[ Review article ]

# Summary 2014 ESC guidelines

Marc J. CLAEYS[1], MD, PhD; Victor LEGRAND [2], MD, PhD; Georges H. MAIRESSE[3], MD; Agnes PASQUET[4], MD, PhD; Michel DE PAUW[5], MD; Guy VAN CAMP[6], MD, PhD

[1]Antwerp University Hospital; [2]CHU du Sart Tilman, Liège; [3]Cliniques du Sud Luxembourg, Arlon; [4]Cliniques Universitaires Saint-Luc, Brussels; [5]UZ Gent; [6]OLV Ziekenhuis, Aalst.

**Keywords** *ESC – guidelines.*

## INTRODUCTION

During the ESC congress in September 2014 in Barcelona, the new ESC guidelines were presented and are now available on the ESC website ( http://www.escardio.org/guidelines).

The new guidelines cover management recommendations on the following cardiovascular items: myocardial revascularization, perioperative risk assessment, hypertrophic cardiomyopathy, pulmonary embolus and aorta disease.

The present document gives a summary of these guidelines and highlights the most important recommendations and changes in the management of these diseases.

It will help to increase awareness about the new guidelines and may stimulate to consult the full document for specific items. Ultimately, the authors hope that this document will enhance implementation of the new ESC guidelines in daily clinical practice.

## GUIDELINES ON MYOCARDIAL REVASCULARIZATION

### Summary by V. Legrand, MD, PhD, FESC

Updated guidelines on myocardial revascularization claim for a multidisciplinary approach and for a well-defined decision-making process in the management of patients with suspected or proven CAD.

Patients presenting with an acute coronary syndrome and those with stable CAD and favourable anatomic situations predefined by the Heart Team may be treated by ad hoc PCI if needed. Patients with multivessel stable CAD should be assessed in a medico-surgical conference. In these patients, recommendation for treatment (surgery or PCI or medical) is based on risk models which assess short-term outcomes (STS score for surgery, eventually EuroSCORE II for surgery or PCI) and those that evaluate long-term outcomes (> 1 y) such as SYNTAX or SYNTAX II scores. A detailed description of how to calculate these scores can easily be downloaded from the Internet.

New guidelines also make recommendations for training, proficiency and operator/institutional competence. Notably, PCI for ACS should be performed by trained operators with an annual volume of at least 75 procedures at institutions performing at least 400 PCIs per year with an established 24-hour/7 day service.

### Stable coronary artery disease

Revascularization for stable CAD should be decided according to symptoms, pre-test probability of significant CAD and functional tests results (e.g. stress echo, nuclear imaging) following the 2013 guidelines on stable coronary artery disease.

Recommendations for the type of revascularization (surgery or PCI) is mostly based on SYNTAX score and recent clinical trial results which confirmed the superiority of surgery in patients with three-vessel disease and SYNTAX score > 22 and in patients with left main disease and a SYNTAX score > 32. Surgery is also recommended

**Address for correspondence:**

Prof. dr. M. Claeys, University Hospital Antwerp, Wilrijkstraat 10, 2650 Edegem, Belgium.
E-mail: marc.claeys@uantwerpen.be

Received 2 November 2014; accepted for publication 25 November 2014.

over PCI in diabetic patients with stable multivessel disease CAD. Only in diabetic patients with syntax score < 23, PCI should be considered as an alternative to CABG. Conversely, patients with one- or two-vessel disease without involvement of proximal LAD do better with PCI. All other situations don't favour one technique over the other, and decision is left to the Heart Team appreciation according to local experience and the patient's medical status.

In case of PCI of SVGs, use of distal protection devices and of DES is recommended.

Pretreatment with clopidogrel 600 mg, at least 2 h before PCI, is recommended on top of aspirin before elective stenting. In "naïve" patients, aspirin, if not given, should be administered i.v. and clopidogrel given immediately post PCI (600 mg loading dose or more, 75 mg daily maintenance). Unfractionated heparin (UFH) is recommended during the procedure. Bivaluridin is indicated in case of heparin-induced thrombocytopenia (HIT) and may be considered in patients at high bleeding risk. After stenting, DAPT is indicated for 1 month after BMS and 6 months after DES. Lifelong ASA is recommended (clopidogrel in case of ASA intolerance).

In order to reduce the risk of contrast-induced nephropathy, guidelines recommend hydration with isotonic saline and use of low/iso-osmolar contrast media with a total contrast volume used < 4 ml/kg. Furosemide with match hydration may be considered in patients with high risk in case where prophylactic hydration cannot be accomplished. Also short-term high-dose statin therapy should be considered. N-acetylcysteine administration or infusion of sodium bicarbonate is NOT indicated.

## Non-ST-segment elevation acute coronary syndromes

Urgent coronary angiography (< 2 h) is recommended in patients at very high risk (cardiogenic shock, life-threatening arrhythmias, etc.) and early invasive strategy (> 24 h) in patients with high risk criterion (GRACE score > 140, dynamic ST-T changes, relevant rise or fall in troponin). A delayed invasive strategy (< 72 h) is recommended in patients with at least one high-risk criterion or with recurrent symptoms. The choice of the revascularization technique is based upon the clinical status of the patient, distribution and severity of angiographic lesions. When PCI is performed, new-generation DES are now recommended.

A P2Y12 inhibitor is recommended on top of ASA and maintained for 12 months unless excessive bleeding risk is present. New guidelines allow choosing among one of the following options according to the clinical/anatomic situation: prasugrel (60 mg loading dose, 10 mg daily dose) in patients in whom coronary anatomy is known. Ticagrelor (180 mg loading dose, 90 mg twice daily) for patients at moderate to high risk of ischaemic events, including those pretreated with clopidogrel. Clopidogrel (600 mg loading dose, 75 mg daily dose) when prasugrel or ticagrelor are not available or contraindicated.

Anticoagulation is selected according to both ischaemic and bleeding risks. Either UFH or bivalirudin are recommended. In patients on fondaparinux, a single bolus of UFH is indicated during PCI, and enoxaparin should be considered as an anticoagulant in patients pretreated with subcutaneous heparin (crossover of UFH and LMWH is not recommended).

## STEMI

Early urgent revascularization by PCI is recommended providing it can be done within 120 min following the first medical contact. When the anticipated delay is above 120 min (including door entrance to balloon), immediate fibrinolysis is recommended with delayed angiography/PCI either as emergency rescue procedure or within 3-12 h. Primary PCI should be limited to the culprit lesion, but immediate revascularization of significant non-culprit lesions may be considered in the same time in selected patients or in case of cardiogenic shock. The intra-aortic balloon pump should be deserved in patients with mechanical complications and may be considered as short-term medical support in ACS patients with cardiogenic shock. New-generation DES are now recommended over balloon and DES, and radial access should be preferred if performed by an experienced radial operator. Thrombus aspiration may be considered in selected patients.

Antiplatelet treatment options for STEMI patients combines aspirin plus prasugrel or ticagrelor given at first medical contact (clopidogrel is recommended when these drugs are not available or contraindicated). New guidelines recommend UFH as first-line anticoagulant with or without i.v. GP IIb/IIIa inhibitor. Bivalirudin or enoxaparin should be considered as a second option.

The document describes also the management of some specific diseases such as chronic kidney disease, associated valvular heart disease, associated carotid disease, arrhythmias and describes procedural aspects of CABG and PCI and recommendations for patients requiring oral anticoagulation.

## REFERENCE

1. Windecker S, Kolh P, Alfonso F, Collet JP, Cremer J, Falk V, Filippatos G, Hamm C, Head SJ, Jüni P, Kappetein AP, Kastrati A, Knuuti J, Landmesser U, Laufer G, Neumann FJ, Richter DJ, Schauerte P, Sousa Uva M, Stefanini GG, Taggart DP, Torracca L, Valgimigli M, Wijns W, Witkowski A; Authors/Task

Force members. 2014 ESC guidelines on myocardial revascularisation. 2014 ESC/EACTS Guidelines on myocardial revascularization: The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)Developed with the special contribution of the European Association of Percutaneous Cardiovascular Interventions (EAPCI). *Eur Heart J* 2014; **35**: 2541-619.

## GUIDELINES ON NON-CARDIAC SURGERY: CARDIOVASCULAR ASSESSMENT AND MANAGEMENT

### Summary by M. Claeys, MD, PhD

This new document, which replaces the 2007 guidelines, recommends a practical evaluation integrating clinical risk factors and test results with the estimated stress of the planned surgical procedure and provides new information on the use of risk reduction strategies.

### Surgical risk estimate

The risk estimate for 30-day risk of cardiovascular death and myocardial infarction is subdivided into low (< 1%), intermediate (1-5%) and high (> 5%)risk. Low-risk surgery includes superficial, breast, eye, reconstructive, asymptomatic carotis, minor orthropedic/gynaeco/urologic surgery. Intermediate risk refers to non-major abdominal/thoracic, symptomatic carotis, peripheral arterial angioplasty, endovascular repair, head and neck, non-minor neurologic/orthopedic/urologic/gynaecologic surgery. High risk includes aorta/major vascular, major abdominal/thoracic surgery and lung-liver transplantation.

### Preoperative cardiac risk assessment

Although the majority of the patients with stable cardiac disease can undergo low and intermediate risk surgery without additional evaluation, selected patients require evaluation by a team of integrated multidisciplinary specialists including cardiologists, naesthesiologists and surgeons:

a) Patients with unstable or severe cardiac disease (e.g. recent myocardial infarction, symptomatic valvular heart disaese, severe arrhythmias) in whom the surgical procedure mostly needs to be postponed until the cardiac problem has been solved.
b) Patient with poor functional capacity (< 4 Mets) and intermediate/high surgical risk
In those patients additional non-invasive testing (stress imaging, echocardiography) is recommended particularly if patients had increased cardiac risk based upon the presence of more than two clinical risk factors (ischaemic heart disaese, heart failure, cerebrovascular disease, renal dysfunction, diabetes mellitus requiring insuline therapy). In case of extensive stress-induced ischaemia more invasive evaluation is advised.

### Risk reduction strategies

a) The role of beta-blocking agents has been downgraded as compared to previous guidelines and initiation of beta-blocking agents (preferentially atenolol or bisoprolol) may be considered only in patients with known ischaemic heart disease or in patients with increased cardiac risk scheduled for high-risk surgery. In order to avoid bradycardia and hypotension, it is recommended to titrate the doses. For patients already under treatment with beta-blocking agents, continuation of these drugs remains recommended.
b) Patients with clinical evidence of atherosclerosis should receive statin therapy for secondary prevention. Perioperative continuation of statins is recommended, favouring statins with a long half-life or extended-release formulation. Preoperative initiation of statin therapy should only be considered in patients undergoing vascular surgery, ideally at least 2 weeks before surgery.
c) Continuation of ACEIs or ARBs, under close monitoring, should be considered in stable patients with heart failure and left ventricular dysfunction. Initiation in untreated patients should be at least one week before surgery.
d) Prophylactic myocardial revascularization before high-risk surgery may be considered in patients with extensive stress-induced ischaemia. In that case the use of new-generation DES, BMS or even balloon angioplasty is recommended.
e) Management of antithrombotic agents:
It is recommended that aspirin and preferentially also P2Y12 inhibitors should be continued for 4 weeks after BMS and for 3-12 months after DES stent, unless the risk of life-threatening surgical bleeding is unacceptably high. In case of discontinuation of P2Y12 the recommended time window between drug cessation and surgery is at least 5 days for clopidogrel and ticagrelor and at least 7 days for prasugrel. For anticoagulation with vitamin K antagonists, bridging therapeutic doses of LMWH twice daily are recommended in patients with a high thrombo-embolic risk, and once-daily doses in low-risk patients. For anticoagulation with non-VKA direct oral anticoagulants (NOACs) "bridging" with LMWH is unnecessary. The overall recommendation is to stop NOACs

for 2-3 times their biological half-lives prior to surgery in surgical interventions with 'normal' bleeding risk, and 4-5 times the biological half-lives before surgery in surgical interventions with high bleeding risk.

The document describes also the management for some specific diseases such as chronic heart failure, valvular heart disease, arrhythmias, pacemaker/ICD, etc.

## REFERENCE

1. Kristensen SD, Knuuti J, Saraste A, Anker S, Bøtker HE, Hert SD, Ford I, Gonzalez-Juanatey JR, Gorenek B, Heyndrickx GR, Hoeft A, Huber K, Iung B, Kjeldsen KP, Longrois D, Lüscher TF, Pierard L, Pocock S, Price S, Roffi M, Sirnes PA, Sousa-Uva M, Voudris V, Funck-Brentano C; Authors/Task Force Members. 2014 ESC/ESA guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur Heart J* 2014; **35**: 2383-431.

# GUIDELINES ON DIAGNOSIS AND MANAGEMENT OF HYPERTROPHIC CARDIOMYOPATHY (HCM)

### Summary by G.H. Mairesse, MD, FESC, FHRS M

These new ESC guidelines are aimed to be practical, innovative and evidence based. They are a comprehensive summary to help physicians for decision-making in daily practice.

The definition of HCM is represented by increased left ventricular wall thickness not solely explained by abnormal loading conditions. In adults, this means a wall thickness > 15 mm in one or more LV myocardial segments measured by any imaging technique. In children, the LV wall thickness has to be more than 2 standard deviations above the predicted mean. The prevalence of HCM is estimated to vary between 0.02 and 0.23%. Sarcomeric protein gene mutations with autosomal dominant transmission are present in 40-60%, other genetic or non-genetic causes can be found in 5-10%, while aetiology remains unknown in 25-30%.

## Diagnosis

The general approach to the diagnosis of HCM always starts with the clinical evaluation with special focus on the family history and the search for "red flags", including non-cardiac symptoms and signs suggesting a specific disease. ECG is a sensitive although non-specific early marker of the disease. At echocardiography, all segments from base to apex should be examined. LV outflow tract (LVOT) obstruction is defined by a peak gradient of > 30 mmHg at rest or > 50 mmHg during physiological provocation. Evaluation of the diastolic LV function is also recommended. MRI should also be considered in patients with HCM at their baseline assessment. Bone scintigraphy with 99mTC-DPD should be considered in patients in whom amyloidosis is suspected.

Genetic testing and counselling is recommended in all patients with HCM, to enable cascade genetic screening of relatives where possible. When the same definite cause of disease is found in first-degree relatives, clinical evaluation including ECG and echocardiography is recommended with long-term follow-up. Prepregnancy risk assessment and counselling is indicated in all women.

Invasive coronary angiography is recommended in adult survivors of sudden cardiac death (SCD), in patients with sustained ventricular tachyarrhythmia and in patients with severe angina. In patients with syncope or frequent or sustained palpitations, 48-h ambulatory ECG monitoring is recommended. Invasive electrophysiological study is recommended in patients with documented recurrent supraventricular tachycardia and in patients with pre-excitation, in order to identify and treat an ablatable substrate, but is not recommended when using programmed ventricular stimulation for SCD risk stratification.

## Management of LVOT obstruction

Patients with maximum resting or provoked LVOT gradient < 50 mmHg should be treated non-invasively. They should avoid dehydration and excess alcohol consumption, avoid arterial and venous dilators, avoid digoxin, and should be maintained in sinus rhythm whenever possible or with appropriate rate control when atrial fibrillation is inevitable.

Non-vasodilating beta blockers uptitrated to the maximum tolerated dose are recommended as first-line therapy to improve symptoms. Verapamil can be an alternative in patients intolerant or contra-indicated to beta blockers. Disopyramide can be added to the beta blocker with ECG monitoring of the QTc interval < 480 msec.

Invasive treatment should be considered only in patients with > 50 mmHg gradient, and moderate to severe symptoms or exertional syncope despite maximum tolerated drug therapy. Surgical septal reduction has similar outcomes compared with septal alcohol ablation, but is preferred when other lesions require surgical intervention. Mitral valve repair or replacement should be considered when mitral regurgitation is not due to the systolic anterior motion of the mitral valve leaflet (SAM) alone. Permanent AV sequential pacing with

short AV interval (100 ± 30 msec) may be considered as an alternative in some patients for other invasive septal reductions in selected patients.

### Arrhythmias

Patients with LA diameter > 45 mm should be closely followed with ambulatory ECG monitoring to detect AF. When AF is detected, lifelong oral anticoagulation is recommended, favouring vitamin K antagonists over NOACs, irrespective of the $CHA_2DS_2$-VASc score. Beta blockers, verapamil and diltiazem are recommended for rate control. Only amiodarone is recommended for rhythm control.

Cardiovascular mortality in adults with HCM is 1-2%/year, with SCD, heart failure and thromboembolism as main causes of death. Patients with HCM should be advised not to participate in competitive sports and discouraged from intense physical activities especially when having risk factors for LVOT obstruction or SCD.

The most important risk factors for SCD are family history, occurrence of syncope, abnormal blood pressure response during exercise, finding of non-sustained ventricular tachycardia and the extent of LV hypertrophy. The probability score for SCD at 5 years should be calculated every 1-2 years in most patients above 16 years old, using the model developed by O'Mahony et al. and available online from the ESC website[2]. This model considers risk factors as age, maximum LV thickness, LA size and maximum LVOT gradient as continuous variables, allowing a more precise individual risk calculation.

ICD implantation should be considered in patients who have survived a cardiac arrest due to ventricular fibrillation or experienced spontaneous sustained ventricular tachycardia causing hemodynamic compromise, and also in patients with an estimated 5 years risk of SCD of > 6. It may also be considered when the 5 years risk of SCD is < 6% and > 4% and in some individual patients when the risk is < 4% only when they have clinical features that are of proven prognostic importance, and when an assessment of the lifelong risk of complications and the impact of an ICD on lifestyle, socio-economic status and psychological health suggests a net benefit from ICD therapy.

### REFERENCES

1. Elliott PM, Anastasakis A, Borger MA, Borggrefe M, Cecchi F, Charron P, Hagege AA, Lafont A, Limongelli G, Mahrholdt H, McKenna WJ, Mogensen J, Nihoyannopoulos P, Nistri S, Pieper PG, Pieske B, Rapezzi C, Rutten FH, Tillmanns C, Watkins H; Authors/Task Force members. 2014 ESC Guidelines on diagnosis and management of hypertrophic cardiomyopathy. *Eur Heart J* 2014; **35**: 2733-79.

2. HCM Risk-SCD calculator. Available at http://doc2do.com/hcm/webHCM.html
O'Mahony C, Jichi F, Pavlou M, Monserrat L, Anastasakis A, Rapezzi C, Biagini E, Gimeno JR, Limongelli G, McKenna WJ, Omar RZ, Elliott PM; Hypertrophic Cardiomyopathy Outcomes Investigators. A novel clinical risk prediction model for sudden cardiac death in hypertrophic cardiomyopathy (HCM risk-SCD). *Eur Heart J* 2014; **35**: 2010-20.

## GUIDELINES ON THE DIAGNOSIS AND MANAGEMENT OF ACUTE PULMONARY EMBOLISM

### Summary by M. De Pauw, MD, FESC

The 2014 ESC guidelines replace the old 2008 version and importantly are also endorsed by the European Respiratory Society (ERS). In 2014 both cardiologists and pulmonologists in Europe speak the same language.

The new version of the guidelines shows essentially three changes:

- A fine-tuning of the risk stratification in order to strengthen a patient-centred treatment
- New recommendations concerning the use of thrombolytics based on outcome data from several recent trials
- Adapted use of oral anticoagulants (including NOACS) in the acute and long-term setting.

### Risk stratification

The diagnostic approach underwent no changes, starting from a basic split between patients presenting with shock or hypotension and those without. The assessment of clinical probability still utilizes the Wells rule and Geneva Scoring. However, both in their simplified version, making it more ready-to-use tools in daily practice, in addition to the diagnostic strategy at presentation, remained unchanged. The major adaptation of the new guidelines is the introduction of a more elaborate prognostic assessment, with direct effect on the therapeutic approach in intermediate risk patients. The risk assessment is founded on 4 items: the initial presentation (with/without shock or hypotension), the newly introduced pulmonary embolism severity index (PESI) whether in its original or simplified version, imaging of the right ventricle and biomarkers. The PESI score consists of 11 clinical parameters (age, sex, cancer, chronic heart failure, chronic pulmonary disease, pulse rate > 110 bpm, systolic blood pressure < 100 mmHg, respiratory rate > 30 breaths/min, temperature < 36°C, altered mental status and oxyhaemoglobin saturation < 90%) with direct impact on the clinical risk profile. A PESI score class 3 or higher or > 1 point in the simplified version increases the 30-day mortality by approximately 10%. Use of these combined risk parameters

identifies an intermediate high risk group, characterized by a higher PESI score, signs of RV dysfunction and positive biomarkers, compared to an intermediate low risk group.

### Acute phase treatment in PE with shock or hypotension

In patients with shock of hypotension the use of thrombolytics (streptokinase, urokinase or rtPA) is recommended following the administration of intravenous anticoagulation with unfractionated heparin. Surgical pulmonary embolectomy or percutaneous catheter-directed treatment may be considered as alternative options, particularly if the bleeding risk is high. Routine use of thrombolytics is not recommended in patients without shock or hypotension. However, close monitoring is recommended in intermediate high risk PE to permit early detection of haemodynamic decompensation and timely administration of rescue reperfusion therapy,. This change illustrates the direct impact of an elaborate prognostic risk stratification on the therapeutic strategy.

### Acute phase treatment in PE without shock or hypotension

In patients with acute PE, anticoagulation is recommended with the objective to prevent both early death and recurrent symptomatic or fatal venous thromboembolism (VTE). The standard duration of treatment should at least cover 3 months. The acute phase treatment consists of parenteral anticoagulation with unfractionated heparin, LMWH or fondaparinux for the first 5-10 days, and should overlap with the initiation of vitamin K antagonists (VKA).

Alternatively and new in the guidelines the initial parenteral anticoagulation can be followed by the administration of one of the new oral anticoagulants dabigatran of edoxaban. If rivaroxaban or apixaban is used oral treatment with one of these drugs should be started directly or after 1-2 day administration of unfractionated heparin, LMWH or fondaparinux, but in the acute phase an increased dose of either rivaroxaban (for 3 weeks) or apixaban (7 days) is used, according to the randomized trials. The results of the trials using NOACs in the treatment of VTE indicate that these agents are non-inferior and possibly safer, in comparison with the classic standard treatment with heparin/VKA.

### Duration of treatment with anticoagulants

In general, PE patients require a three-month treatment with oral anticoagulants, whether related to a transient risk factor or an unprovoked PE. In cancer patients the use of LMWH is preferred. Decisions for further treatment are based on balancing the risk of recurrence (transient risk factors, unprovoked PE, cancer associated), against the risk of major haemorrhage. Especially in patients with a second episode of an unprovoked PE an indefinite therapy should be considered, as well as a prolonged treatment in cancer patients until the cancer is cured. Finally up to now the experience with the new oral anticoagulants as acute, long-term or extended therapeutic options is still limited.

The 2014 PE guidelines introduce a new chapter to elicit the awareness for chronic thromboembolic pulmonary hypertension (CTPH), caused by an incomplete resolution of PE.

### REFERENCE

1. Konstantinides SV, Torbicki A, Agnelli G, Danchin N, Fitzmaurice D, Galiè N, Gibbs JS, Huisman MV, Humbert M, Kucher N, Lang I, Lankeit M, Lekakis J, Maack C, Mayer E, Meneveau N, Perrier A, Pruszczyk P, Rasmussen LH, Schindler TH, Svitil P, Vonk Noordegraaf A, Zamorano JL, Zompatori M; Authors/Task Force Members. 2014 ESC Guidelines on diagnosis and management of acute pulmonary embolism: The Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC)Endorsed by the European Respiratory Society (ERS). *Eur Heart J* 2014; **35**:3033-73.

## GUIDELINES ON THE DIAGNOSIS AND MANAGEMENT OF AORTIC DISEASE

### Summary by Agnes Pasquet, MD, PhD, FESC

The guidelines present the aorta as a "whole organ". The previous guidelines were published in 2001 and cover only the topics of aortic dissection. Meanwhile computed tomography (CT) and magnetic resonance imaging (MRI) have been developed and play an important role in the treatment of aortic disease and endovascular therapy.

The guidelines review the different imaging modalities, their indication, advantage and limitation and the different therapeutic options.

Acute aortic dissection (AAD) is extensively discussed. First, the classification of AAD is presented. After the description of the main clinical presentation and complication of AAD, the guidelines give recommendations for the diagnostic workup for AAD including imaging modalities and underline the role of the "a priori risk" for the disease. A flowchart for decision making in patients with acute chest pain is proposed. First an acute coronary syndrome must be ruled out. Patients are divided into haemodynamically stable or unstable patients. In unstable patients, echocardiography or CT have to exclude the presence of an AAS. In stable patient the diagnosis workup will be

different from that in patients with low or high probability of AAS.

Of course, emergency surgery is recommend for type A aortic dissection (class I, B) but a hybrid procedure (replacement of the ascending aorta/arch, plus percutaneous aortic of branch procedure) could be considered if organ malperfusion is associated ( class IIa, B). In uncomplicated type B aortic dissection, TEVAR should be considered (class IIa, B) but will be preferred over surgery in complicated type B aortic dissection (class I, C).

When an aortic aneurysm is identified, the entire aorta and the aortic valve must be assessed (class I, C). Patients with aortic aneurysms have a higher risk for peripheral artery disease and have also an increased risk of cardiovascular disease. Hence, general principles of prevention of cardiovascular disease must be considered (class IIa, C).

The guidelines review the threshold for intervention in the ascending, aortic arch and the descending aortic aneurysm. Surgery is indicated if the aneurysm is ≥ 55 mm. Lower thresholds should be considered for patients with elastopathy (e.g. Marfan), with bicuspid valve or in case of rapid progression. For descending aortic aneurysm TEVAR should be considered rather than surgery when anatomy is suitable.

Screening of abdominal aortic aneurysm (AAA) is recommended in all men > 65 years and could be considered in women > 65 years with a history of smoking of in a first-degree relative of the patient with AAA. Recommendations for follow-up and treatment of asymptomatic patients are provided. In asymptomatic patients with acceptable surgical risk, either endovascular (EVAR) or open surgery should be proposed (class I, A). In symptomatic patients, immediate ultrasound or CT is recommended (class I, C). Emergency repair should be performed in case of ruptured AAA. In symptomatic non-ruptured AAA either endovascular repair (EVAR) or open surgery could be performed (class I, A).

The guidelines also discuss genetic diseases affecting the aorta, such as Turner, Marfan, Loeys Dietz, etc. Finally, a chapter is devoted to the long-term follow up of chronic aortic disease and discusses the chronic aortic dissection and the follow-up after thoracic of abdominal aortic intervention.

## REFERENCE

1. Erbel R, Aboyans V, Boileau C, Bossone E, Bartolomeo RD, Eggebrecht H, Evangelista A, Falk V, Frank H, Gaemperli O, Grabenwöger M, Haverich A, Iung B, Manolis AJ, Meijboom F, Nienaber CA, Roffi M, Rousseau H, Sechtem U, Sirnes PA, Allmen RS, Vrints CJ; ESC Committee for Practice Guidelines (CPG); Document reviewers; Authors/Task Force members. 2014 ESC Guidelines on the diagnosis and management of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J* 2014; **35**: 2873-926.