Acute Coronary Syndrome – Part 2

According to 2023 ESC guidelines

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Figure 7

Modes of presentation and pathways to invasive management and myocardial revascularization in patients presenting with STEMI

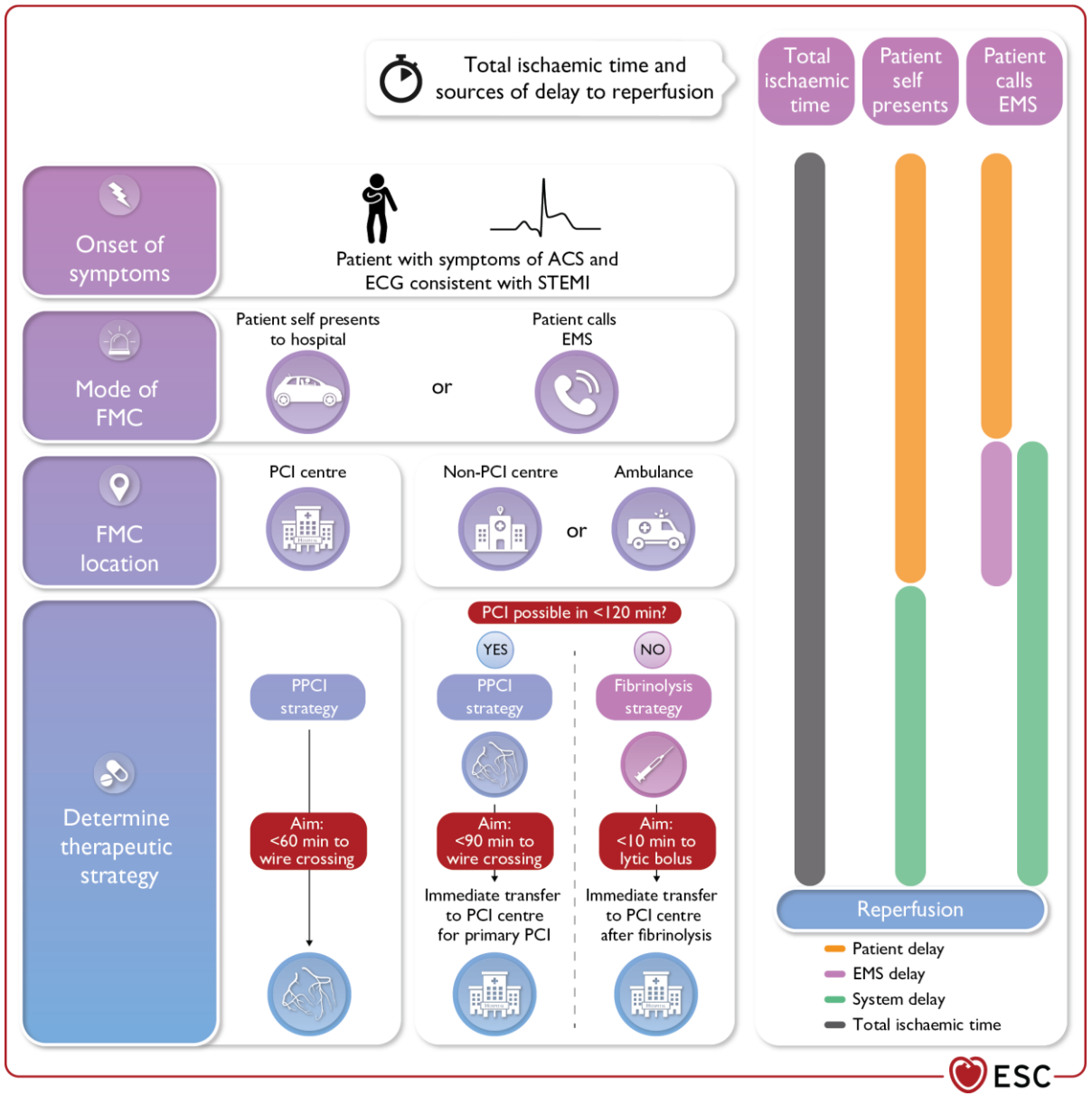

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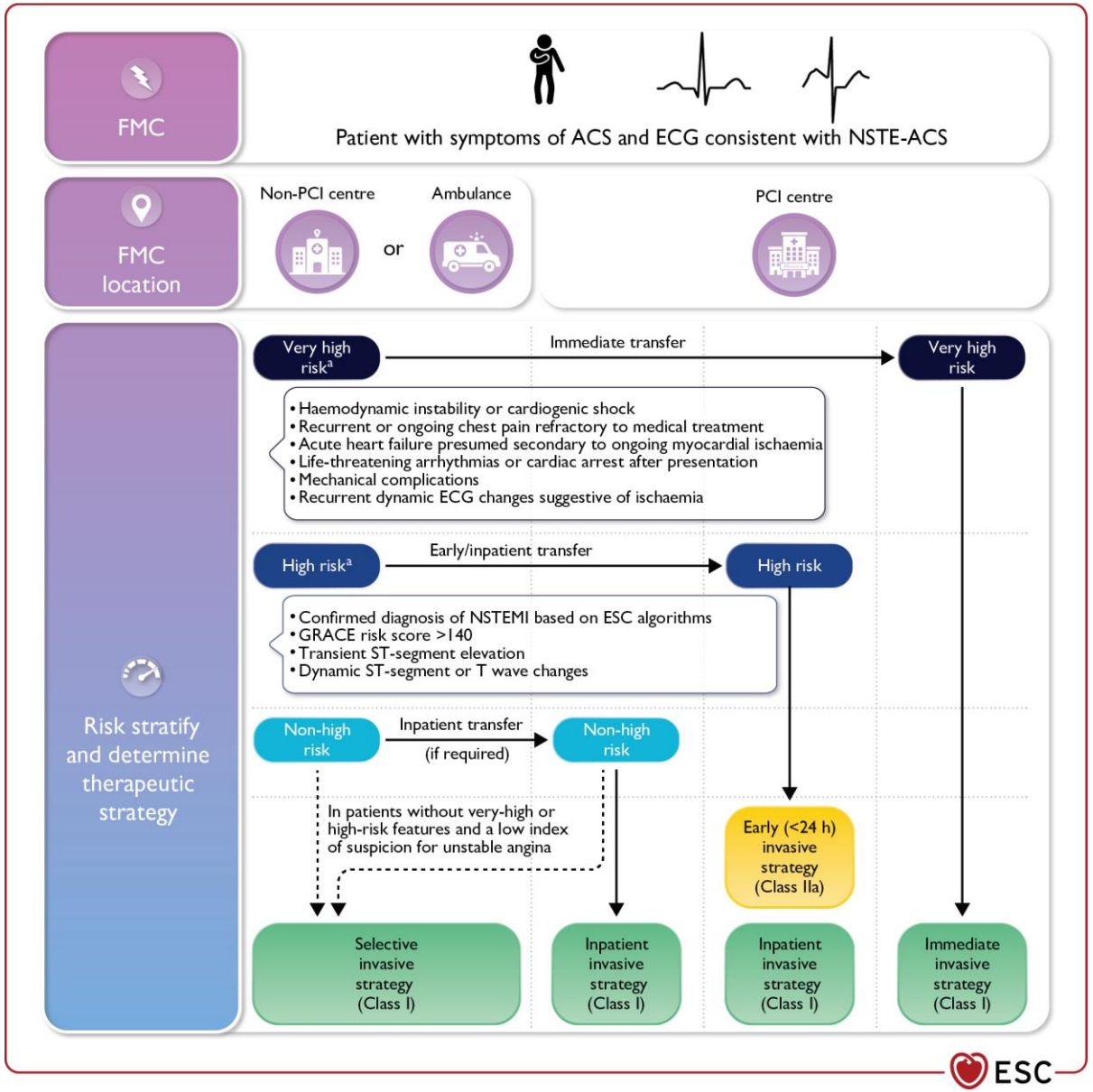
Figure 8

Selection of invasive strategy and reperfusion therapy in patients presenting with NSTE-ACS



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Recommendations for reperfusion therapy and timing of invasive strategy (1)

Recommendations	Class	Level
Recommendations for reperfusion therapy for patients with STEMI		
Reperfusion therapy is recommended in all patients with a working diagnosis of STEMI (persistent ST-segment elevation or equivalents) and symptoms of ischaemia of ≤12 h duration.	I	A
A PPCI strategy is recommended over fibrinolysis if the anticipated time from diagnosis to PCI is <120 min.	I	A
If timely PPCI (<120 min) cannot be performed in patients with a working diagnosis of STEMI, fibrinolytic therapy is recommended within 12 h of symptom onset in patients without contraindications.	I	A
Rescue PCI is recommended for failed fibrinolysis (i.e. ST-segment resolution <50% within 60–90 min of fibrinolytic administration) or in the presence of haemodynamic or electrical instability, worsening ischaemia, or persistent chest pain.	I	A

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Recommendations for reperfusion therapy and timing of invasive strategy (2)

Recommendations	Class	Level
Recommendations for reperfusion therapy for patients with STEMI (continued)		
In patients with a working diagnosis of STEMI and a time from symptom onset >12 h, a PPCI strategy is recommended in the presence of ongoing symptoms suggestive of ischaemia, haemodynamic instability, or life-threatening arrhythmias.	I	C
A routine PPCI strategy should be considered in STEMI patients presenting late (12–48 h) after symptom onset.	IIa	B
Routine PCI of an occluded IRA is not recommended in STEMI patients presenting >48 h after symptom onset and without persistent symptoms.	III	A

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Recommendations for reperfusion therapy and timing of invasive strategy (3)

Recommendations	Class	Level
Transfer/interventions after fibrinolysis		
Transfer to a PCI-capable centre is recommended in all patients immediately after fibrinolysis.	I	A
Emergency angiography and PCI of the IRA, if indicated is recommended in patients with new-onset or persistent heart failure/shock after fibrinolysis.	I	A
Angiography and PCI of the IRA, if indicated, is recommended between 2 and 24 h after successful fibrinolysis.	I	A
Invasive strategy in NSTE-ACS		
An invasive strategy during hospital admission is recommended in NSTE-ACS patients with high-risk criteria or a high index of suspicion for unstable angina.	I	A
A selective invasive approach is recommended in patients without very high- or high-risk NSTE-ACS criteria and with a low index of suspicion for NSTE-ACS.	I	A

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Recommendations for reperfusion therapy and timing of invasive strategy (4)

Recommendations	Class	Level
Invasive strategy in NSTE-ACS (continued)		
An immediate invasive strategy is recommended in patients with a working diagnosis of NSTE-ACS and with at least one of the following very high-risk criteria: • Haemodynamic instability or cardiogenic shock • Recurrent or refractory chest pain despite medical treatment • In-hospital life-threatening arrhythmias • Mechanical complications of MI • Acute heart failure presumed secondary to ongoing myocardial ischaemia • *Recurrent* dynamic ST-segment or T wave changes, particularly intermittent ST-segment elevation.	I	C

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Recommendations for reperfusion therapy and timing of invasive strategy (5)

Recommendations	Class	Level
Invasive strategy in NSTE-ACS (continued)		
An early invasive strategy within 24 h should be considered in patients with at least one of the following high-risk criteria: • Confirmed diagnosis of NSTEMI based on current recommended ESC hs-cTn algorithms • Dynamic ST-segment or T wave changes • Transient ST-segment elevation • GRACE risk score >140	IIa	A

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Dose regimen of antiplatelet and anticoagulant drugs in acute coronary syndrome patients (1)

Antiplatelet drugs	
Aspirin	LD of 150–300 mg orally or 75–250 mg i.v. if oral ingestion is not possible, followed by oral MD of 75–100 mg o.d.; no specific dose adjustment in CKD patients.
$P2Y_{12}$ receptor inhibitors (oral or i.v.)	
Clopidogrel	LD of 300–600 mg orally, followed by an MD of 75 mg o.d.; no specific dose adjustment in CKD patients. Fibrinolysis: at the time of fibrinolysis an initial dose of 300 mg (75 mg for patients older than 75 years of age).
Prasugrel	LD of 60 mg orally, followed by an MD of 10 mg o.d. In patients with body weight <60 kg, an MD of 5 mg o.d. is recommended. In patients aged ≥75 years, prasugrel should be used with caution, but a MD of 5 mg o.d. should be used if treatment is deemed necessary. No specific dose adjustment in CKD patients. Prior stroke is a contraindication for prasugrel.

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Dose regimen of antiplatelet and anticoagulant drugs in acute coronary syndrome patients (2)

Antiplatelet drugs	
$P2Y_{12}$ receptor inhibitors (oral or i.v.) (continued)	
Ticagrelor	LD of 180 mg orally, followed by an MD of 90 mg b.i.d.; no specific dose adjustment in CKD patients.
Cangrelor	Bolus of 30 mcg/kg i.v. followed by 4 mcg/kg/min infusion for at least 2 h or the duration of the procedure (whichever is longer). In the transition from cangrelor to a thienopyridine, the thienopyridine should be administered immediately after discontinuation of cangrelor with an LD (clopidogrel 600 mg or prasugrel 60 mg); to avoid a potential DDI, prasugrel may also be administered 30 min before the cangrelor infusion is stopped. Ticagrelor (LD 180 mg) should be administered at the time of PCI to minimize the potential gap in platelet inhibition during the transition phase.

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Dose regimen of antiplatelet and anticoagulant drugs in acute coronary syndrome patients (3)

Antiplatelet drugs	
GP IIb/IIIa receptor inhibitors (i.v.)	
Eptifibatide	Double bolus of 180 mcg/kg i.v. (given at a 10-min interval) followed by an infusion of 2.0 mcg/kg/min for up to 18 h. For CrCl 30–50 mL/min: first LD, 180 mcg/kg i.v. bolus (max 22.6 mg); maintenance infusion, 1 mcg/kg/min (max 7.5 mg/h). Second LD (if PCI), 180 mcg/kg i.v. bolus (max 22.6 mg) should be administered 10 min after the first bolus. Contraindicated in patients with end-stage renal disease and with prior ICH, ischaemic stroke within 30 days, fibrinolysis, or platelet count <100 000/mm^3.
Tirofiban	Bolus of 25 mcg/kg i.v. over 3 min, followed by an infusion of 0.15 mcg/kg/min for up to 18 h. For CrCl ≤60 mL/min: LD, 25 mcg/kg i.v. over 5 min followed by a maintenance infusion of 0.075 mcg/kg/min continued for up to 18 h. Contraindicated in patients with prior ICH, ischaemic stroke within 30 days, fibrinolysis, or platelet count <100 000/mm^3.

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Dose regimen of antiplatelet and anticoagulant drugs in acute coronary syndrome patients (4)

Anticoagulant drugs	
UFH	Initial treatment: i.v. bolus 70–100 U/kg followed by i.v. infusion titrated to achieve an aPTT of 60–80 s. During PCI: 70–100 U/kg i.v. bolus or according to ACT in case of UFH pretreatment.
Enoxaparin	Initial treatment: For treatment of ACS 1 mg/kg b.i.d. subcutaneously for a minimum of 2 days and continued until clinical stabilization. In patients whose CrCl is below 30 mL per minute (by Cockcroft–Gault equation), the enoxaparin dosage should be reduced to 1 mg per kg o.d. During PCI: For patients managed with PCI, if the last dose of enoxaparin was given less than 8 h before balloon inflation, no additional dosing is needed. If the last s.c. administration was given more than 8 h before balloon inflation, an i.v. bolus of 0.3 mg/kg enoxaparin sodium should be administered.

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Dose regimen of antiplatelet and anticoagulant drugs in acute coronary syndrome patients (5)

Anticoagulant drugs (continued)	
Bivalirudin	During PPCI: 0.75 mg/kg i.v. bolus followed by i.v. infusion of 1.75 mg/kg/h for 4 h after the procedure. In patients whose CrCl is below 30 mL/min (by Cockcroft–Gault equation), maintenance infusion should be reduced to 1 mg/kg/h.
Fondaparinux	Initial treatment: 2.5 mg/d subcutaneously. During PCI: A single bolus of UFH is recommended. Avoid if CrCl <20 mL/min.

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Figure 9

Antithrombotic treatments in acute coronary syndrome: pharmacological targets

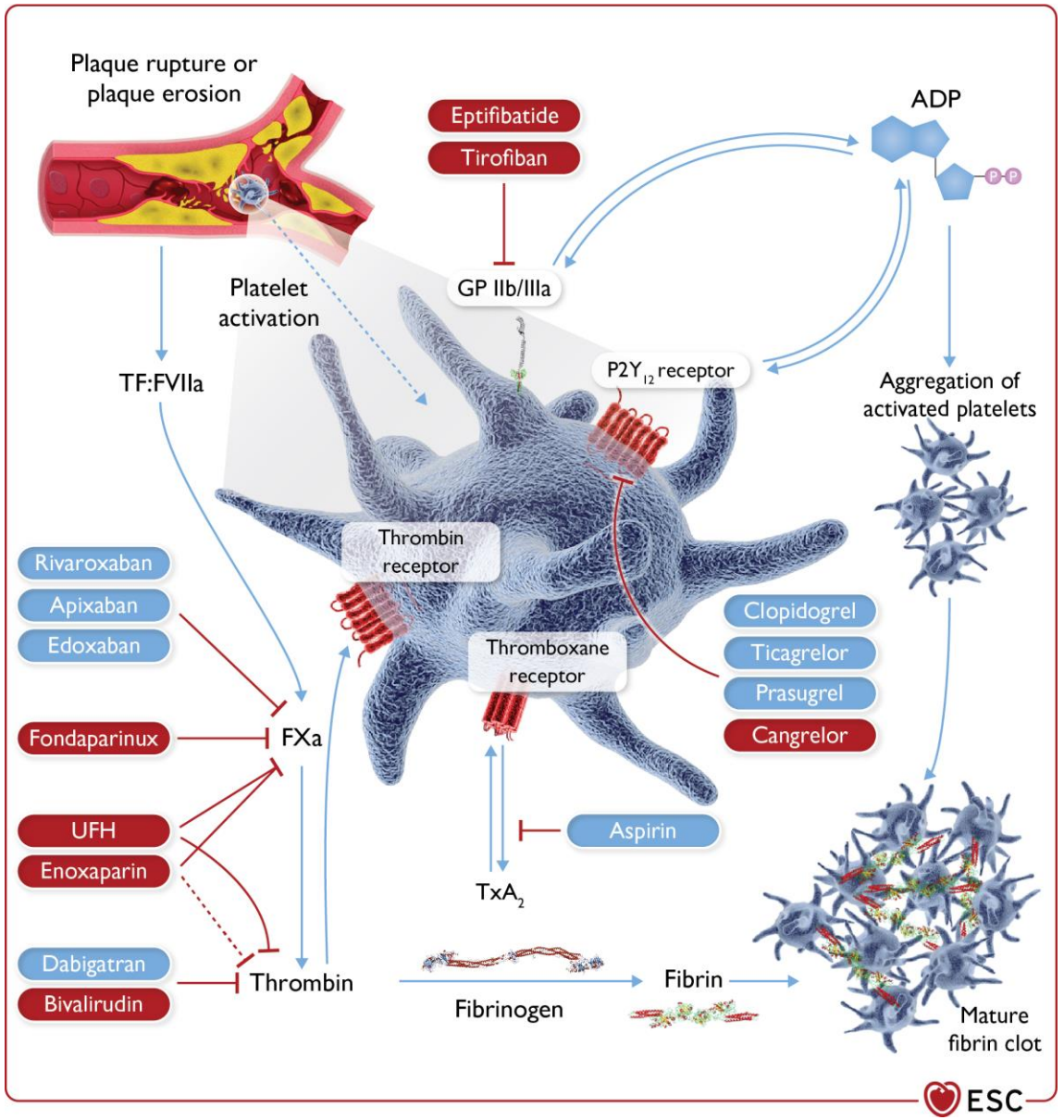

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Figure 10

Recommended default antithrombotic therapy regimens in acute coronary syndrome patients without an indication for oral anticoagulation

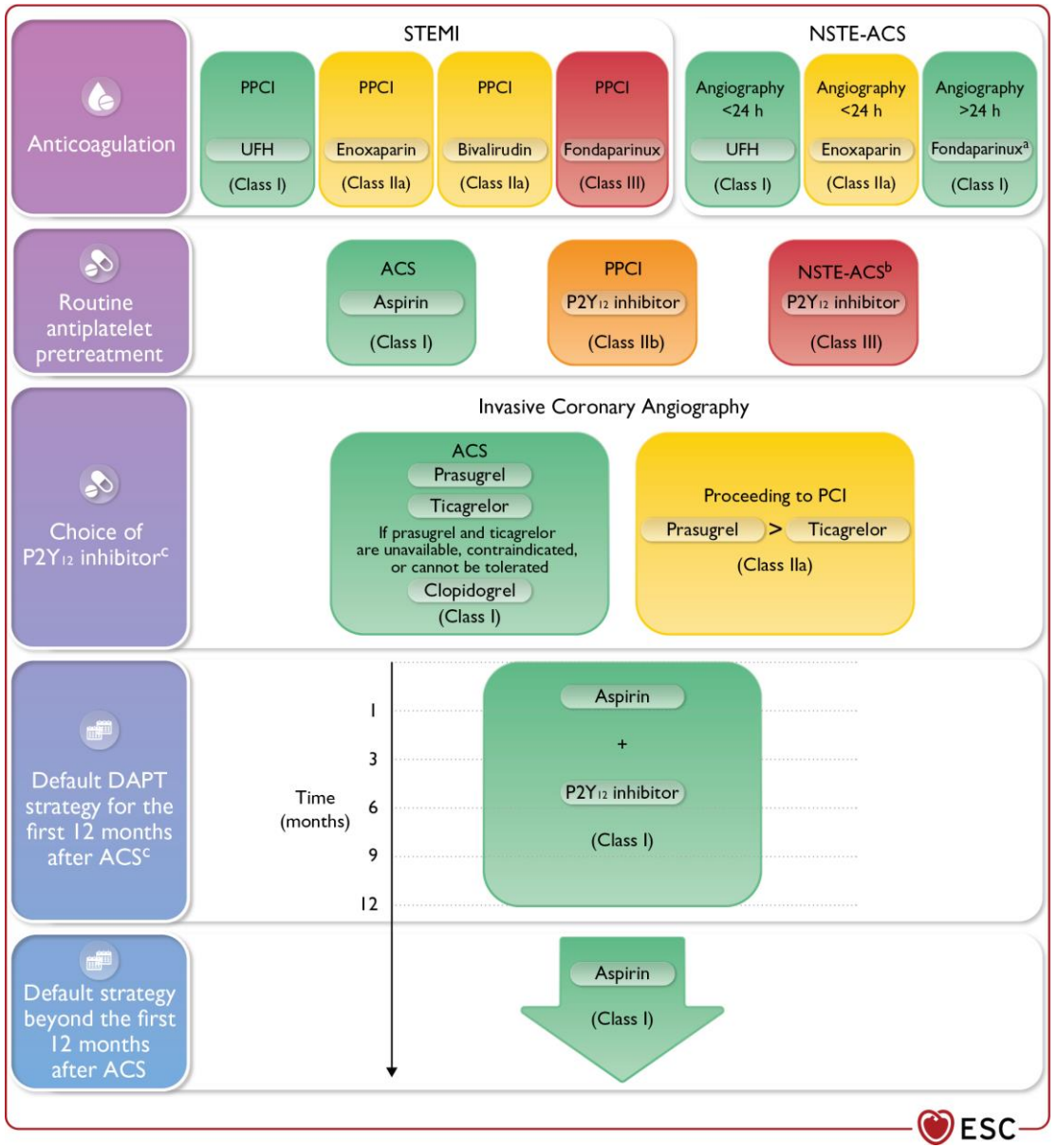

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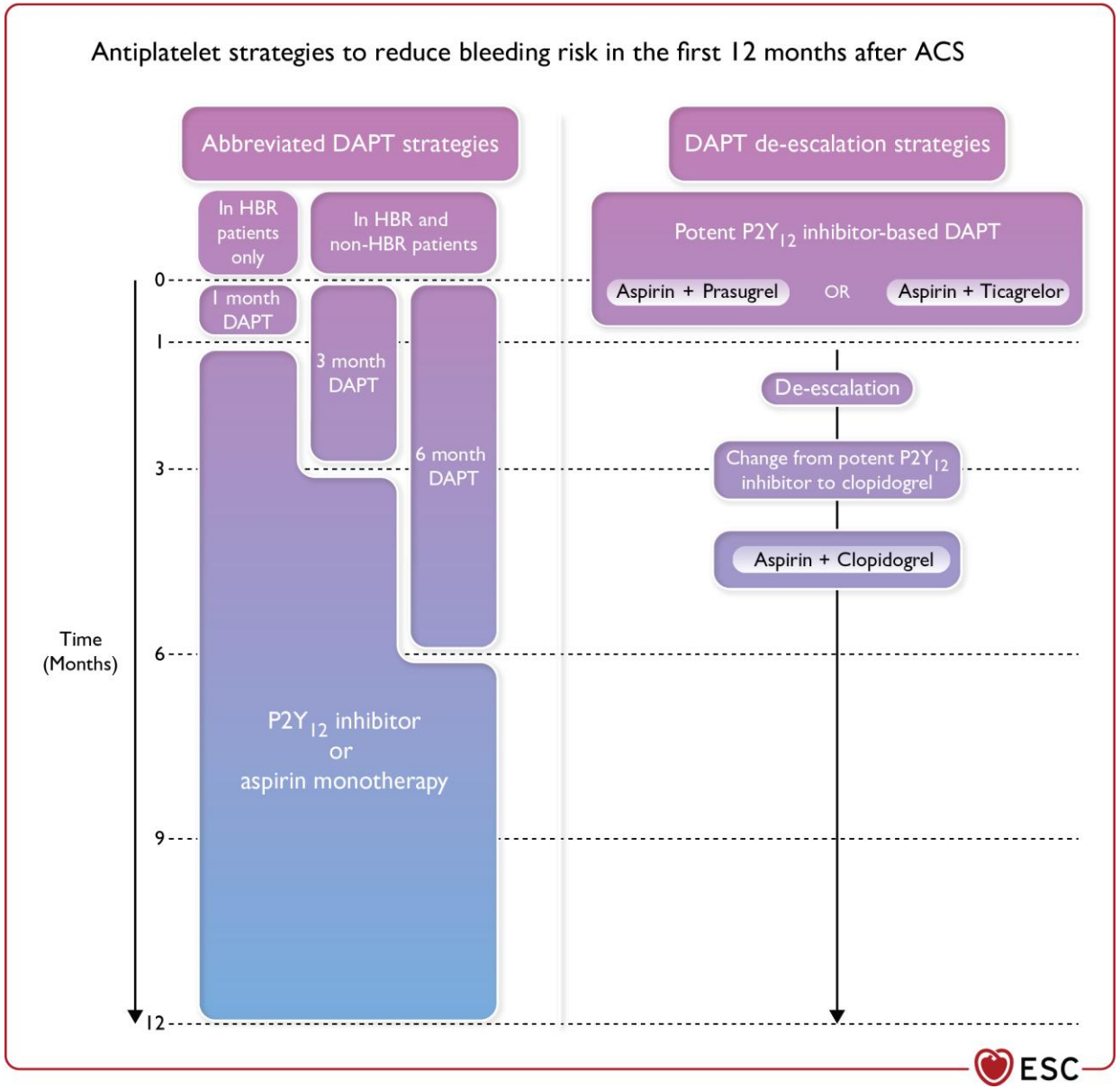
Figure 11

Alternative antiplatelet strategies to reduce bleeding risk in the first 12 months after an ACS



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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (1)

Recommendations	Class	Level
Antiplatelet therapy		
Aspirin is recommended for all patients without contraindications at an initial oral LD of 150–300 mg (or 75–250 mg i.v.) and an MD of 75–100 mg o.d. for long-term treatment.	I	A
In all ACS patients, a $P2Y_{12}$ receptor inhibitor is recommended in addition to aspirin, given as an initial oral LD followed by an MD for 12 months unless there is HBR.	I	A
A proton pump inhibitor in combination with DAPT is recommended in patients at high risk of gastrointestinal bleeding.	I	A
Prasugrel is recommended in $P2Y_{12}$ receptor inhibitor-naïve patients proceeding to PCI (60 mg LD, 10 mg o.d. MD, 5 mg o.d. MD for patients aged ≥75 years or with a body weight <60 kg).	I	B
Ticagrelor is recommended irrespective of the treatment strategy (invasive or conservative) (180 mg LD, 90 mg b.i.d. MD).	I	B

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (2)

Recommendations	Class	Level
Antiplatelet therapy (continued)		
Clopidogrel (300–600 mg LD, 75 mg o.d. MD) is recommended when prasugrel or ticagrelor are not available, cannot be tolerated, or are contraindicated.	I	C
If patients presenting with ACS stop DAPT to undergo CABG, it is recommended they resume DAPT after surgery for at least 12 months.	I	C
Prasugrel should be considered in preference to ticagrelor for ACS patients who proceed to PCI.	IIa	B
GP IIb/IIIa receptor antagonists should be considered if there is evidence of no-reflow or a thrombotic complication during PCI.	IIa	C
In $P2Y_{12}$ receptor inhibitor-naïve patients undergoing PCI, cangrelor may be considered.	IIb	A
In older ACS patients, especially if HBR, clopidogrel as the $P2Y_{12}$ receptor inhibitor may be considered.	IIb	B

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (3)

Recommendations	Class	Level
Antiplatelet therapy (continued)		
Pretreatment with a $P2Y_{12}$ receptor inhibitor may be considered in patients undergoing a primary PCI strategy.	IIb	B
Pretreatment with a $P2Y_{12}$ receptor inhibitor may be considered in NSTE-ACS patients who are not expected to undergo an early invasive strategy (<24 h) and do not have HBR.	IIb	C
Pretreatment with a GP IIb/IIIa receptor antagonist is not recommended.	III	A
Routine pretreatment with a $P2Y_{12}$ receptor inhibitor in NSTE-ACS patients in whom coronary anatomy is not known and early invasive management (<24 h) is planned is not recommended.	III	A

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (4)

Recommendations	Class	Level
Anticoagulant therapy		
Parenteral anticoagulation is recommended for all patients with ACS at the time of diagnosis.	I	A
Routine use of a UFH bolus (weight-adjusted i.v. bolus during PCI of 70–100 IU/kg) is recommended in patients undergoing PCI.	I	C
Intravenous enoxaparin at the time of PCI should be considered in patients pretreated with subcutaneous enoxaparin.	IIa	B
Discontinuation of parenteral anticoagulation should be considered immediately after an invasive procedure.	IIa	C

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (5)

Recommendations	Class	Level
Patients with STEMI		
Enoxaparin should be considered as an alternative to UFH in patients with STEMI undergoing PPCI.	IIa	A
Bivalirudin with a full-dose post PCI infusion should be considered as an alternative to UFH in patients with STEMI undergoing PPCI.	IIa	A
Fondaparinux is not recommended in patients with STEMI undergoing PPCI.	III	B
Patients with NSTE-ACS		
For patients with NSTE-ACS in whom early invasive angiography (i.e. within 24 h) is not anticipated, fondaparinux is recommended.	I	B
For patients with NSTE-ACS in whom early invasive angiography (i.e. within 24 h) is anticipated, enoxaparin should be considered as an alternative to UFH.	IIa	B

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (6)

Recommendations	Class	Level
Combining antiplatelets and OAC		
As the default strategy for patients with atrial fibrillation and CHA_2DS_2-VASc score ≥1 in men and ≥2 in women, after up to 1 week of triple antithrombotic therapy following the ACS event, dual antithrombotic therapy using a NOAC at the recommended dose for stroke prevention and a single oral antiplatelet agent (preferably clopidogrel) for up to 12 months is recommended.	I	A
During PCI, a UFH bolus is recommended in any of the following circumstances: - if the patient is on a NOAC - if the INR is <2.5 in VKA-treated patients.	I	C
In patients with an indication for OAC with VKA in combination with aspirin and/or clopidogrel, careful regulation of the dose intensity of VKA with a target INR of 2.0–2.5 and a time in the therapeutic range >70% should be considered.	IIa	B

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (7)

Recommendations	Class	Level
Combining antiplatelets and OAC (continued)		
When rivaroxaban is used and concerns about HBR prevail over ischaemic stroke, rivaroxaban 15 mg o.d. should be considered in preference to rivaroxaban 20 mg o.d. for the duration of concomitant SAPT or DAPT.	**IIa**	**B**
In patients at HBR, dabigatran 110 mg b.i.d. should be considered in preference to dabigatran 150 mg b.i.d. for the duration of concomitant SAPT or DAPT, to mitigate bleeding risk.	**IIa**	**B**
In patients requiring anticoagulation and treated medically, a single antiplatelet agent in addition to an OAC should be considered for up to 1 year.	**IIa**	**B**
In patients treated with an OAC, aspirin plus clopidogrel for longer than 1 week and up to 1 month should be considered in those with high ischaemic risk or with other anatomical/procedural characteristics that are judged to outweigh the bleeding risk.	**IIa**	**C**

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Recommendations for antiplatelet and anticoagulant therapy in acute coronary syndrome (8)

Recommendations	Class	Level
Combining antiplatelets and OAC (continued)		
In patients requiring OAC, withdrawing antiplatelet therapy at 6 months while continuing OAC may be considered.	IIb	B
The use of ticagrelor or prasugrel as part of triple antithrombotic therapy is not recommended.	III	C

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Recommendations for alternative antithrombotic therapy regimens (1)

Recommendations	Class	Level
Shortening/de-escalation of antithrombotic therapy		
In patients who are event-free after 3–6 months of DAPT and who are not high ischaemic risk, single antiplatelet therapy (preferably with a $P2Y_{12}$ receptor inhibitor) should be considered.	IIa	A
De-escalation of $P2Y_{12}$ receptor inhibitor treatment (e.g. with a switch from prasugrel/ticagrelor to clopidogrel) may be considered as an alternative DAPT strategy to reduce bleeding risk.	IIb	A
In HBR patients, aspirin or $P2Y_{12}$ receptor inhibitor monotherapy after 1 month of DAPT may be considered.	IIb	B
De-escalation of antiplatelet therapy in the first 30 days after an ACS event is not recommended.	III	B

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Recommendations for alternative antithrombotic therapy regimens (2)

Recommendations	Class	Level
Prolonging antithrombotic therapy		
Discontinuation of antiplatelet treatment in patients treated with an OAC is recommended after 12 months.	I	B
Adding a second antithrombotic agent to aspirin for extended long-term secondary prevention should be considered in patients with high ischaemic risk and without HBR.	IIa	A
Adding a second antithrombotic agent to aspirin for extended long-term secondary prevention may be considered in patients with moderate ischaemic risk and without HBR.	IIb	A
$P2Y_{12}$ inhibitor monotherapy may be considered as an alternative to aspirin monotherapy for long-term treatment.	IIb	A

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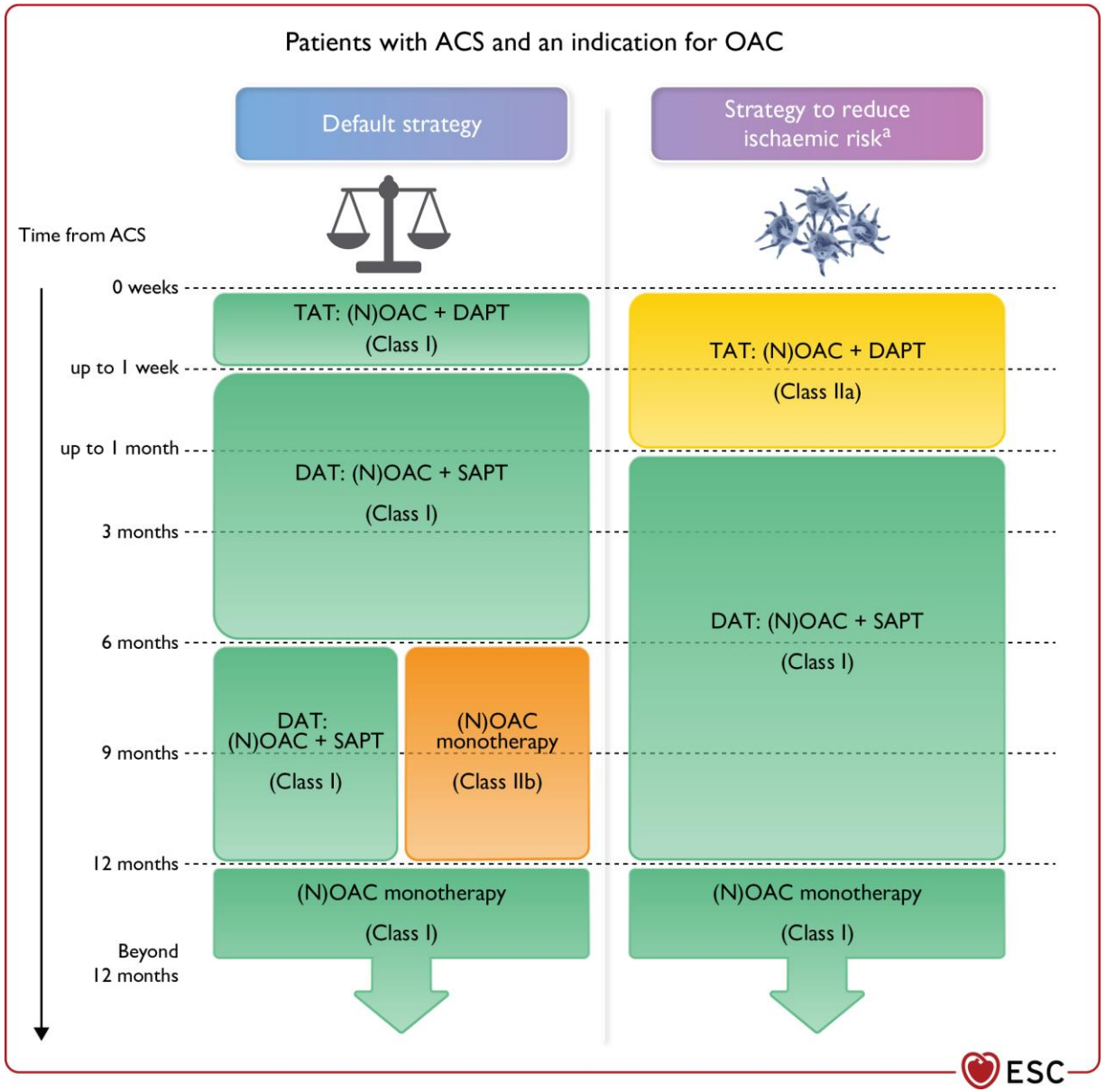
Figure 12

Antithrombotic regimens in patients with acute coronary syndrome and an indication for oral anticoagulation



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