



**ACVC**

Association for  
Acute CardioVascular Care

Edition 2025

# CLINICAL DECISION MAKING TOOLKIT

Instant guidance for diagnosis, risk stratification and management



**ESC**

European Society  
of Cardiology



**ACVC**

Association for  
Acute CardioVascular Care

# The Clinical Decision Making Toolkit

is produced by the **Association for Acute CardioVascular Care (ACVC)**  
of the **European Society of Cardiology (ESC)**.

This toolkit is supported by Boston Scientific and Inari Medical in the form of an unrestricted financial support. The scientific programme has not been influenced in any way by its sponsor.



**ESC**

European Society  
of Cardiology



**ACVC**

Association for  
Acute CardioVascular Care

# **The Association for Acute CardioVascular Care Clinical Decision-Making TOOLKIT**

**Héctor Bueno, M.D., PhD., FESC**  
Editor in Chief

**Jorge Nuche, M.D., PhD.**  
Associate Editor

ISBN: 978-2-9537898-7-4



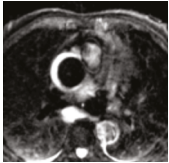
**ESC**  
European Society  
of Cardiology

# ACUTE AORTIC SYNDROMES

A. Evangelista & H. Schaubroeck

# ACUTE AORTIC SYNDROMES: Concept and classification (1)

## Types of presentation



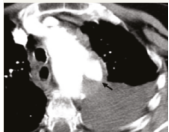
### Intramural hematoma (IMH)

Aortic wall hematoma with no entry tear and no two-lumen flow

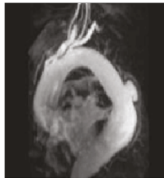


### Classic aortic dissection

Separation of the aorta media with presence of extraluminal blood within the layers of the aortic wall. The intimal flap divides the aorta into two lumina, the true and the false



### Aortic aneurysm rupture (contained or not contained)



### Penetrating aortic ulcer (PAU)

Atherosclerotic lesion penetrates the internal elastic lamina of the aorta wall

**a** Regular aorta



**b** Aortic dissection



**c** Intramural haematoma



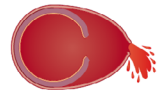
**d** Penetrating aortic ulcer



**e** Aortic pseudoaneurysm



**f** Traumatic aortic injury

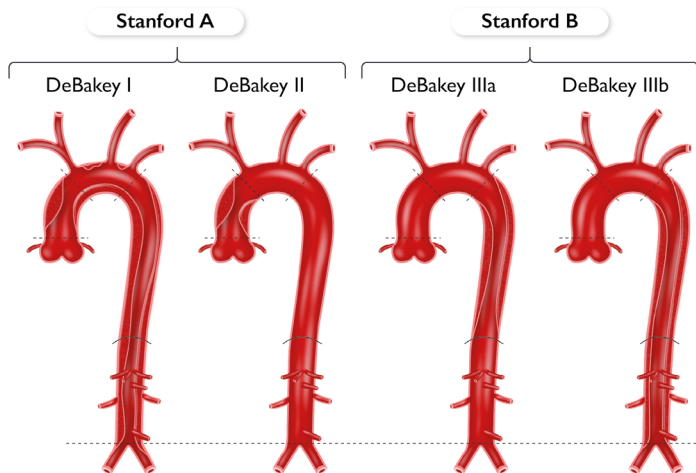


## ACUTE AORTIC SYNDROMES: Concept and classification (2)

### Anatomic classification and time course

#### Stanford Classification

- Type A. Includes all dissections involving the ascending aorta regardless of entry site location



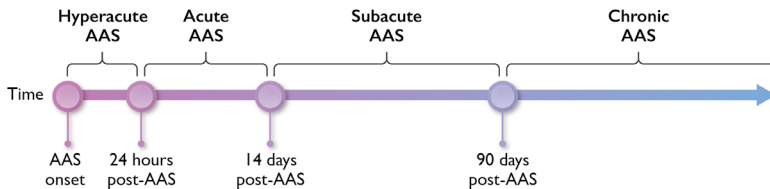
### Frequency of acute aortic syndrome

60%

10–15%

25–30%

### Classification of timing

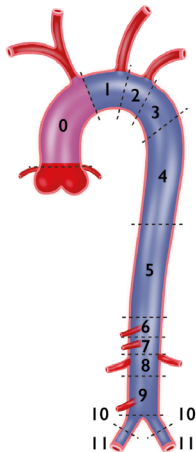


## ACUTE AORTIC SYNDROMES: Concept and classification (2)

### Anatomic classification and time course

#### Stanford Classification

- **Type B.** Dissections include all those distal to the brachiocephalic trunk, sparing the ascending aorta



Type	Proximal extent	Distal extent
<b>A<sub>D</sub></b>	0	0
Entry tear:	1	1
<b>Zone 0</b>	2	2
	3	3
	4	4
<b>B<sub>PD</sub></b>	5	5
Entry tear:	6	6
<b>≥Zone 1</b>	7	7
	8	8
<b>I<sub>D</sub></b>	9	9
Unidentified entry tear involving	10	10
<b>Zone 0</b>	11	11
	12	12



## TEM aortic dissection classification



Type



A



B



Non-A non-B



Entry



E0



E1



E2



E3



E0



E3



E0



E2



E3



Malperfusion

M0 - no malperfusion

M1 - coronary

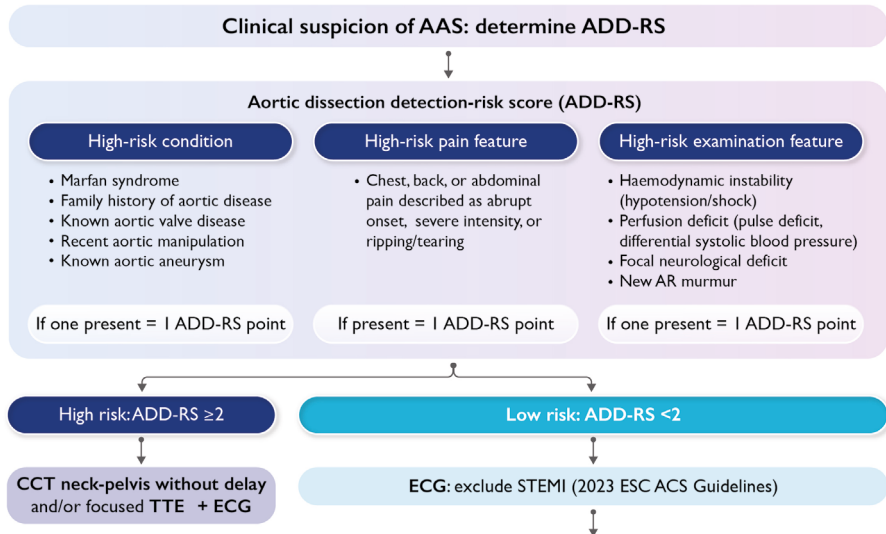
M2 - supra-aortic

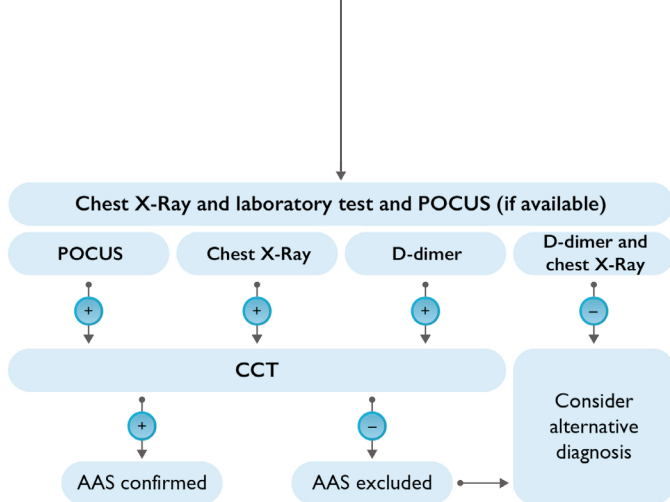
M3 - spinal, visceral, iliac

(-) no clinical symptoms

(+) clinical symptoms

## ACUTE AORTIC SYNDROMES: Diagnostic multiparametric work-up





## Laboratory tests required for patients with ACUTE AORTIC dissection

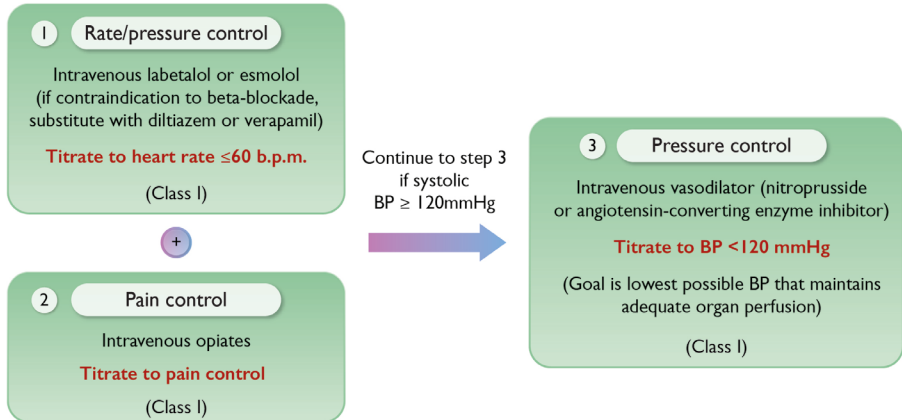
Laboratory tests	To detect signs of:
Red blood cell count	Blood loss, bleeding, anaemia
White blood cell count	Infection, inflammation (SIRS)
C-reactive protein	Inflammatory response
ProCalcitonin	Differential diagnosis between SIRS and sepsis
Creatine kinase	Reperfusion injury, rhabdomyolysis
TroponinIorT	Myocardial ischaemia, myocardial infarction
D-dimer	Aortic dissection, pulmonary embolism, thrombosis
Creatinine	Renal failure (existing or developing)
Aspartate transaminase / alanine aminotransferase	Liver ischaemia, liver disease
Lactate	Bowel ischaemia, metabolic disorder
Glucose	Diabetes mellitus
Blood gases	Metabolic disorder, oxygenation

## Details required from imaging in ACUTE AORTIC dissection

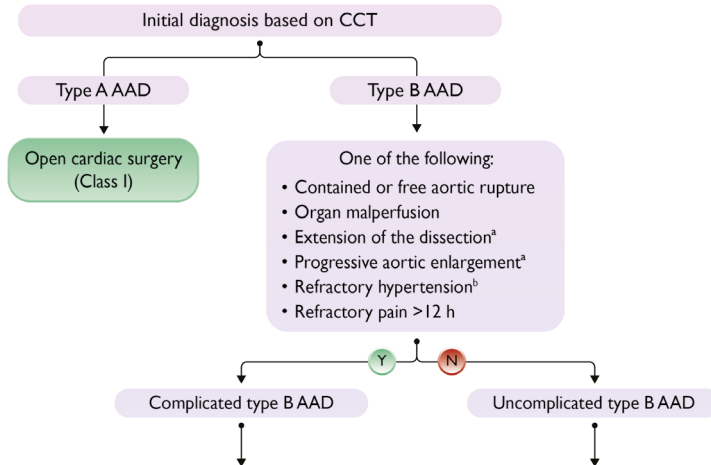
<b>Aortic dissection</b>	<ul style="list-style-type: none"><li>• Visualisation of intimal flap</li><li>• Extent of the disease according to the aortic anatomic segmentation</li><li>• Identification of the false and true lumens (if present)</li><li>• Localisation of entry and re-entry tears (if present)</li><li>• Identification of antegrade and/or retrograde aortic dissection</li><li>• Identification grading, and mechanism of aortic valve regurgitation</li><li>• Involvement of side branches</li><li>• Detection of malperfusion (low flow or no flow)</li><li>• Detection of organ ischaemia (brain, myocardium, bowels, kidneys, etc.)</li><li>• Detection of pericardial effusion and its severity</li><li>• Detection and extent of pleural effusion</li><li>• Detection of peri-aortic bleeding</li><li>• Signs of mediastinal bleeding</li></ul>
<b>Intramural haematoma</b>	<ul style="list-style-type: none"><li>• Localisation and extent of aortic wall thickening</li><li>• Co-existence of atheromatous disease (calcium shift)</li><li>• Presence of small intimal tears</li></ul>
<b>Penetrating aortic ulcer</b>	<ul style="list-style-type: none"><li>• Localisation of the lesion (length and depth)</li><li>• Co-existence of intramural haematoma</li><li>• Involvement of the peri-aortic tissue and bleeding</li><li>• Thickness of the residual wall</li></ul>
<b>In all cases</b>	<ul style="list-style-type: none"><li>• Co-existence of other aortic lesions: aneurysms, plaques, signs of inflammatory disease, etc.</li></ul>

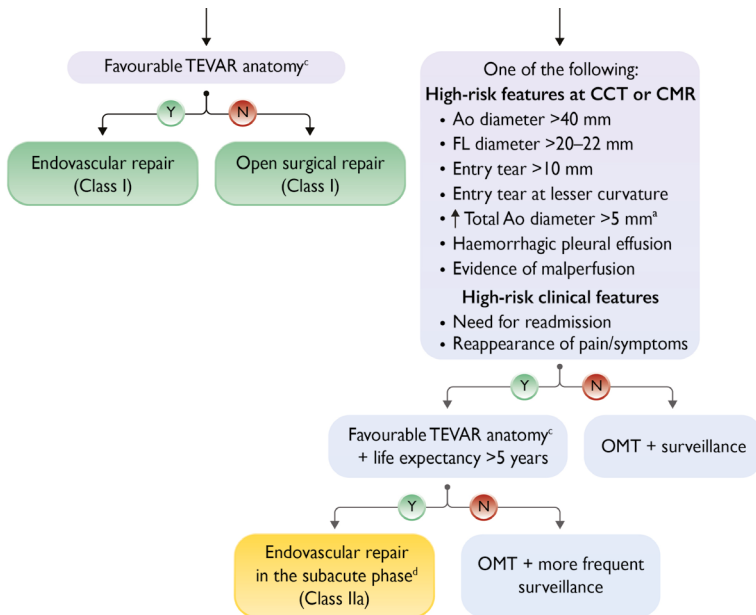
## ACUTE AORTIC SYNDROMES: Initial management

Transfer to high-volume aortic centre is advisable with a multidisciplinary aorta team as well as admission to an intensive care unit for invasive bloodpressure and 3-lead ECG monitoring. Initial management consists of medical stabilization in all types of acute aortic syndromes.



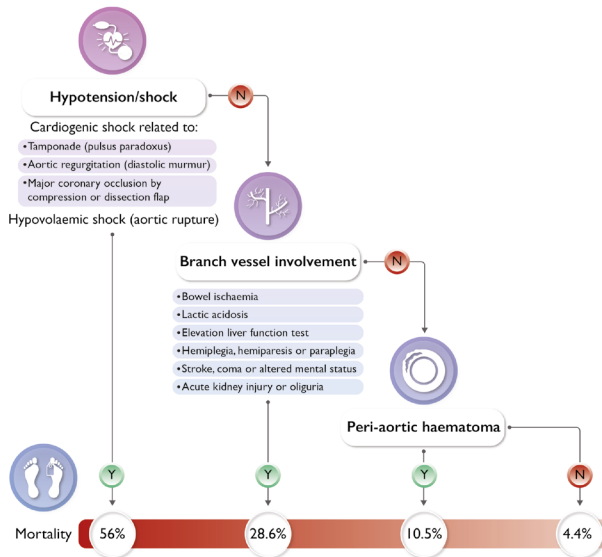
## ACUTE AORTIC SYNDROMES: Interventional management



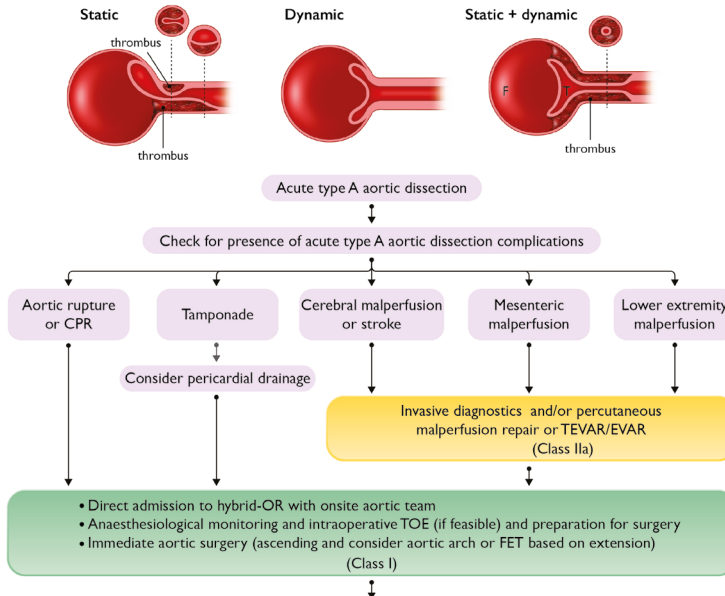


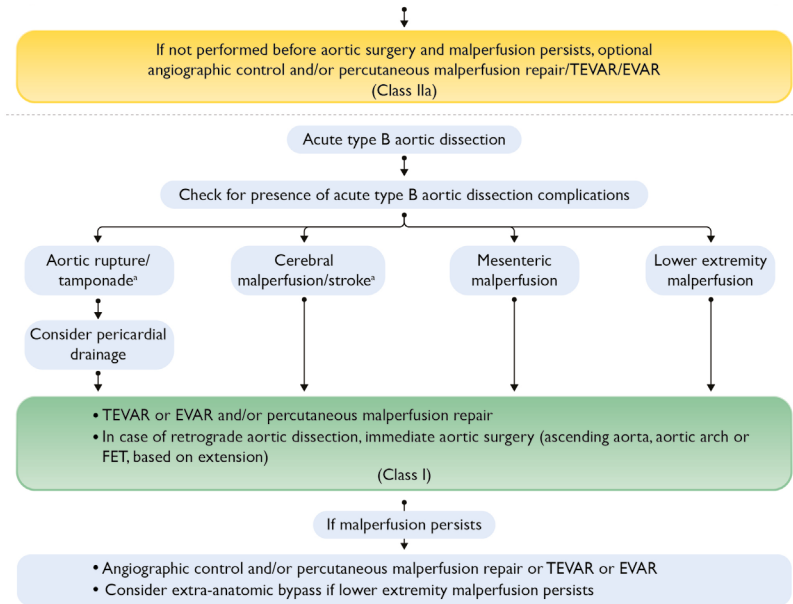


## ACUTE AORTIC SYNDROMES: Complications (1)



## ACUTE AORTIC SYNDROMES: Complications (2)





## ACUTE AORTIC SYNDROMES: Surgical management

### TYPE A ACUTE AORTIC DISSECTION

#### URGENT SURGERY (<24h)

Graft replacement of ascending aorta +/- arch with/without aortic valve or aortic root replacement/repair (depending on aortic regurgitation and aortic root involvement)

#### Emergency Surgery

- Haemodynamic instability (hypotension/shock)
- Tamponade
- Severe acute aortic regurgitation
- Impending rupture
- Flap in aortic root
- Malperfusion syndrome

#### Elective/individualised Surgery

- Non-complicated intramural hematoma
- Comorbidities
- Age >80 years

### TYPE B ACUTE AORTIC DISSECTION

Definitive diagnosis by clinical presentation and imaging

Yes

No

#### COMPLICATED defined as:

- Impending rupture
- Malperfusion
- Refractory HTN
- SBP (<90 mmHg)
- Shock

MEDICAL MANAGEMENT and TEVAR

MEDICAL MANAGEMENT and OPEN SURGERY REPAIR if TEVAR contraindicated

UNCOMPLICATED defined as:  
No features of complicated dissection

MEDICAL MANAGEMENT and imaging surveillance protocol

- On admission
- At 7 days
- At discharge
- Every 6 months thereafter

## Abbreviations

**APTT** = Activated partial thromboplastin time  
**AB** = Airway and breathing  
**ABG** = Arterial blood gas  
**AADs** = Antiarrhythmic drugs  
**AAS** = Acute aortic syndrome  
**ACEI** = Angiotensin converting enzyme inhibitor  
**ACLS** = Advanced cardiovascular life support  
**ACS** = Acute coronary syndrome  
**ACT** = Activated clotting time  
**AD** = Aortic Dissection  
**AED** = Automated external defibrillator  
**AF** = Atrial fibrillation  
**ANA** = Antinuclear antibodies  
**Ao** = Aortic  
**aPTT** = Activated partial thromboplastin time  
**ARB** = Angiotensin receptor blockers  
**AS** = Aortic stenosis  
**AV** = Atrioventricular  
**AVB** = Atrioventricular conduction block  
**AVN** = Atrioventricular node  
**AVNRT** = Atrioventricular nodal re-entrant tachycardia

**AVNT** = Atrioventricular nodal tachycardia  
**BID** = Twice a day  
**BBB** = Bundle branch block  
**BLS** = Basic life support  
**BNP** = Brain natriuretic peptide  
**BP** = Blood pressure  
**CABG** = Coronary artery bypass grafting  
**CAD** = Coronary artery disease  
**Cath Lab** = Catheterisation laboratory  
**CCB** = Calcium channel blockers  
**CCU** = Coronary care unit  
**CHF** = Congestive heart failure  
**CMR** = Cardiovascular magnetic resonance  
**COPD** = Chronic obstructive pulmonary disease  
**CPAP** = Continuous positive airway pressure  
**CPR** = Cardiopulmonary resuscitation  
**Cr** = Creatinine blood level (mg/dL)  
**CrCl** = Creatinine clearance  
**CRP** = C-reactive protein  
**CS** = Cardiogenic shock  
**CSM** = Carotid sinus massage  
**CSNRT** = Corrected sinus node recovery time

## Abbreviations (Cont.)

**CSS** = Carotid sinus syndrome

**CT** = Computed tomography

**CT-angio** = Computed tomography angiography

**cTn** = Cardiac troponin

**CUS** = Compression venous ultrasound

**CV** = Cardiovascular

**CVA** = Cerebrovascular accident

**CXR** = Chest X-ray

**DAPT** = Dual antiplatelet therapy

**DD** = Diastolic dysfunction

**DM** = Diabetes mellitus

**dTT** = Diluted thrombin time

**DVT** = Deep vein thrombosis

**ECG** = Electrocardiogram

**Echo** = Echocardiogram

**ECMO** = Extracorporeal membrane oxygenation

**ECT** = Ecarin clotting time

**ED** = Emergency department

**EF** = Ejection fraction

**EG** = Electrograms

**eGFR** = Estimated glomerular filtration rate  
(ml/min/1.73 m<sup>2</sup>)

**EMB** = Endomyocardial biopsy

**EMS** = Emergency medical services

**EPS** = Electrophysiological study

**ERC** = European Resuscitation Council

**ESR** = Erythrocyte sedimentation rate

**ETT** = Exercise treadmill testing

**FFP** = Fresh frozen plasma

**FMC** = First medical contact

**GER** = Gastroesophageal reflux

**GFR** = Glomerular flow rate

**GI** = Gastrointestinal

**GP** = Glycoprotein

**Hb** = Haemoglobin

**HF** = Heart failure

**HIT** = Heparin-induced thrombocytopenia

**HOCM** = Hypertrophic obstructive cardiomyopathy

**HTN** = Hypertension

**HR** = Heart rate

**hsTn** = High-sensitive troponin

**IABP** = Intra-aortic balloon pump

**ICC** = Intensive cardiac care

**ICCU** = Intensive cardiac care unit

## Abbreviations (Cont.)

**ICD** = Implantable cardioverter defibrillator  
**ICI** = Immune checkpoint inhibitors  
**IHD** = Ischemic heart disease  
**IMH** = Intramural hematoma  
**IRF** = Immediate-release formulation  
**ISFC** = International Society and Federation of Cardiology  
**i.o.** = Intraosseous  
**IV** = Invasive ventilation  
**i.v.** = Intravenous  
**KD** = Kidney disease  
**LBBB** = Left bundle branch block  
**LD** = Loading dose  
**LGE** = Late gadolinium enhancement  
**LMWH** = Low-molecular weight heparin  
**LOC** = Loss of consciousness  
**LV** = Left ventricular  
**LVAD/Bi-AD** = left ventricular, bi-ventricular assist device  
**LVD** = Left ventricular dysfunction  
**LVEF** = Left ventricular ejection fraction  
**LVH** = Left ventricular hypertrophy

**LVSD** = Left ventricular systolic dysfunction  
**MCS** = Mechanical circulatory support  
**MD** = Maintenance dose  
**MDCT** = Computed tomography with >4 elements  
**MI** = Myocardial infarction  
**MRA** = Mineralocorticoid receptor antagonist  
**MRI** = Magnetic resonance imaging  
**Mvo** = Microvascular obstruction  
**NIV** = Non-invasive ventilation  
**NOAC** = New oral anticoagulants  
**NSAID** = Non-steroidal anti-inflammatory drugs  
**NSVT** = Non-sustained ventricular tachycardia or recurrent  
**NSTE-ACS** = Non ST-segment elevation acute coronary syndrome  
**NSTEMI** = Non ST-segment elevation myocardial infarction  
**NTG** = Nitroglycerin  
**NT-proBNP** = N-terminal pro brain natriuretic peptide  
**NVAF** = Non-valvular atrial fibrillation  
**NYHA** = New York Heart Association

**OH** = Orthostatic hypotension  
**PAP** = Pulmonary arterial pressure  
**PAU** = Penetrating aortic ulcer  
**PCI** = Percutaneous coronary intervention  
**PCM** = Physical counter-measures  
**PCP** = Pulmonary capillary pressure  
**PE** = Pulmonary embolism  
**PEA** = Pulmonary endarterectomy  
**PEEP** = Positive end expiratory pressure  
**PPC** = Prothrombin complex concentrate  
**PR** = Pulmonary regurgitation  
**PRECISE-DAPT** = PREdicting bleeding  
Complications In patients undergoing Stent  
implantation and subsequent Dual Anti Platelet  
Therapy  
**PRF** = Prolonged-release formulation  
**ProCT** = Procalcitonin  
**PRN** = Pro re nata  
**PS-PEEP** = Pressure support-positive end-  
expiratory pressure  
**PSVT** = Paroxysmal supraventricular tachycardia  
**QD** = Once a day

**QPM** = Every evening  
**rFVIIa** = Recombinant factor VIIa  
**rtPA** = Recombinant tissue plasminogen activator  
**RV** = Right ventricular  
**RVOT-VT** = Right ventricular outflow tract  
ventricular tachycardia  
**SBP** = Systemic blood pressure  
**s.c** = Subcutaneous  
**SIRS** = Systemic inflammatory response syndrome  
**SLE** = Systemic lupus erythematosus  
**SMU** = Syncope management units  
**STE-ACS** = ST-segment elevation acute  
coronary syndrome  
**STEMI** = ST-segment elevation myocardial infarction  
**SVT** = Supraventricular tachycardia  
**Spo<sub>2</sub>** = Oxygen saturation  
**TEE** = Transesophageal echocardiography  
**TEVAR** = Thoracic endovascular aortic repair  
**TIA** = Transient ischemic attack  
**TID** = Three times a day  
**TLOC** = Transient loss of consciousness  
**TOE** = Transoesophageal echocardiography



## Abbreviations (Cont.)

**TSH** = Thyroid-stimulating hormone  
**TTE** = Transthoracic echocardiography  
**UA** = Unstable angina  
**UFH** = Unfractionated heparin  
**ULN** = Upper limit of normal  
**VBGA** = venous blood gas analysis  
**VF** = Ventricular fibrillation  
**VR** = Vascular resistance  
**VT** = Ventricular tachycardia  
**VTE** = Venous thromboembolism  
**VVS** = Vasovagal syncope  
**WBC** = white blood cell count  
**WHO** = World Health Organization  
**WPW** = Wolff-Parkinson-White

## References and copyright acknowledgments

Reproduced with permission from Europa Group and the European Society of Cardiology (ESC). Source: Stavros V. Konstantinides et al., «Percutaneous Treatment Options for Acute Pulmonary Embolism: A Clinical Consensus Statement by the ESC Working Group on Pulmonary Circulation and Right Ventricular Function and the European Association of Percutaneous Cardiovascular Interventions,» *EuroIntervention* 18, no. 8 (2023): e623-e638, <https://doi.org/10.4244/EIJ-D-22-00246>.

# Be at the heart of your community

Become an ACVC Member

**#BePartOfTheHeart**



**ACVC**  
Association for  
Acute CardioVascular Care  
 European Society of Cardiology

# The ACVC supports you all year long



**Textbook  
& Handbooks**



**ACVC Congress**



**>7,500 members**



**Webinars  
& elearning**



**European  
Heart Journal - Acute  
Cardiovascular Care**



**ACVC Schools**



**Global Network  
of National  
Representatives**



**Certification**



**ACVC**  
Association for  
Acute CardioVascular Care  
♥ European Society of Cardiology

**Together saving lives**

## Disclaimer and Copyrights

This is a publication of the Association for Acute CardioVascular Care (ACVC) of the European Society of Cardiology (ESC). Its content reflects the opinion of the authors based on the evidence available at the time it was written and does not necessarily imply an endorsement by ACVC or the ESC.

The guidance suggested in the Clinical Decision Making Toolkit does not override the individual responsibility of the healthcare professional to make appropriate decisions according to each patient's circumstances and profile, as well as local regulations and licenses.

Some content, illustrations/tables/figures were inspired and/or adapted from ESC Guidelines and other existing sources, with permission granted by the original publishers.

## Acknowledgements

We are indebted to all the authors for their commitment and for the strong effort to synthesise their wide scientific knowledge and clinical experience into simple algorithms and schemes using the aim to help clinicians in everyday clinical practice in the easiest possible manner as the main driver of their work.

The support of this initiative by the Association for Acute CardioVascular Care (ACVC) board members was essential to launch this initiative as was the hard work of the ESC staff to make this project move forward.

March 2025



**ACVC**

Association for  
Acute CardioVascular Care

# Acute Aortic Syndromes



[www.escardio.org](http://www.escardio.org)



**ESC**  
European Society  
of Cardiology