νόσο και αιφνίδιος καρδιακός θάνατος. Αλγόριθμοι αντιμετώπισης

Σ. Ζερβάκης

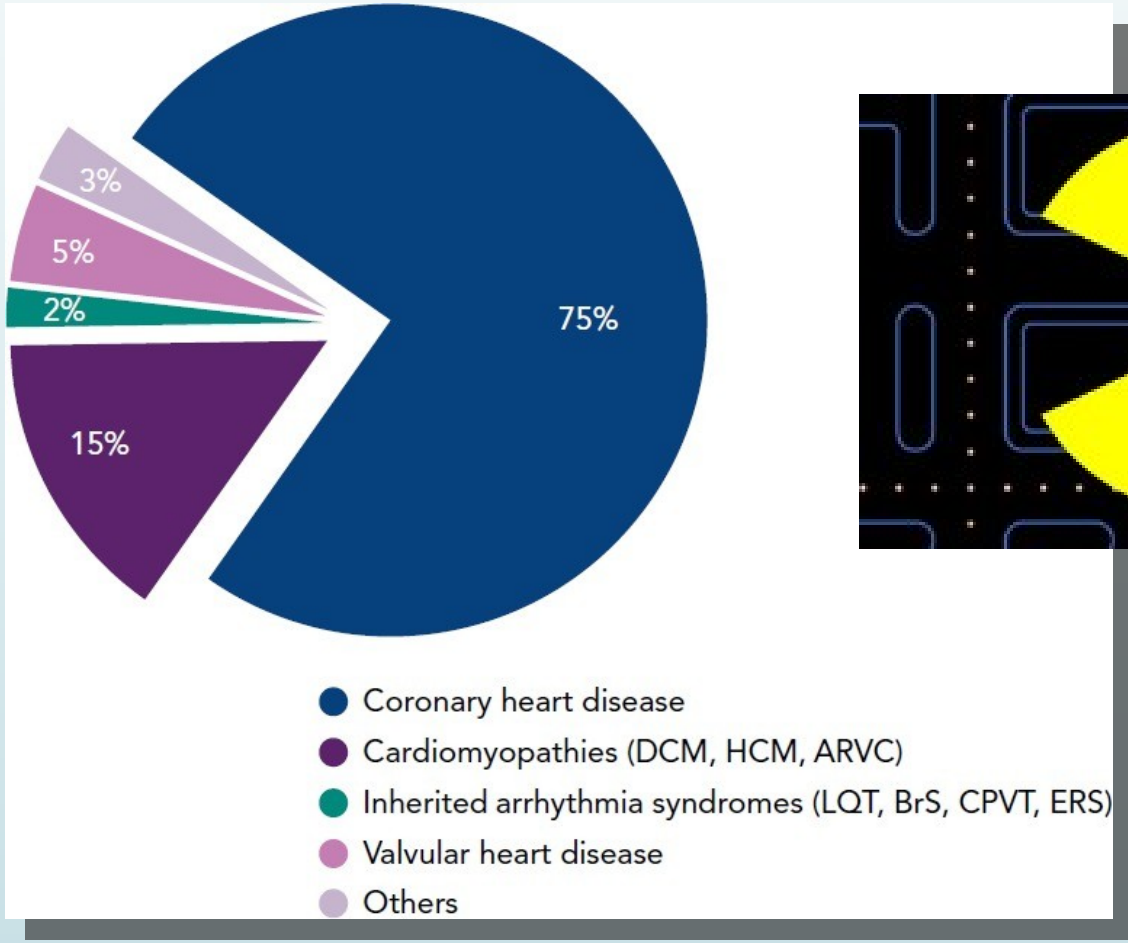
MD, Ειδικευόμενος Καρδιολογίας Πα.Γ.Ν.Ηρακλείου

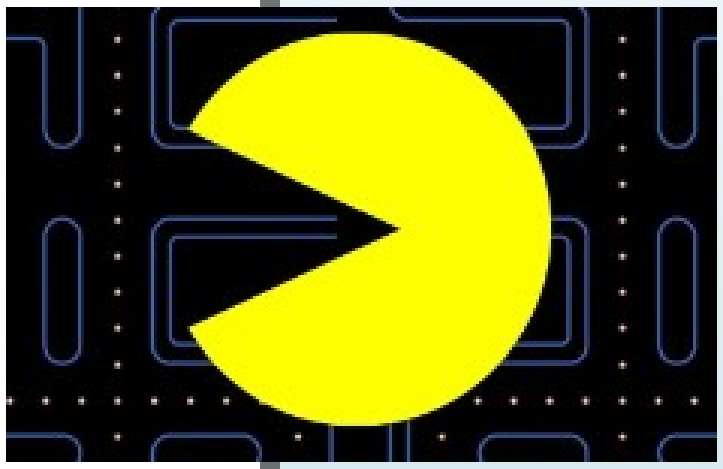
Αιφνίδιος καρδιακός θάνατος και…

… στεφανιαία νόσος

Στεφανιαία νόσος

Ευθύνεται συνολικά για τη **συντριπτική πλειονότητα** των αιφνιδίων θανάτων στον Δυτικό κόσμο





Srinivasan et al., Arrhythm Electrophysiol Rev. 2018 Jun;7(2):111-117.

Στενή σχέση μεταξύ

- στεφανιαίας νόσου
- και αιφνιδίου θανάτου

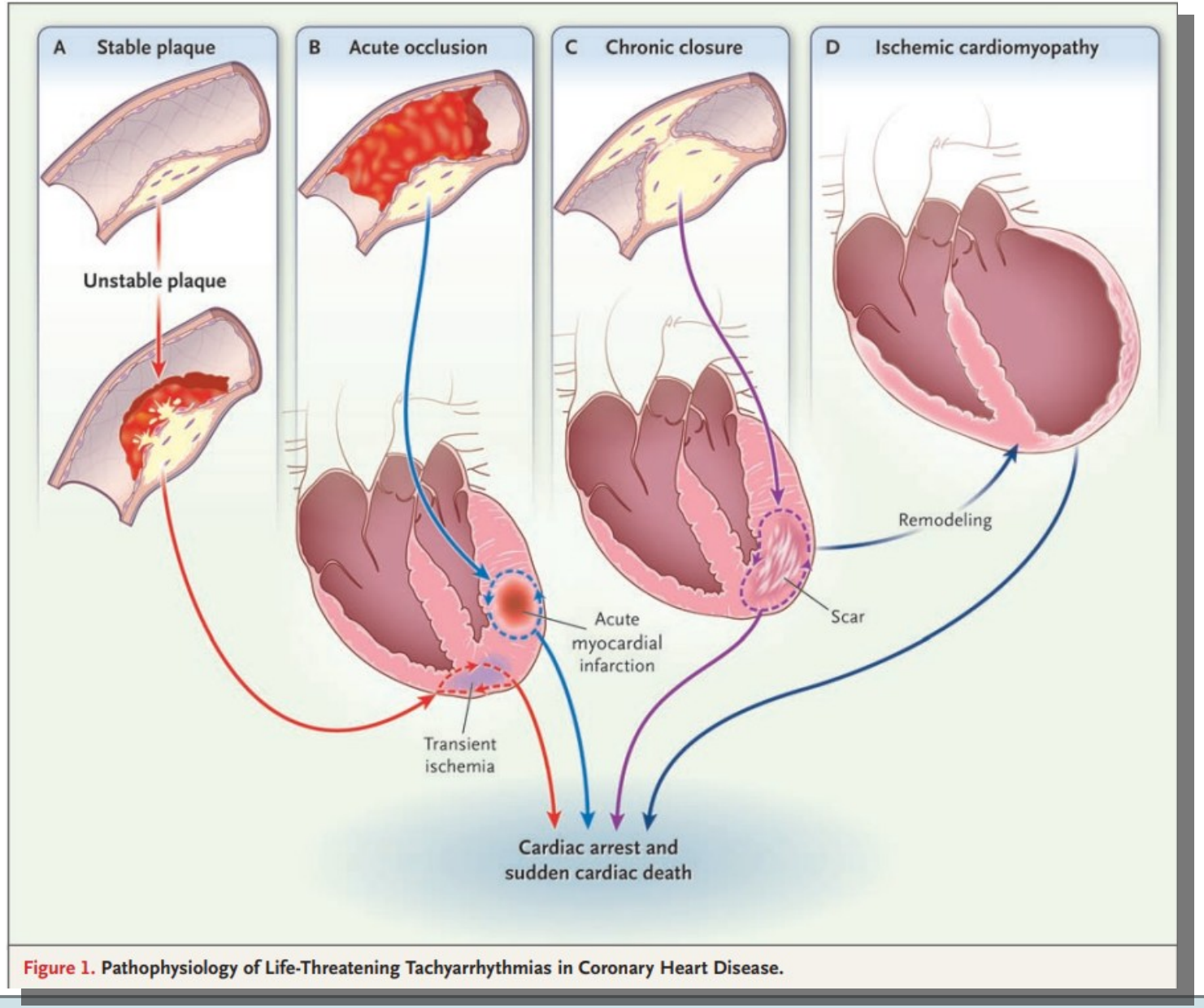


Figure 1. Pathophysiology of Life-Threatening Tachyarrhythmias in Coronary Heart Disease.

Myerburg RJ. N Engl J Med. 2008 Nov 20;359(21):

Table 1. Primary modes of cardiac arrest/SCD and mechanisms in selected disorders

Disorder	Primary mode of cardiac arrest/SCD	Mechanism
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Dilated cardiomyopathy	VT	Scar-mediated reentry Bundle branch reentry
Hypertrophic cardiomyopathy	VT/VF	Multiple
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WPW syndrome	VF	Rapid conduction to the ventricles down an accessory pathway resulting in VF

CAD, coronary artery disease; *MI*, myocardial infarction; *VT*, ventricular tachycardia; *VF*, ventricular fibrillation; *CPVT*, catecholaminergic polymorphic ventricular tachycardia

McElwee et. Al., J Nucl Cardiol. 2016 Dec;23(6):1368-1379.

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Table 1. Effects of Metabolic Changes on Cardiac Ion Channel/Transporter Function and Arrhythmogenicity

Channel/Transporter Effects	Metabolic Changes	Effects on Electric/Ionic Homeostasis	Proarrhythmic Mechanism
Na^+/K^+ ATPase ↓	Ischemia/hypoxia	Na^+ overload	Ca^{2+} overload and DAD
Cx hemichannel ↑	Ischemia	Na^+ overload	Ca^{2+} overload and DAD
Peak I_{Na} ↓	Ischemia/heart failure	↓ Na^+ influx	Slow conduction
Late I_{Na} ↑	Ischemia/hypoxia acidosis, ↑ LPC AMPK mutation	↑ Na^+ influx, prolonged APD	EAD
Kv ↓	Diabetes mellitus, heart failure	↓ K^+ influx, prolonged APD	EAD
Kv↑	Insulin treatment in diabetic heart, PI3Kα activation, exercise training	↑ K^+ channel expression	Protective
I_{KATP} ↑	Ischemia	↑ K^+ influx, shortened APD	Current sink, slow conduction
RyR2	↓ during ischemia, ↑ on reperfusion	SR Ca^{2+} load ↑, spontaneous Ca^{2+} waves ↑	Ca^{2+} transient/action potential alternans

APD, action potential duration; Cx, connexin; DAD, delayed afterdepolarization; EAD, early afterdepolarization; I_{KATP}: ATP-sensitive K^+ current; Kv, voltage-gated K^+ current; Late I_{Na}, late Na^+ current; LPC, lysophosphatidylcholine; Peak I_{Na}, peak Na^+ current; RyR2, ryanodine receptor 2; and SR, sarcoplasmic reticulum.

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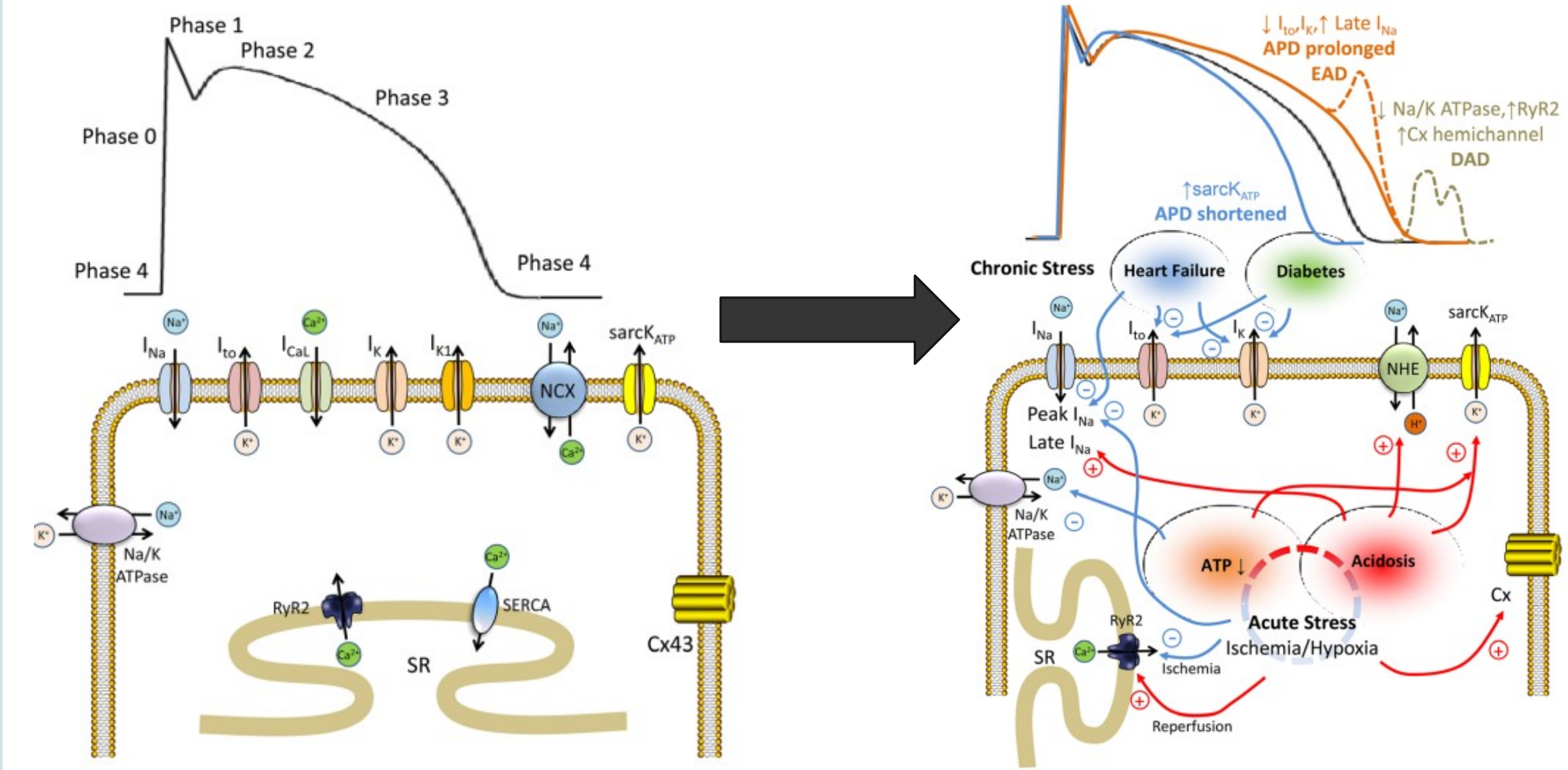

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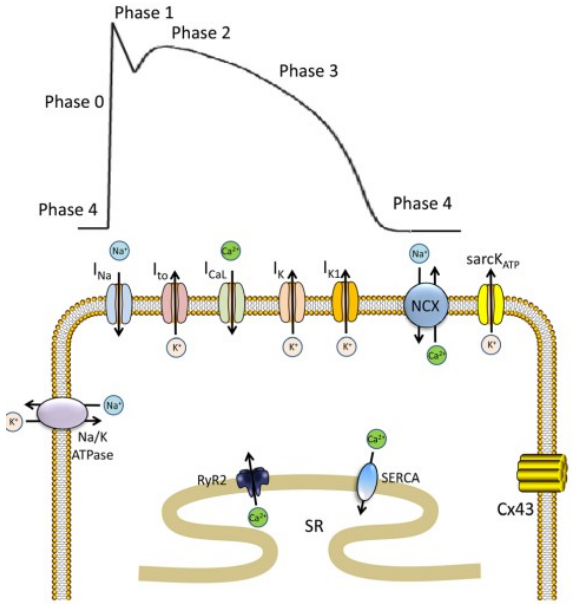

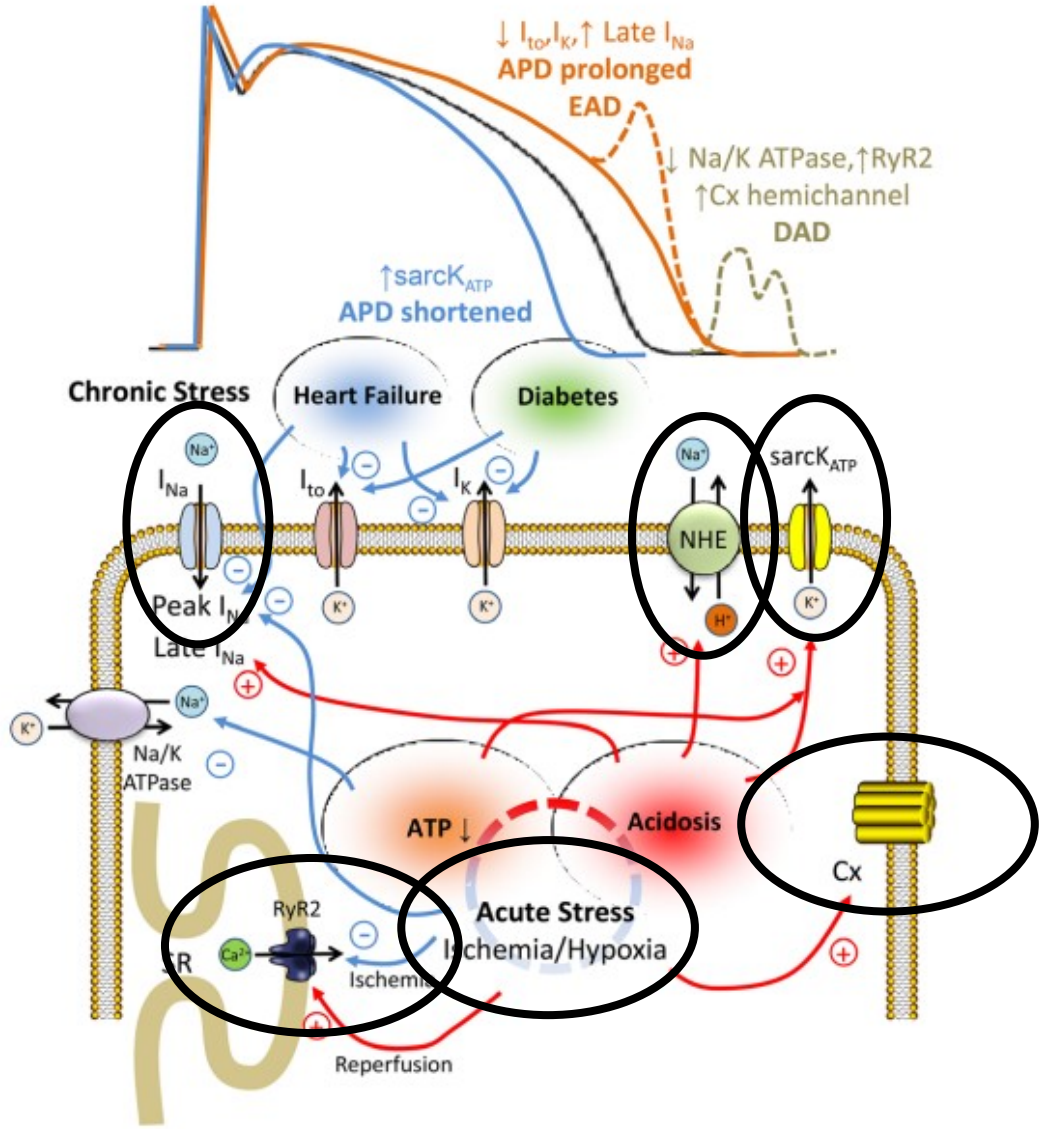

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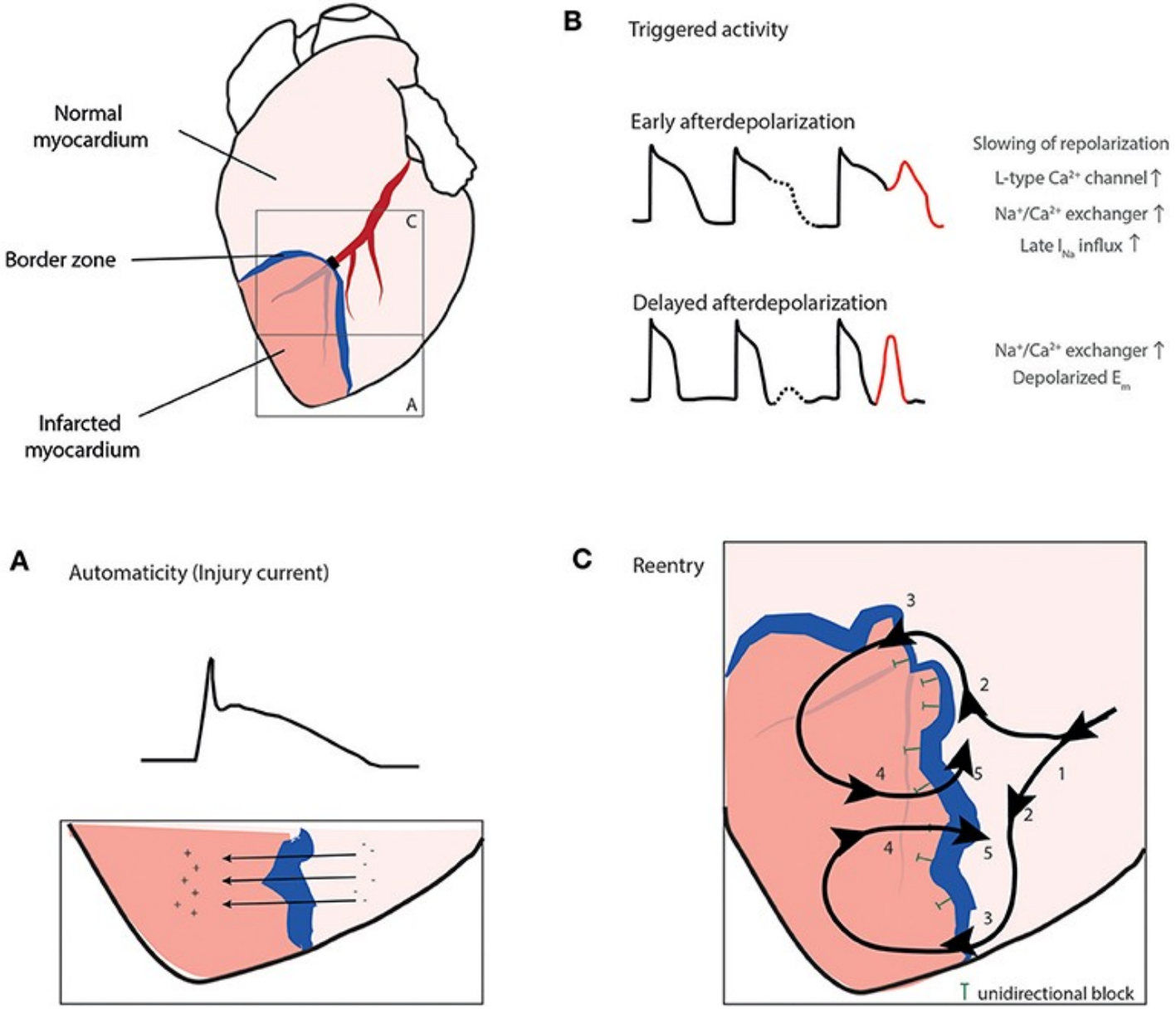

Sattler et al., Front Cardiovasc Med. 2019 Nov 5;6:158.

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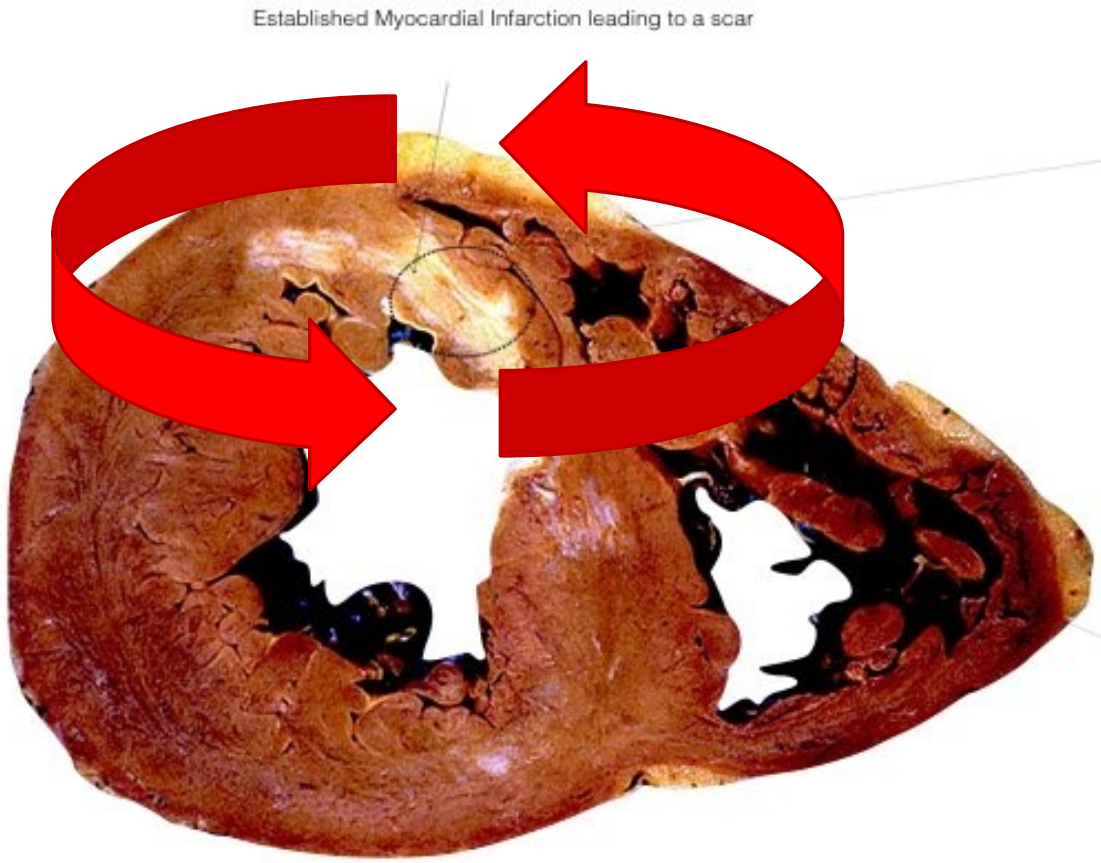
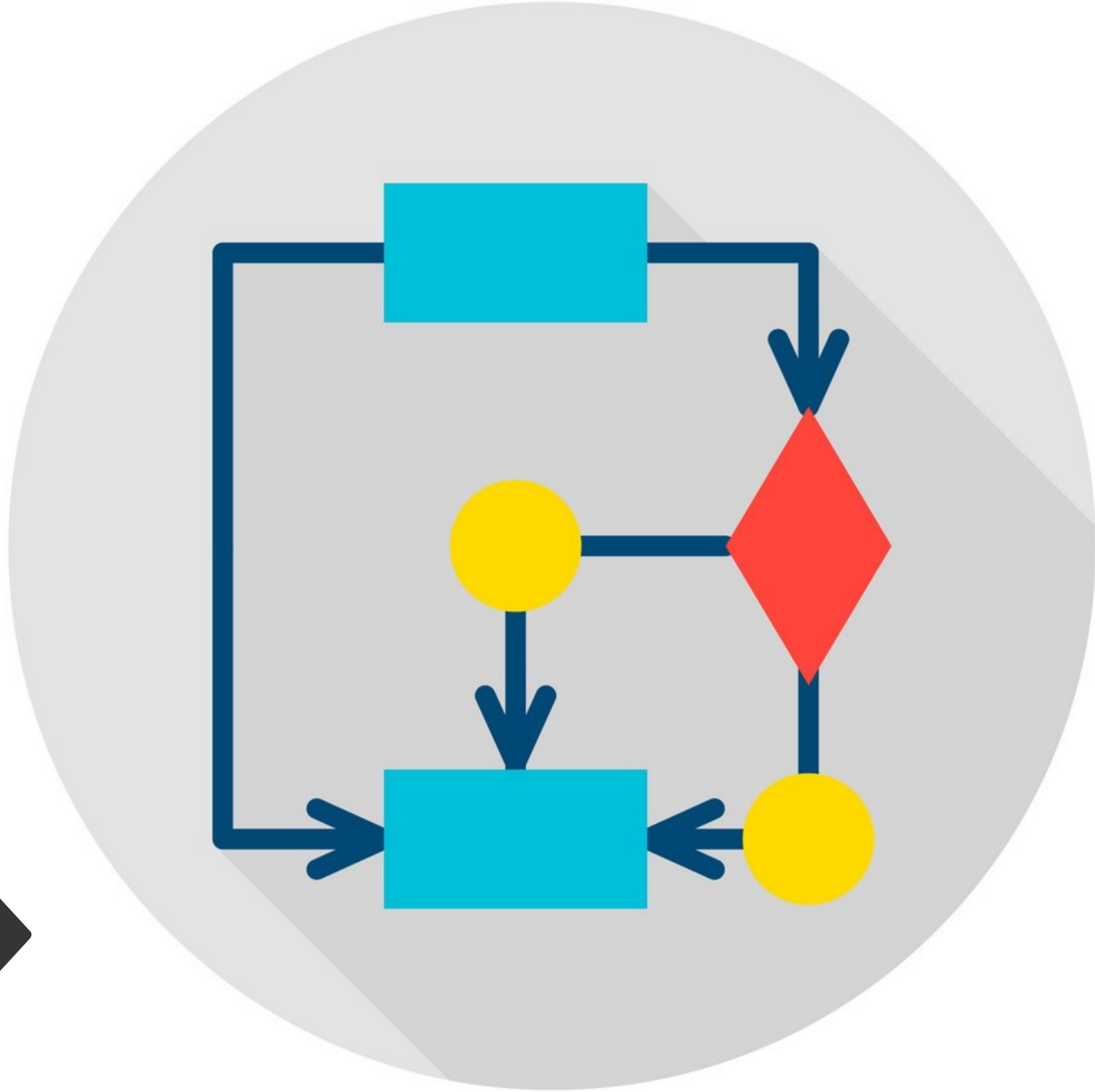


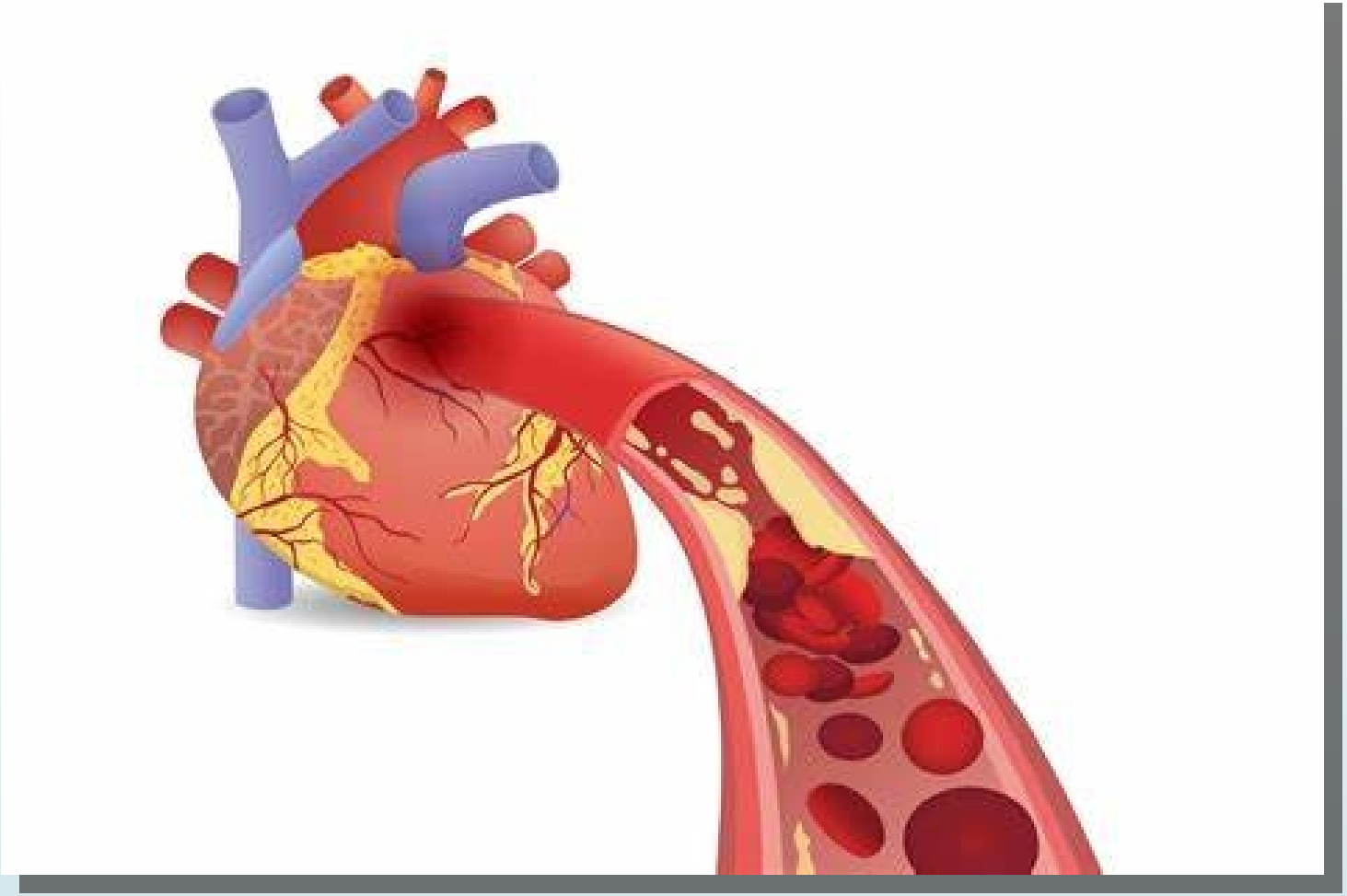
Myocardial Infarction

Schematic up of scar tissue

Αλγόριθμοι αντιμετώπισης



Οξεία ισχαιμία



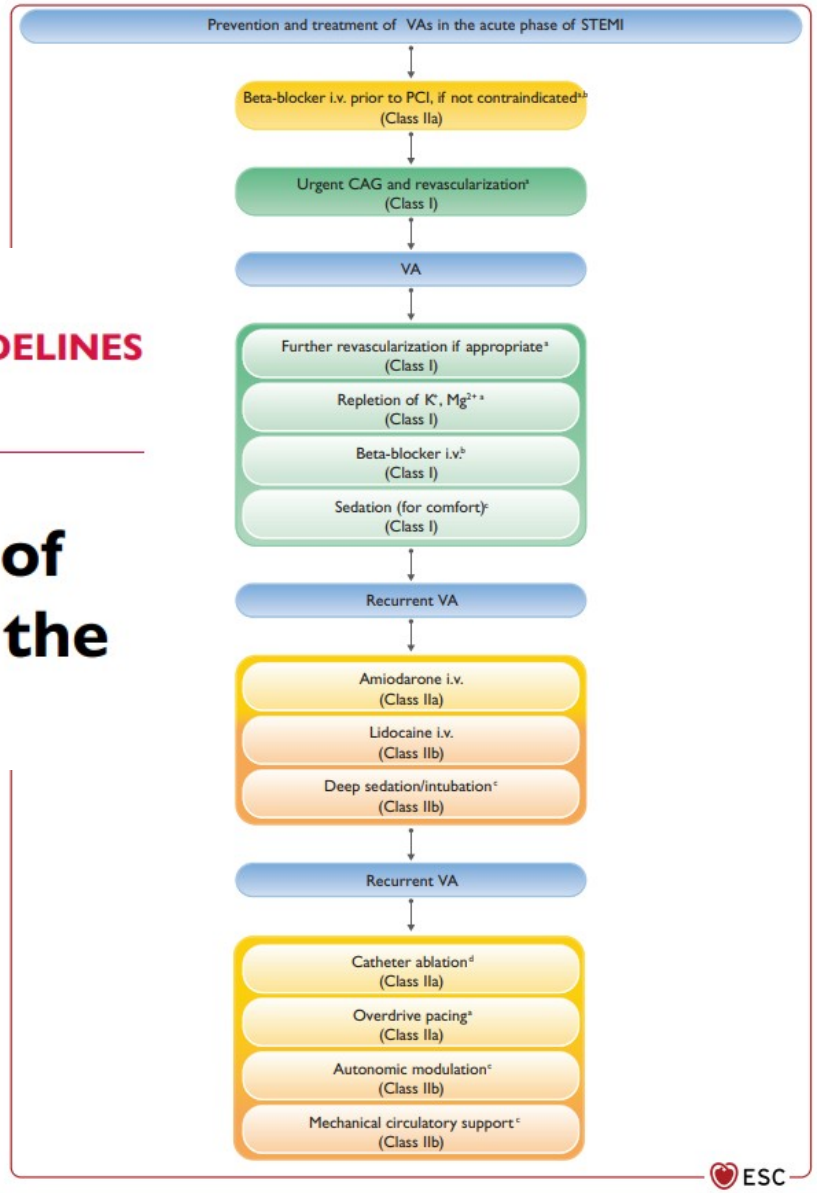
4–12% των STEMI → κοιλιακή αρρυθμιογέννεση το πρώτο 48ωρο (κυρίως το πρώτο 24ωρο)

2022 ESC Guidelines on VAs and SCD

ESC European Society of Cardiology
European Heart Journal (2022) **43**, 3997–4126
https://doi.org/10.1093/eurheartj/ehac262

ESC GUIDELINES

2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

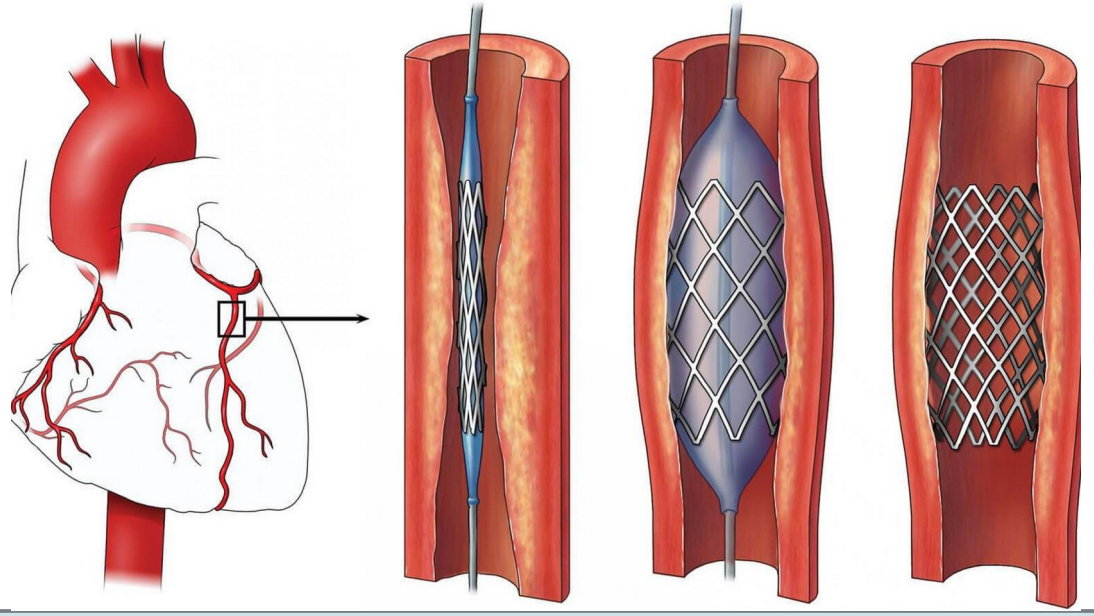


2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Prevention and treatment of VAs in the acute phase of STEMI

Beta-blocker i.v. prior to PCI, if not contraindicated[a,b]
(Class IIa)

Urgent CAG and revascularization[a]
(Class I)



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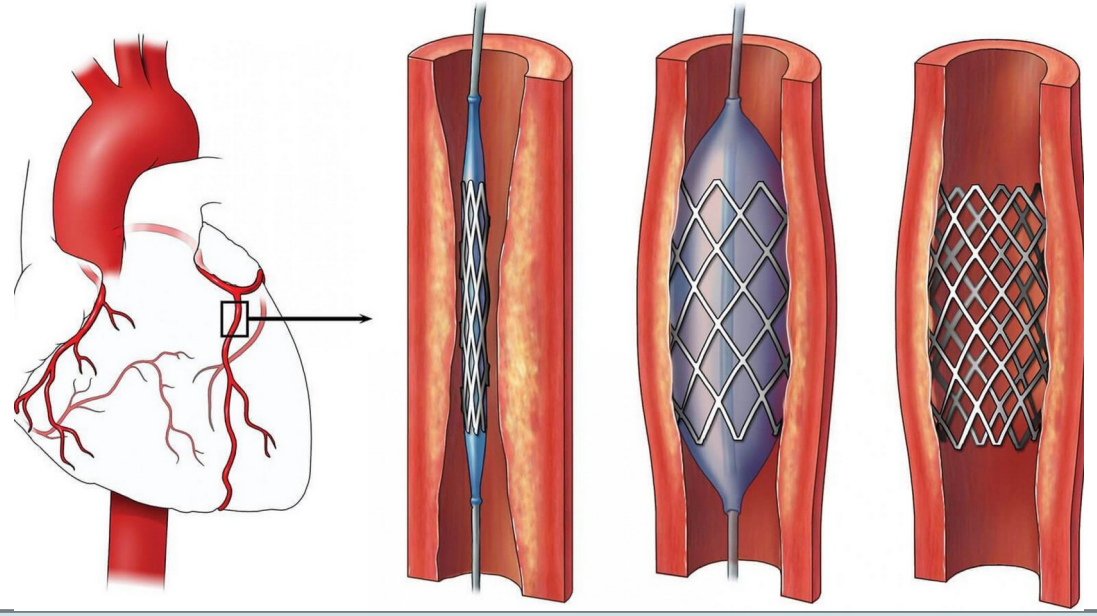
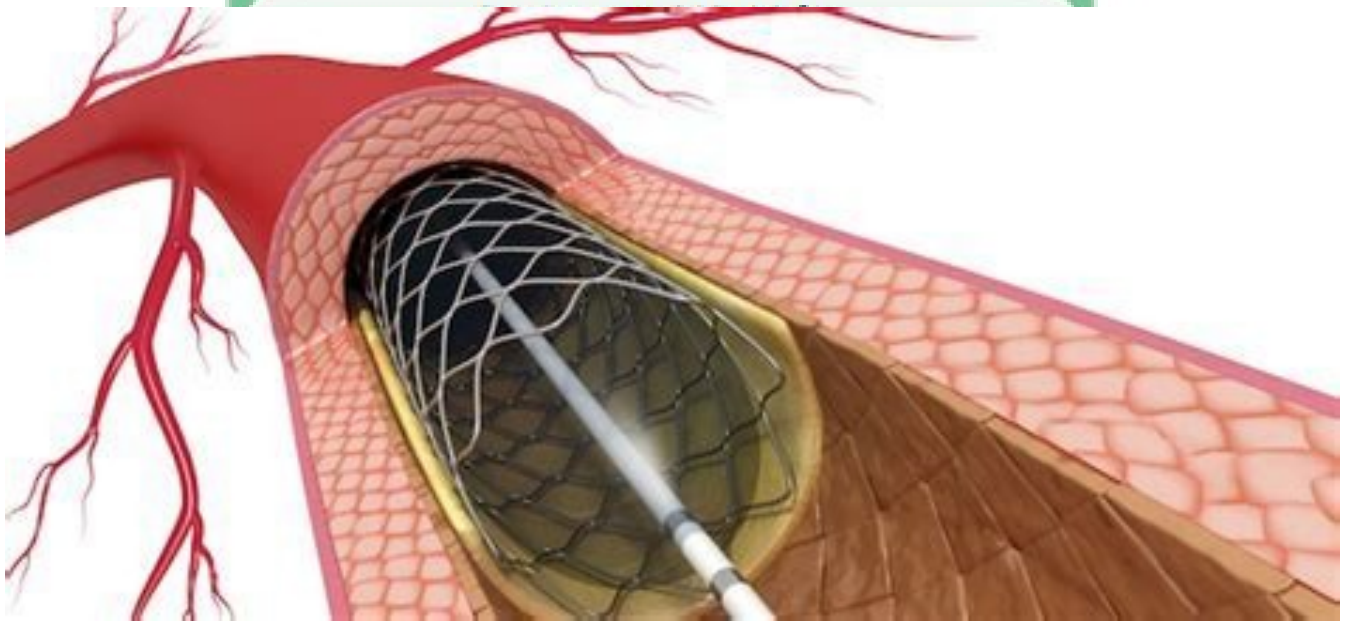


2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

VA

Further revascularization if appropriate[a]
(Class I)



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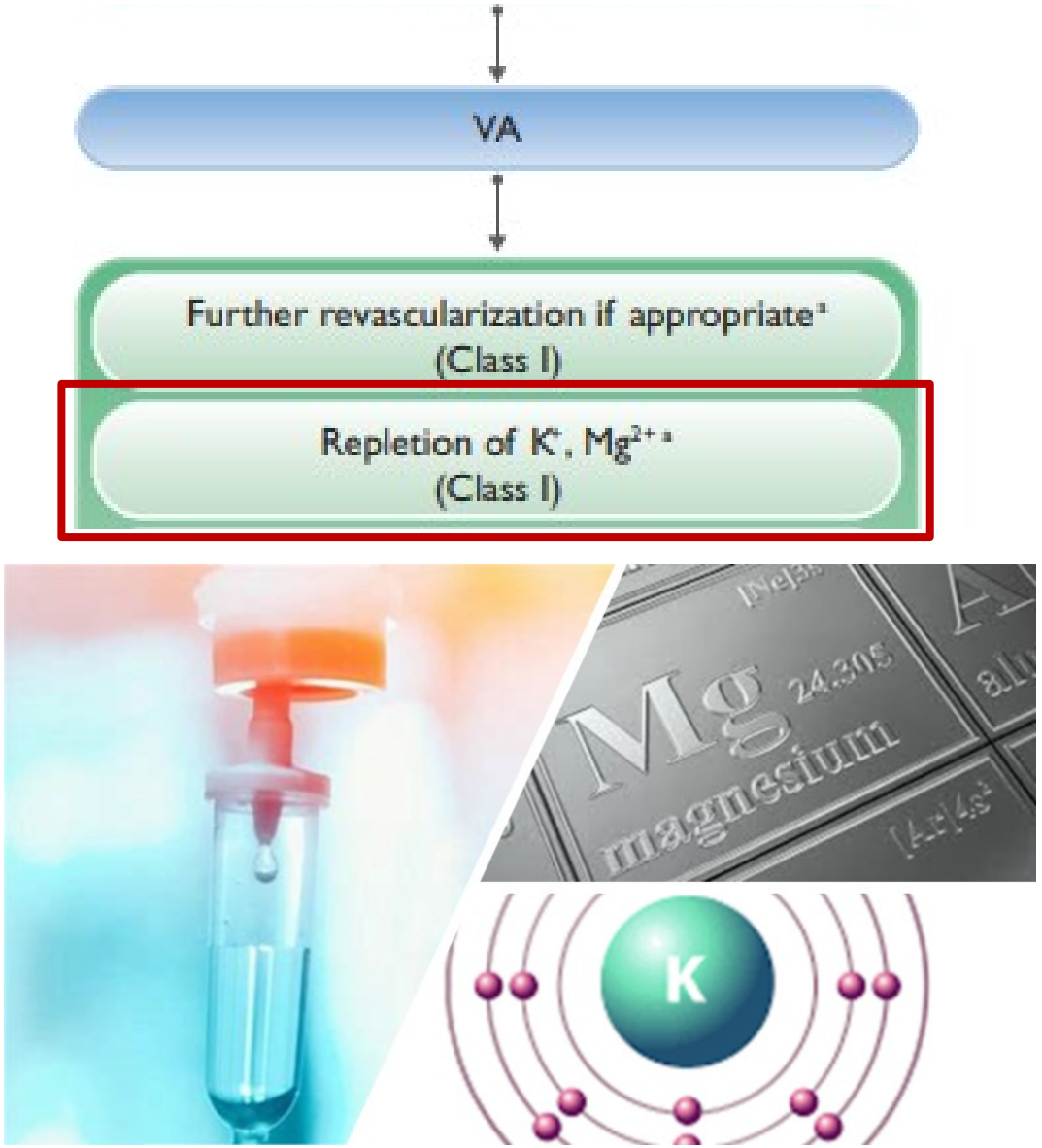


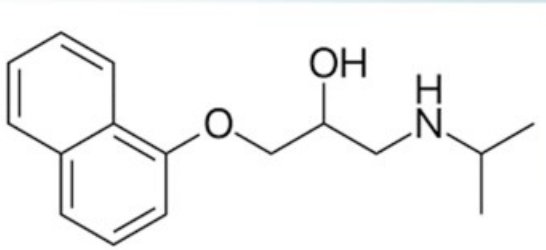
2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

VA

Further revascularization if appropriate[a]
(Class I)

Repletion of K^+, Mg^{2+} [a]
(Class I)

Beta-blocker i.v.[b]
(Class I)



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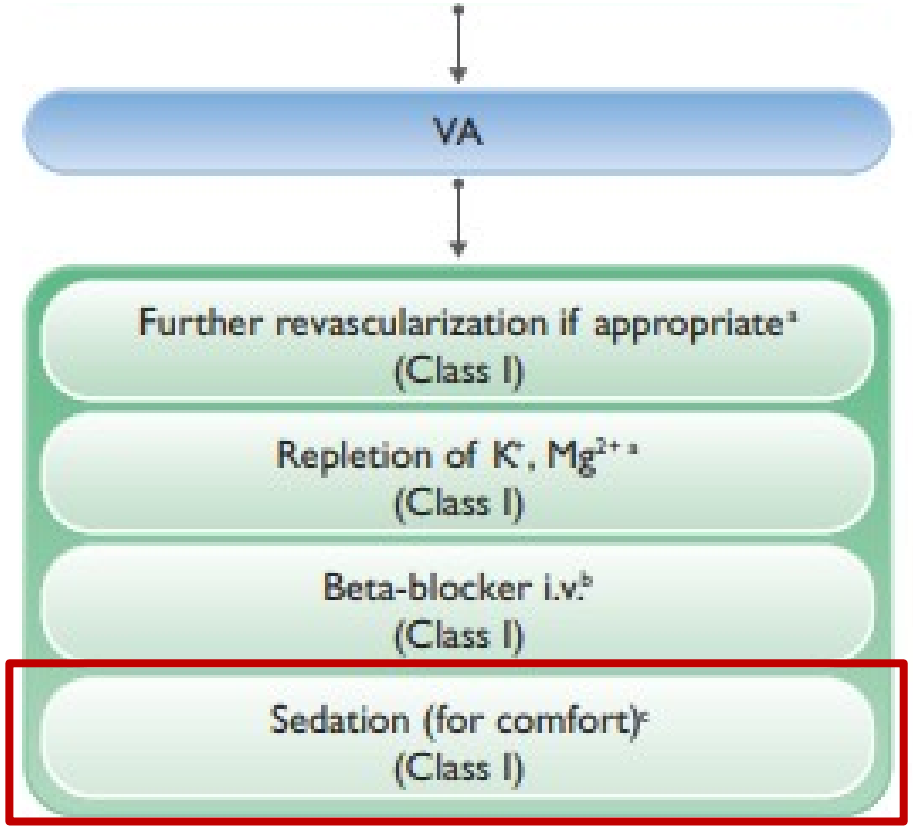


2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Recurrent VA

Amiodarone i.v.
(Class IIa)

2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Table 8 Anti-arrhythmic drugs (acute and chronic treatment)

Anti-arrhythmic drug	Effects on ECG	Indications (specific indication)	Oral dose per day (i.v. dose)	Side effects	Contraindications, precautions, other considerations
Amiodarone	Decreases sinus node frequency, prolongs QT interval[a]	PVC, VT, VF	200–400 mg Loading dose: 600–1200 mg/ 24 h 8–10 days. (Loading dose: 5 mg/kg in 20 min–2 h, 2–3 times in 24 h, then 600–1200 mg/ 24 h 8–10 days)	*Cardiac:* Bradycardia, TdP (infrequent) *Extracardiac:* Photosensitivity, corneal deposits, hypothyroidism, hyperthyroidism, pulmonary toxicity, hepatotoxicity, polyneuropathy, skin discoloration	*Precautions:* Sinus node dysfunction, severe AV conduction disturbances, hyperthyroidism *Other considerations:* Can be used in patients with heart failure. Increases the risk of myopathy when used with statins

Recurrent VA

Amiodarone i.v.
(Class IIa)

Lidocaine i.v.
(Class IIb)

2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Table 8 **Anti-arrhythmic drugs (acute and chronic treatment)**

Anti-arrhythmic drug	Effects on ECG	Indications (specific indication)	Oral dose per day (i.v. dose)	Side effects	Contraindications, precautions, other considerations
Lidocaine	No significant effects	(VT/VF associated with ACS)	No oral use (50–200 mg bolus, then 2–4 mg/min)	*Cardiac:* Sinoatrial arrest *Extracardiac:* Central nervous system effects (e.g. drowsiness, dizziness)	*Precautions:* Reduced dose with reduced liver blood flow (e.g. shock, β-blockade, severe heart failure) *Other considerations:* More effective with high potassium level. Few haemodynamic side effects

2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

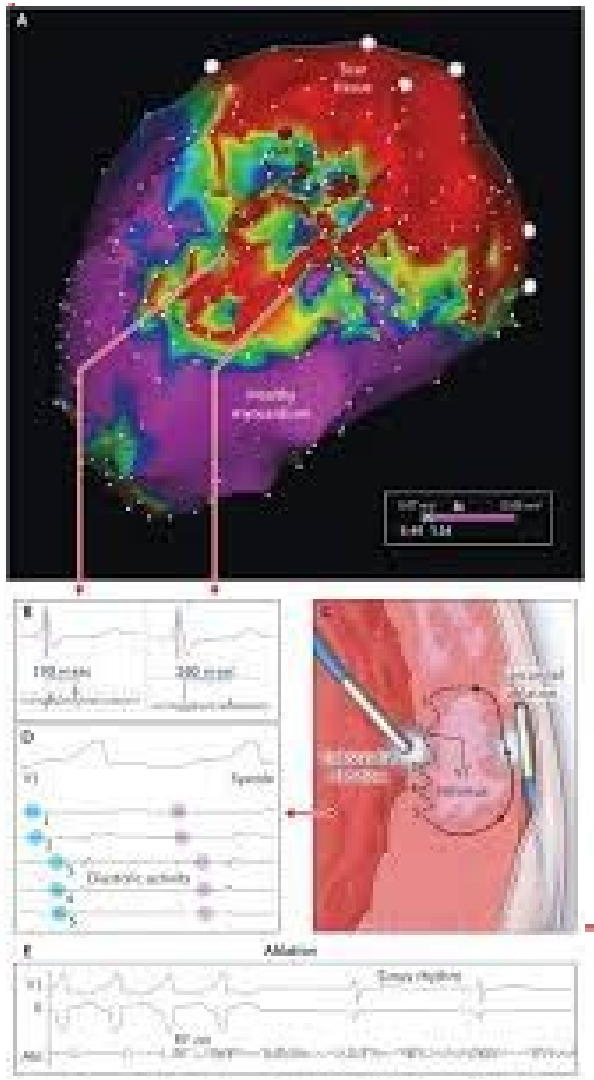
Recurrent VA

Amiodarone i.v.
(Class IIa)

Lidocaine i.v.
(Class IIb)

Deep sedation/intubation[c]
(Class IIb)

2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

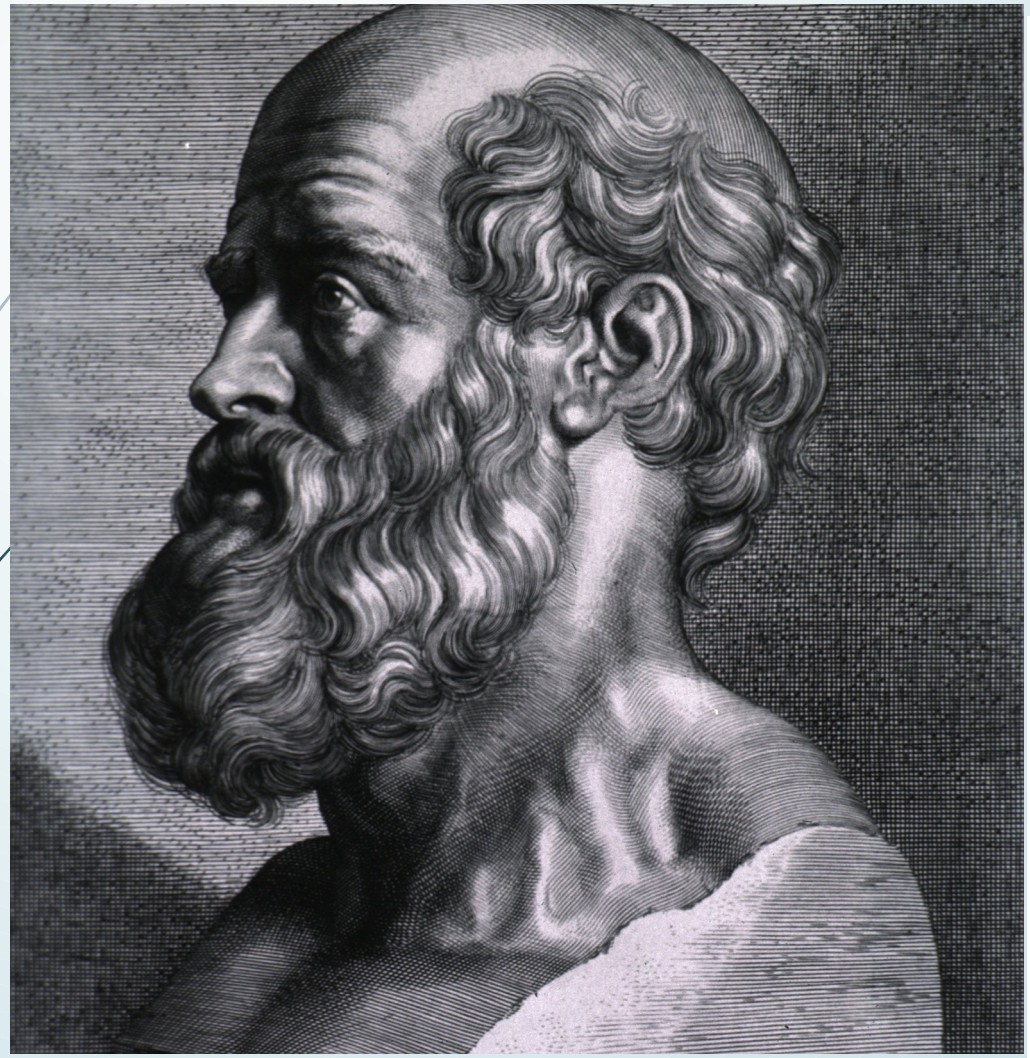


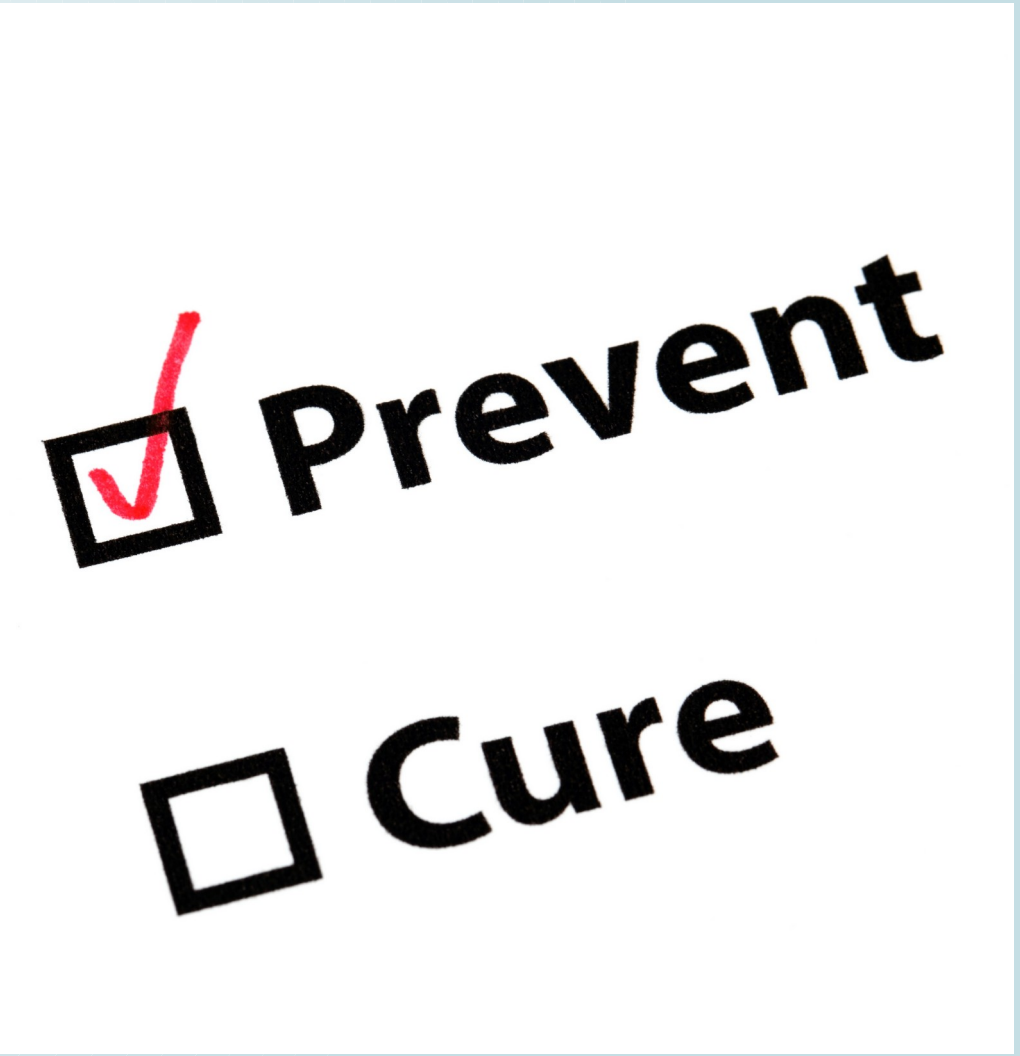
Recurrent VA

- Catheter ablation[d] (Class IIa)
- Overdrive pacing[a] (Class IIa)
- Autonomic modulation[c] (Class IIb)
- Mechanical circulatory support[c] (Class IIb)

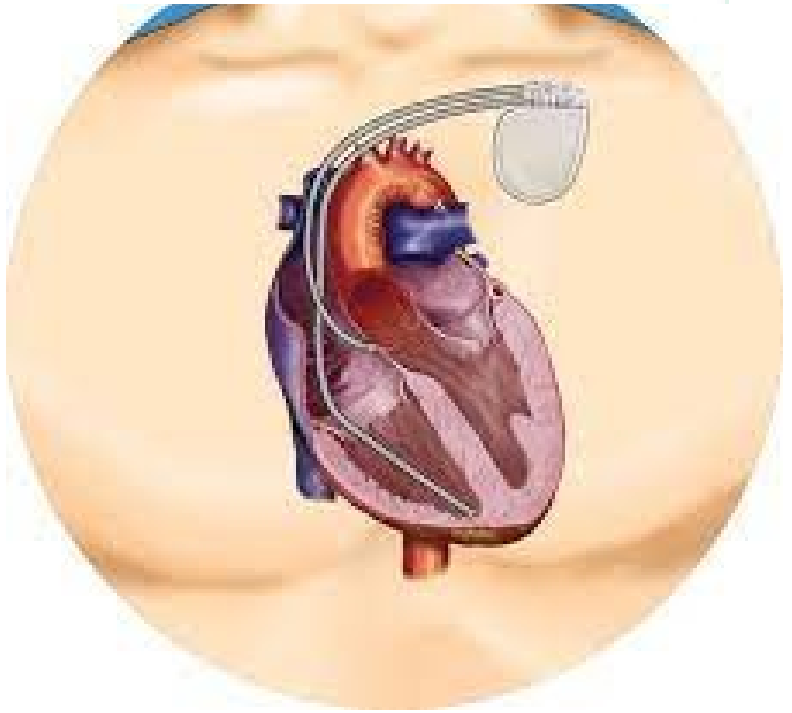
ESC

2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD




Prevent
Cure

Secondary prevention of SCD and treatment of VAs		
ICD implantation is recommended in patients without ongoing ischaemia with documented VF or haemodynamically not-tolerated VT occurring later than 48 h after MI.[349–351]	I	A



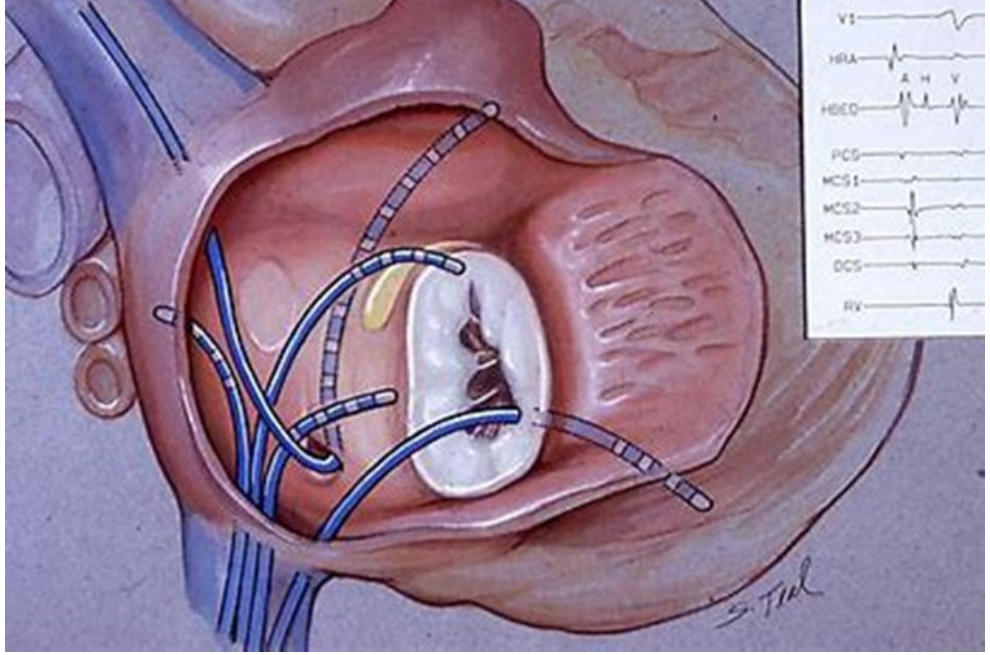
2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Recommendation Table 23 — Recommendations for risk stratification and treatment of ventricular arrhythmias early after myocardial infarction

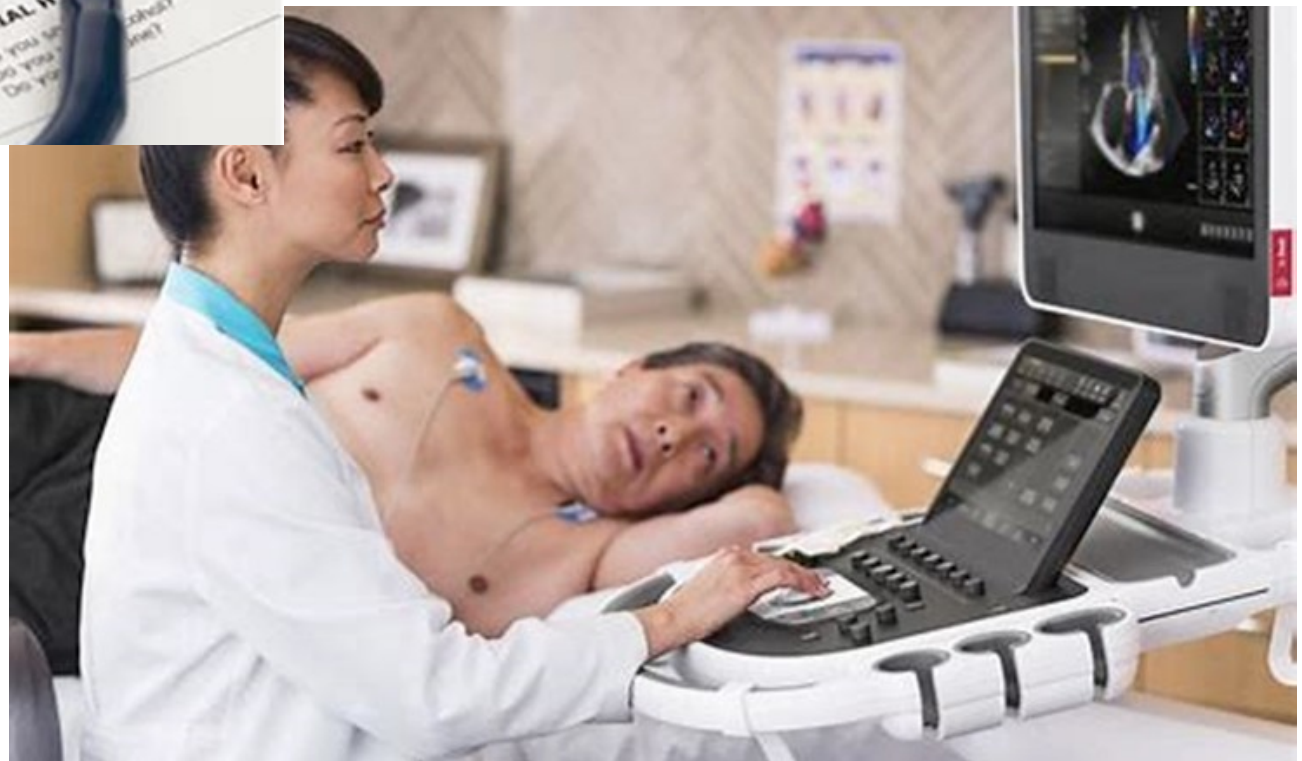
Recommendations	Class[a]	Level[b]
Risk stratification		
Early (before discharge) assessment of LVEF is recommended in all patients with acute MI.[567,568]	I	B
In patients with pre-discharge LVEF ≤40%, re-evaluation of LVEF 6–12 weeks after MI is recommended to assess the potential need for primary prevention ICD implantation.[568,573,574]	I	C

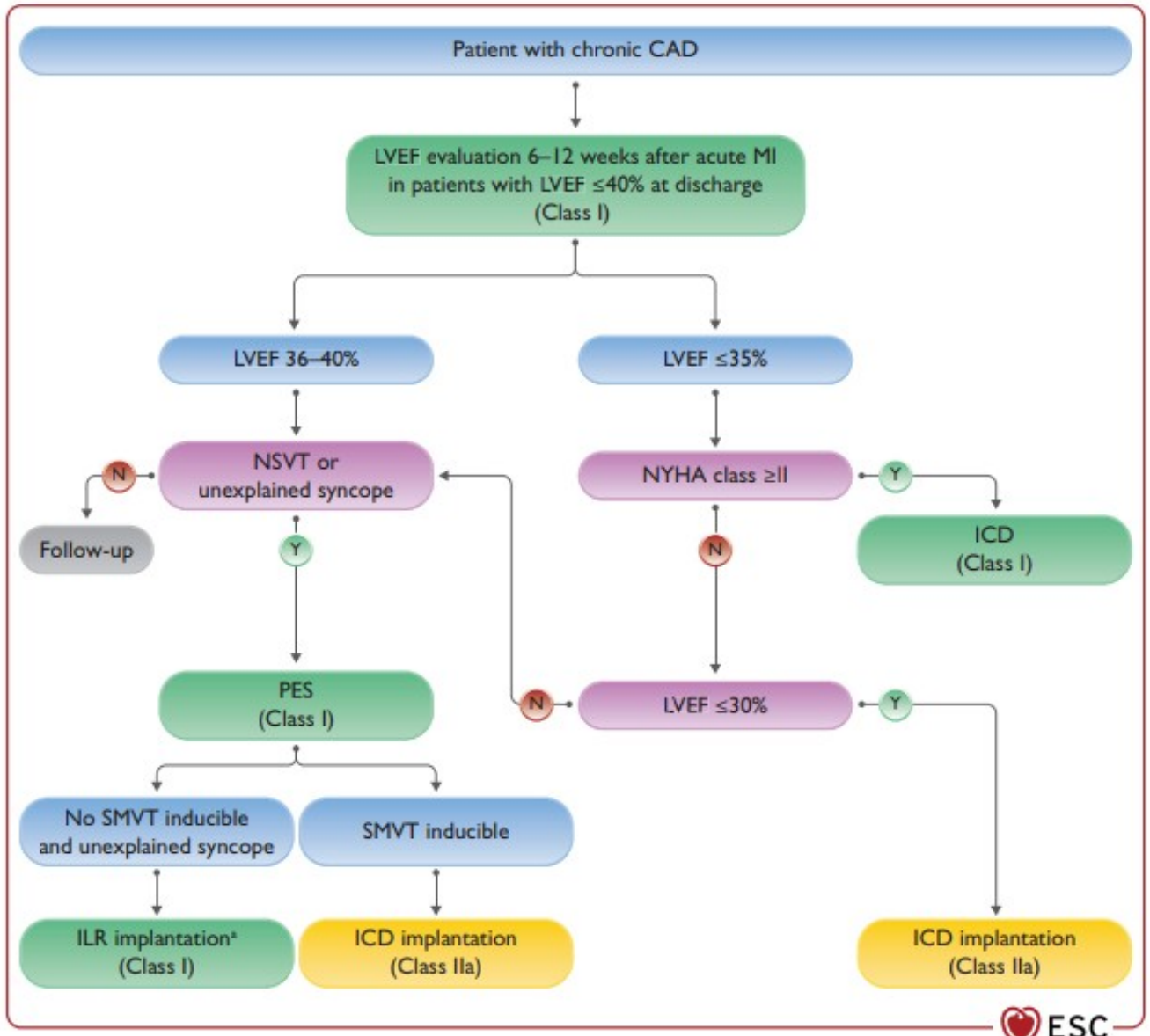
2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD


MEDICAL HISTORY FORM
Patient's name
DOB
Weight
ALLERGIES
CURRENT SYMPTOMS
Cough/Sputum > 3 weeks
Fever, unexplained
Weight loss / anorexia
Night sweats
Fatigue
MEDICAL HISTORY
Asthma
Cancer
Depression
Epilepsy
Heart
Breast cancer
Thyroid disease
High blood pressure
Depression
SOCIAL HISTORY


HRA
HBEO
PCS
MCS1
MCS2
MCS3
DCS
RV

Εργαλεία





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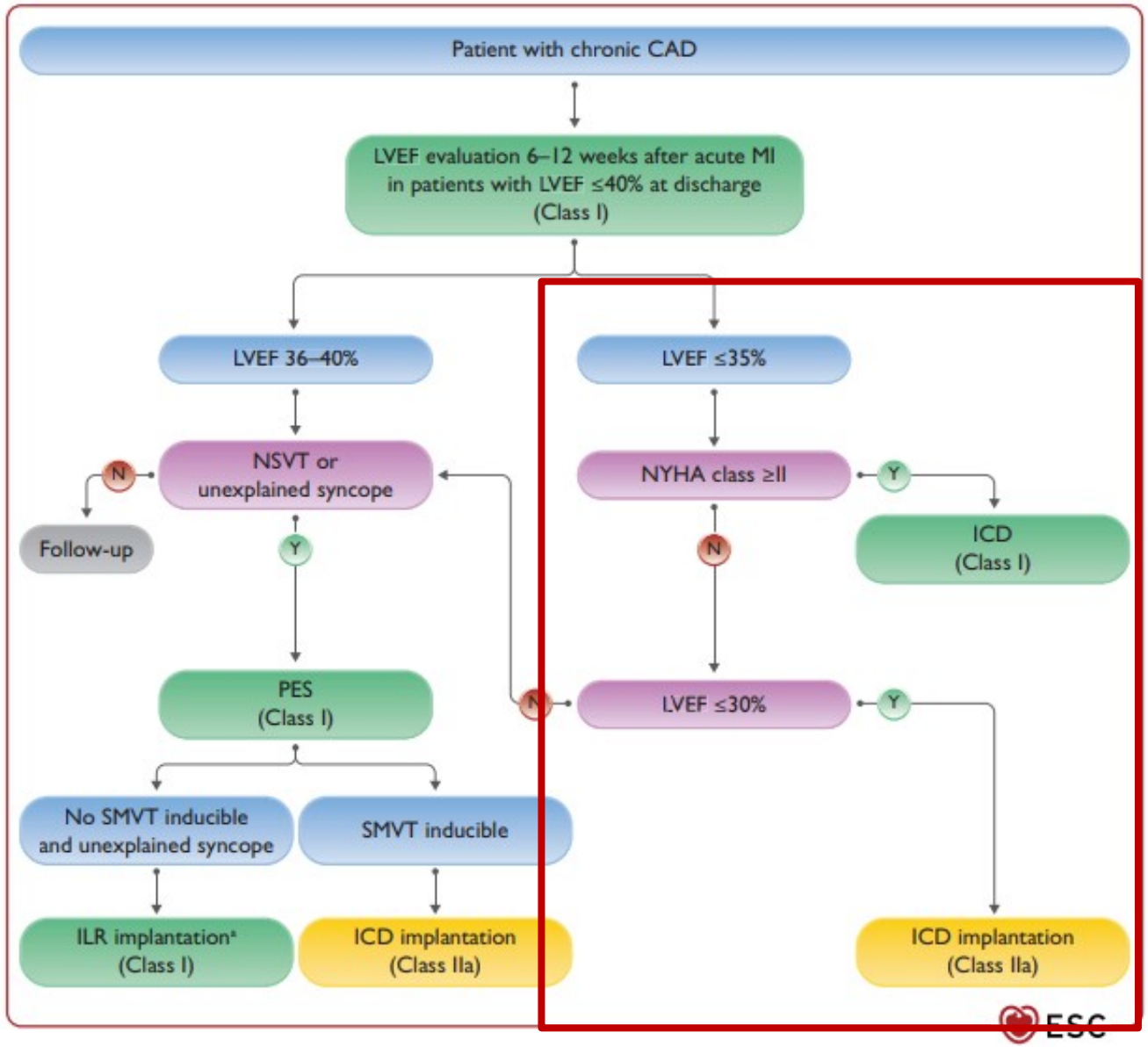

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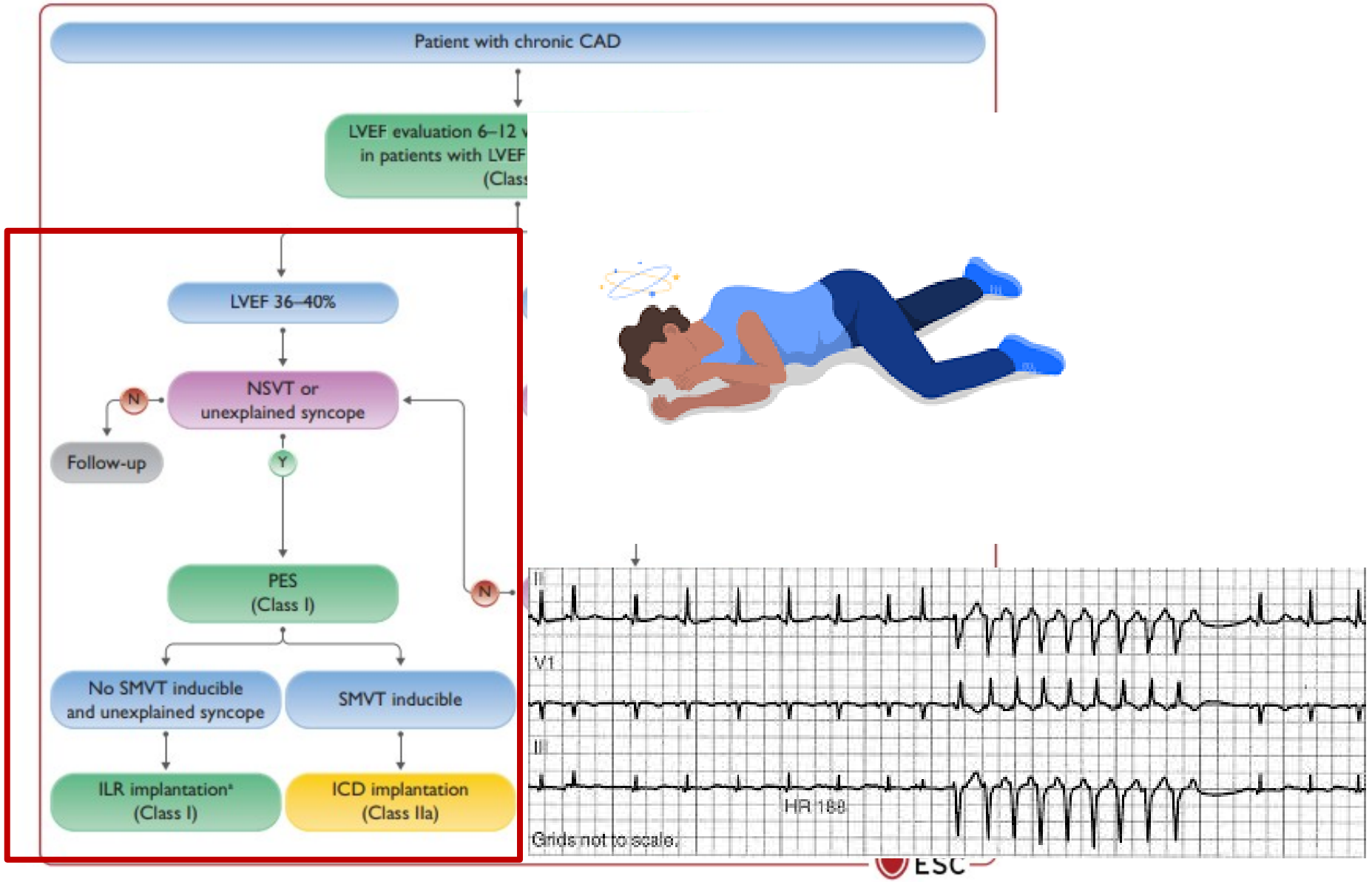

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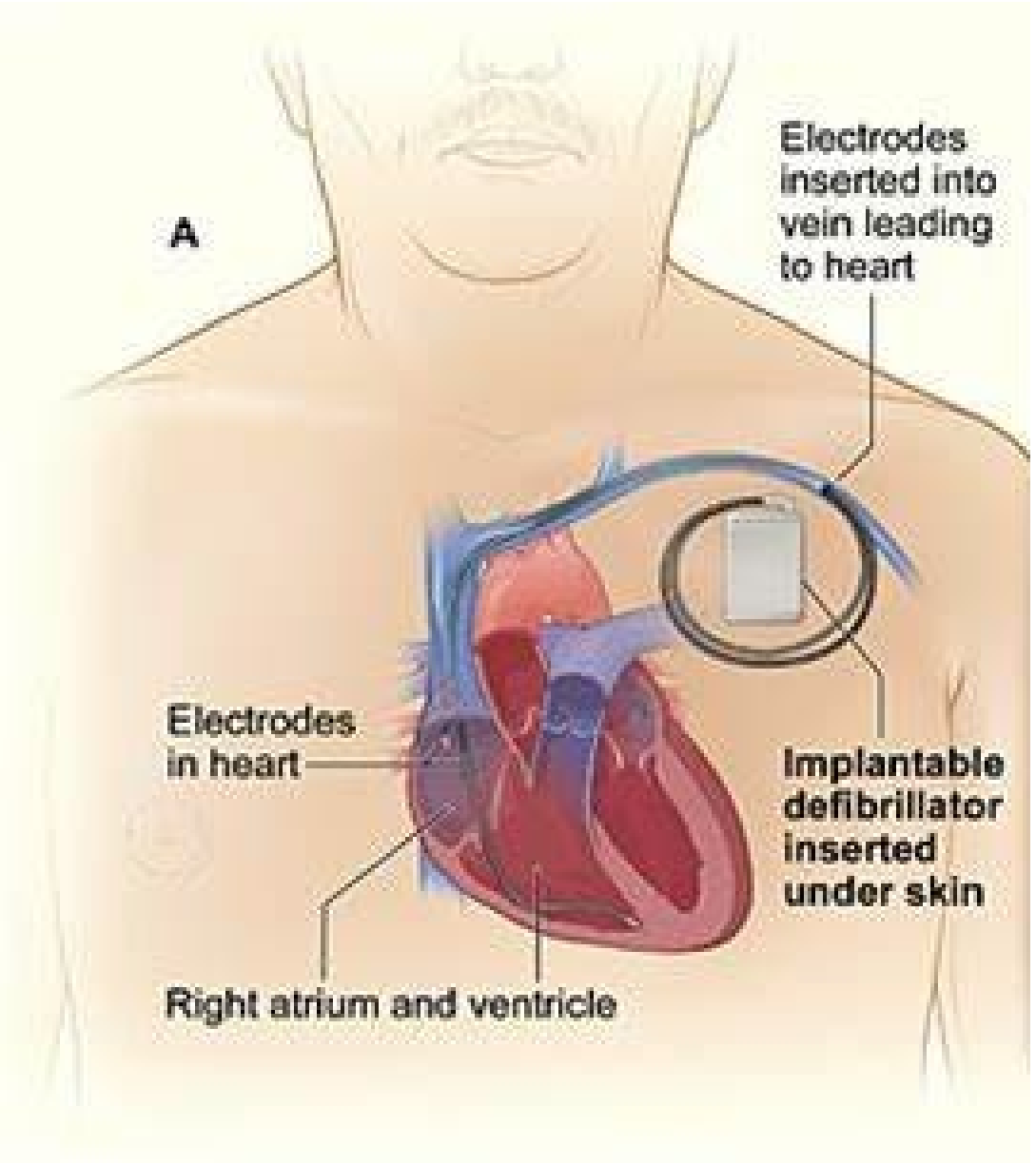
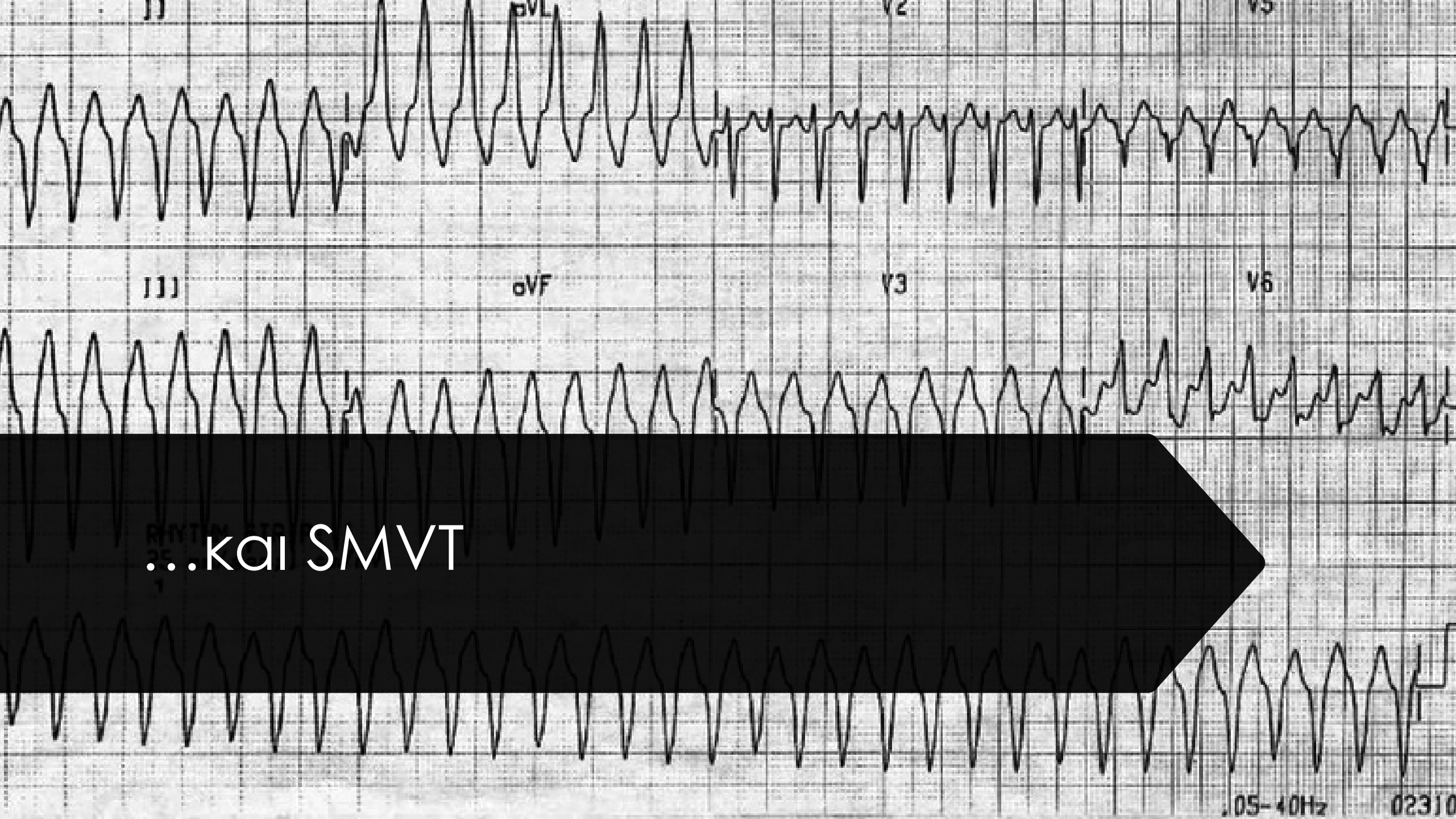
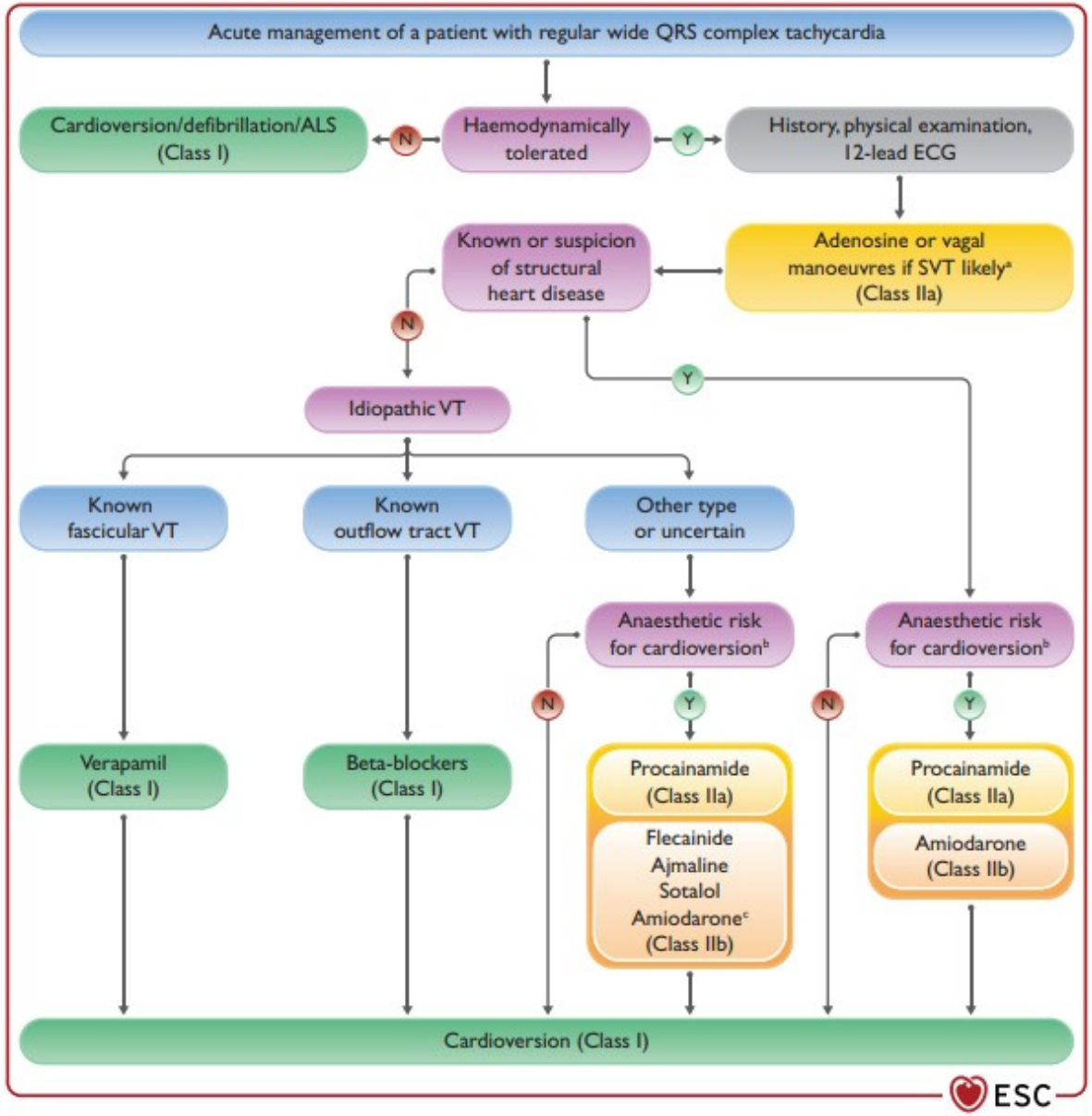

A
Electrodes inserted into vein leading to heart
Electrodes in heart
Implantable defibrillator inserted under skin
Right atrium and ventricle

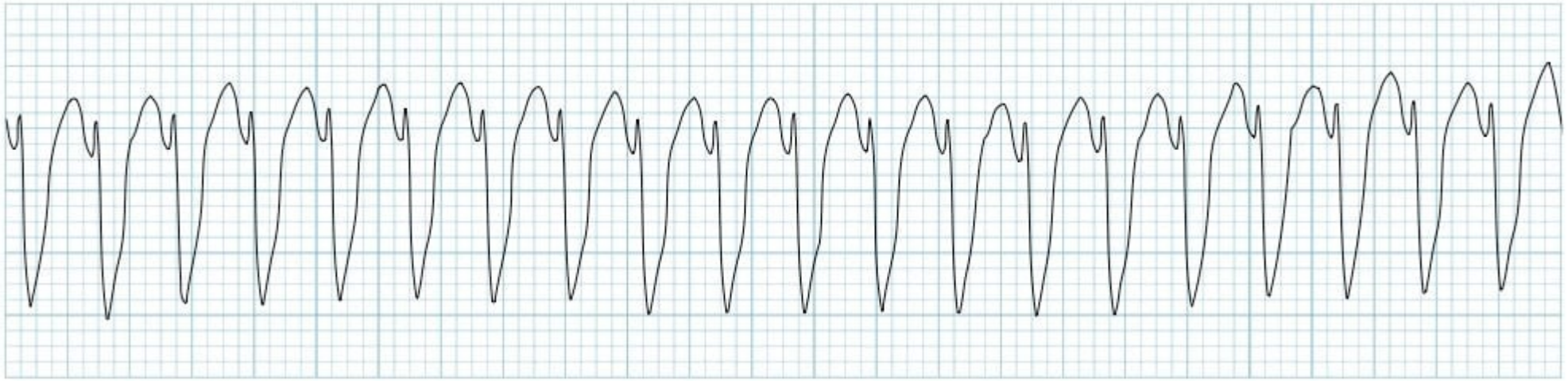
Ασθενής με ιστορικό στεφανιαίας νόσου…

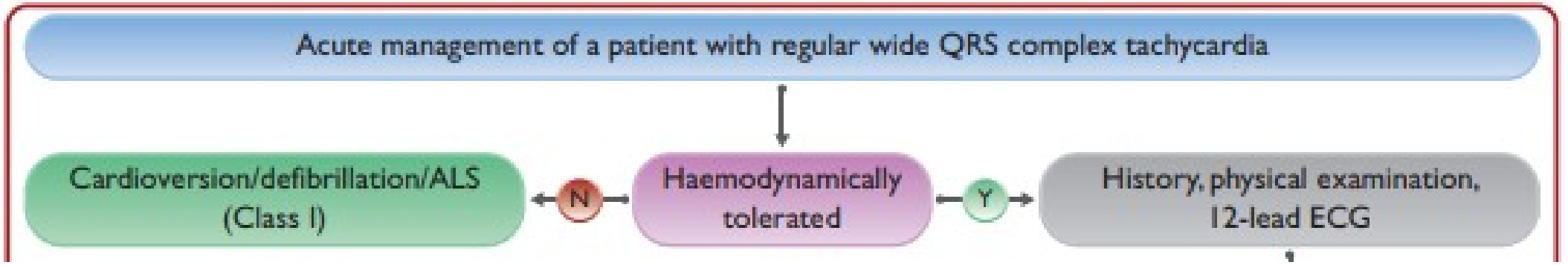


...και SMVT



2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD





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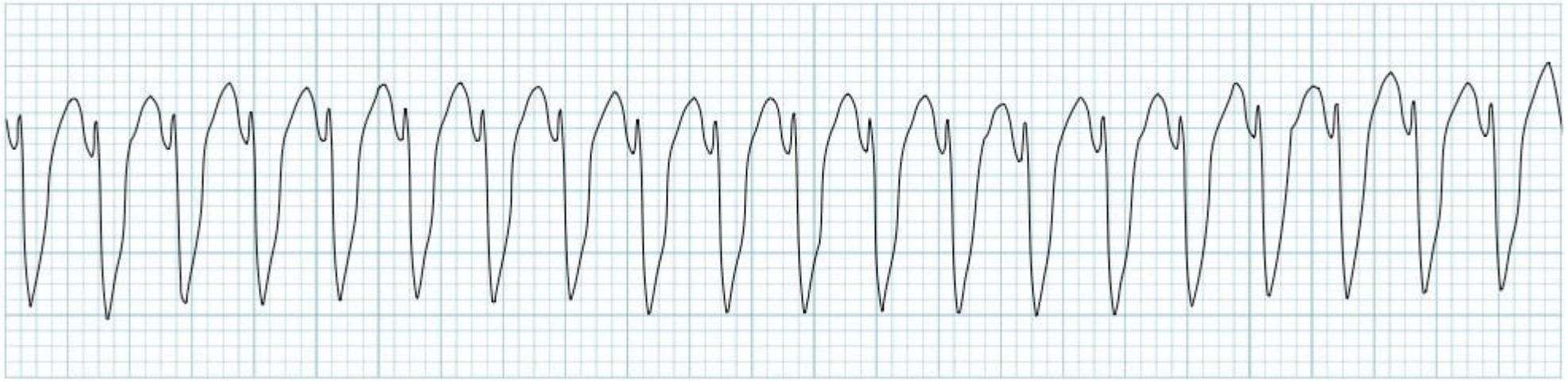

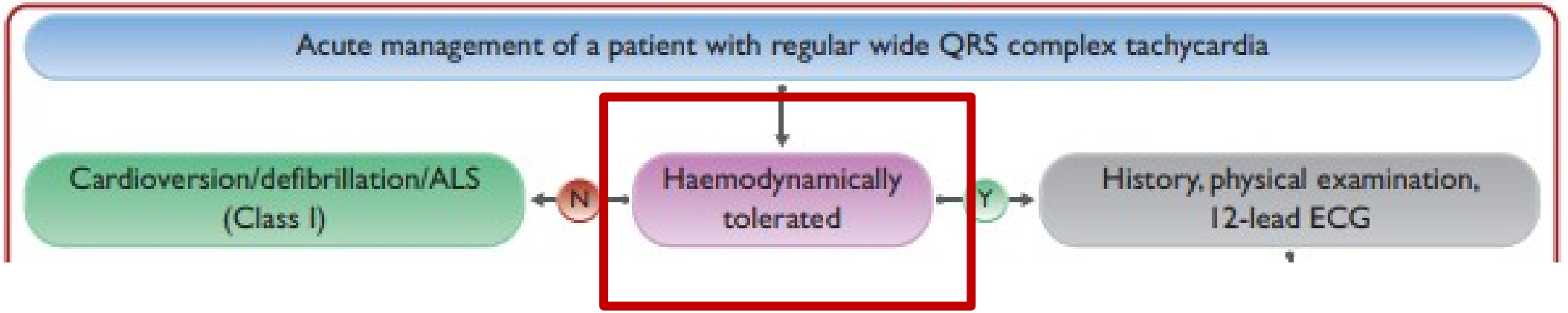

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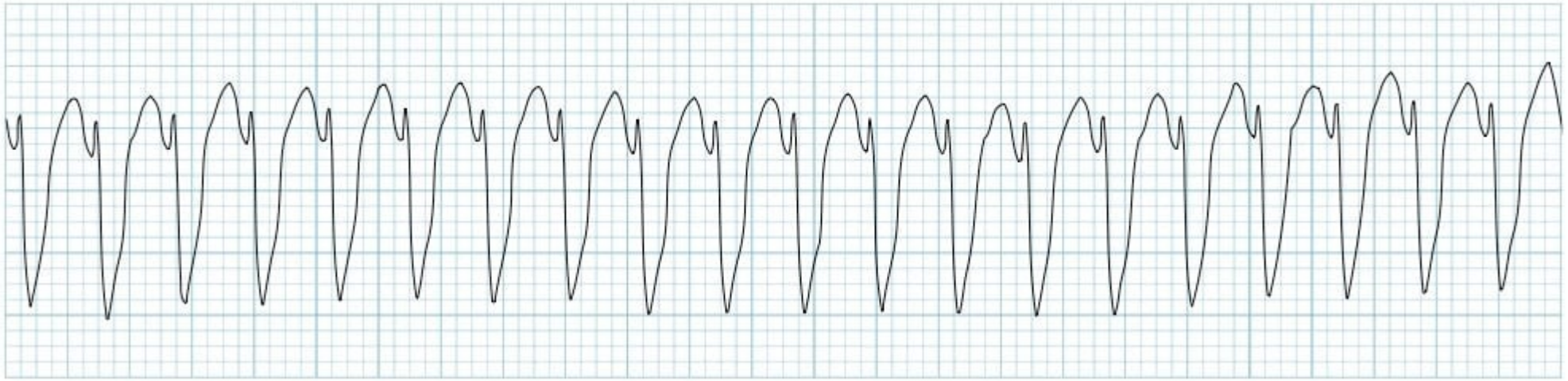
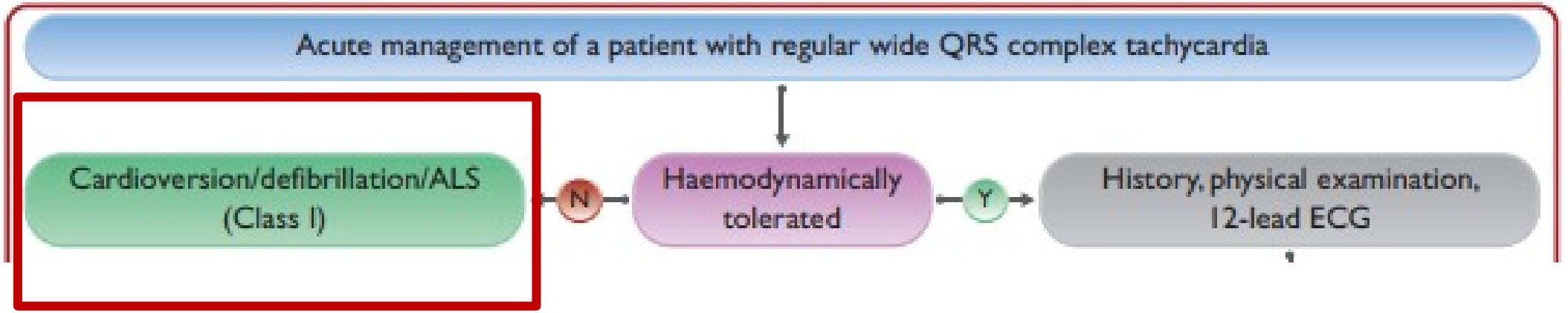
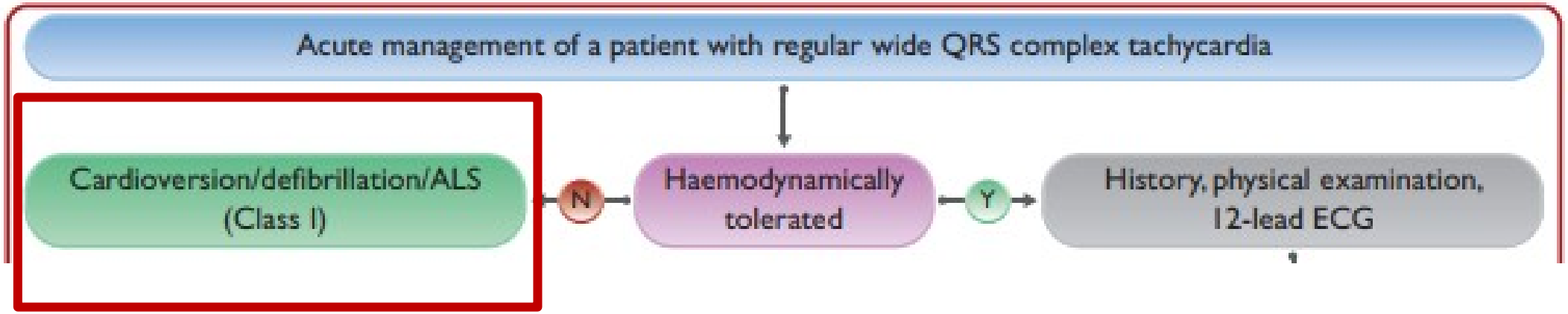




2022 ESC Guidelines for the management of patients with VAs and the prevention of SCD

Recommendations	Class[a]	Level[b]
Acute management of sustained VT		
DC cardioversion is recommended as the first-line treatment for patients with haemodynamically not-tolerated SMVT.[303,339]	I	B



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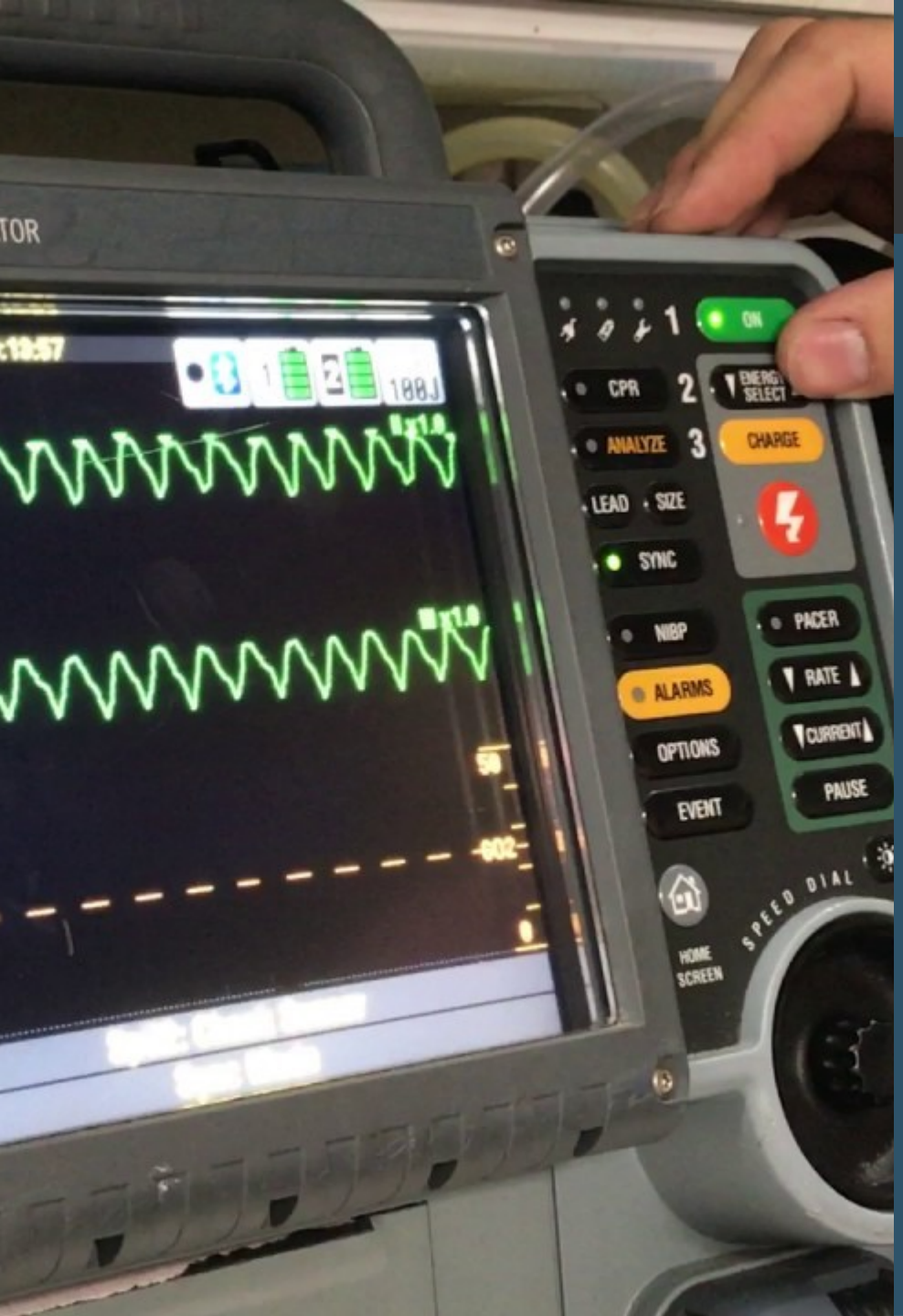
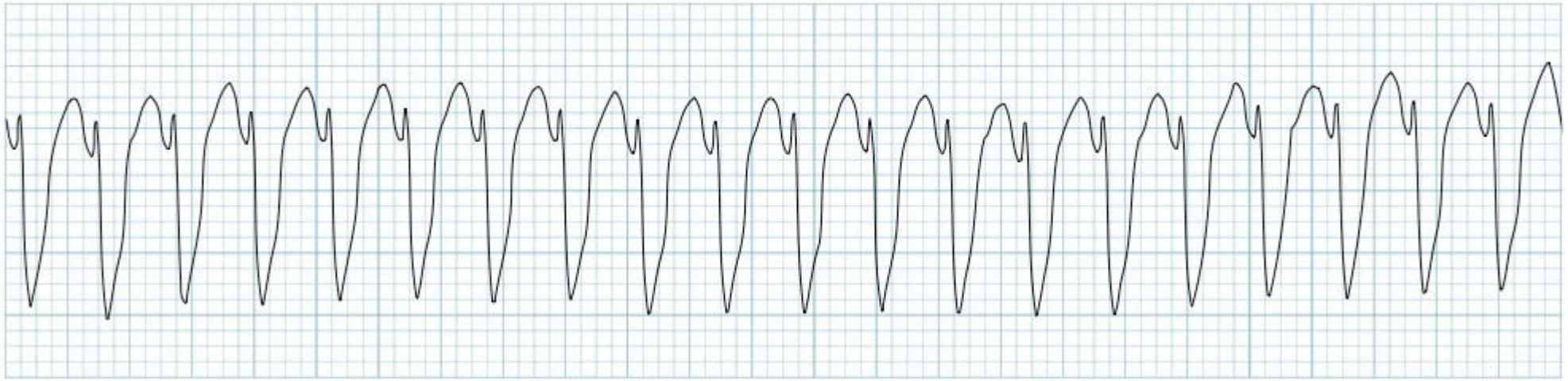
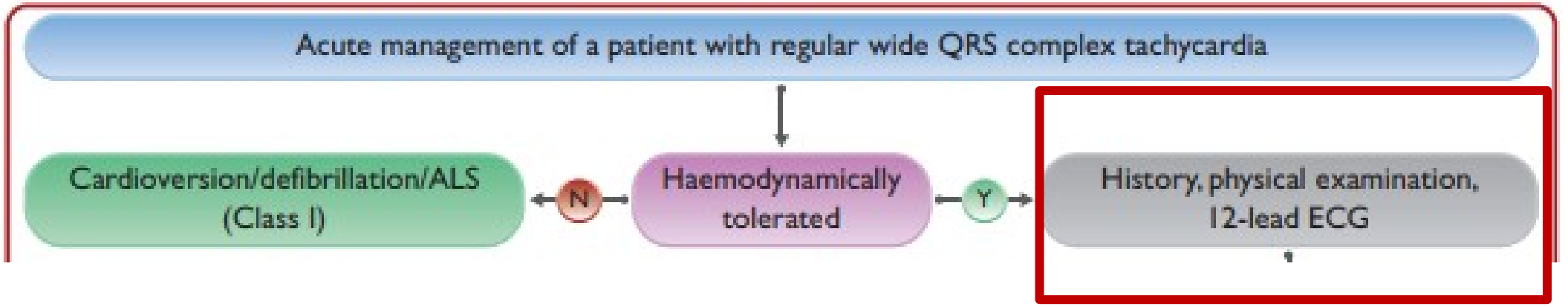


Ηλεκτρική καρδιομετατροπή-απινίδωση

- Συγχρονισμένη καρδιομετατροπή
- Εάν ο συγχρονισμός δεν είναι εφικτός, ασύγχρονη χορήγηση σοκ





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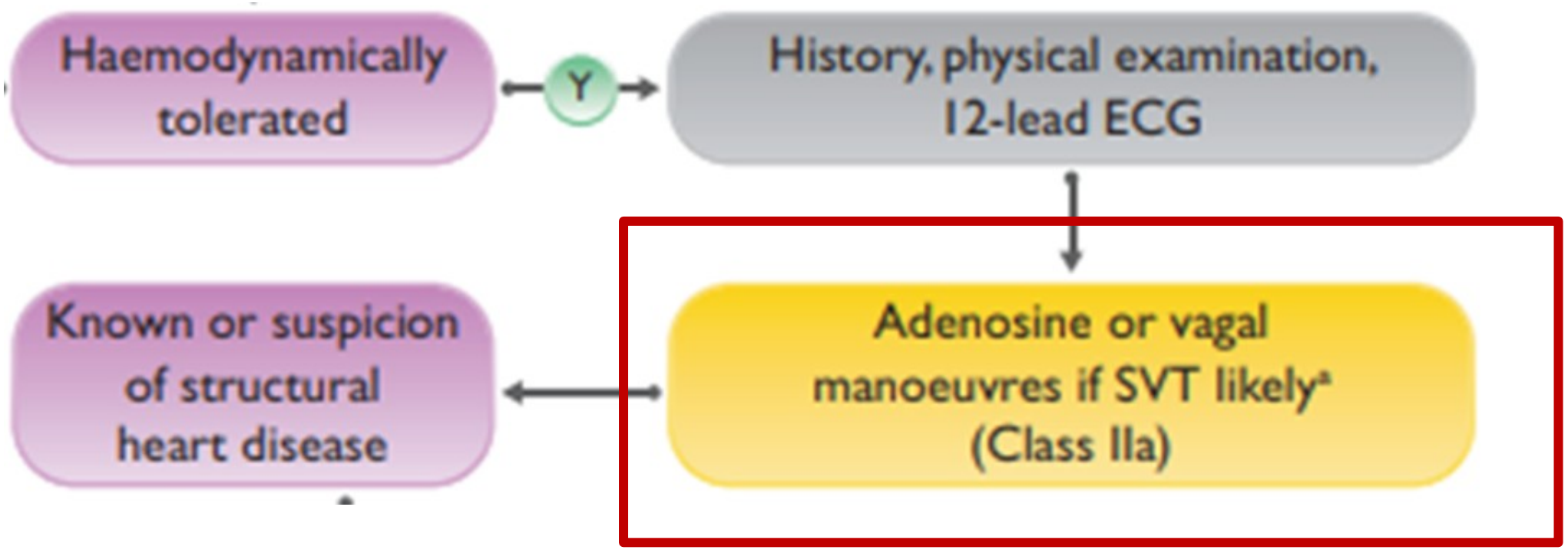

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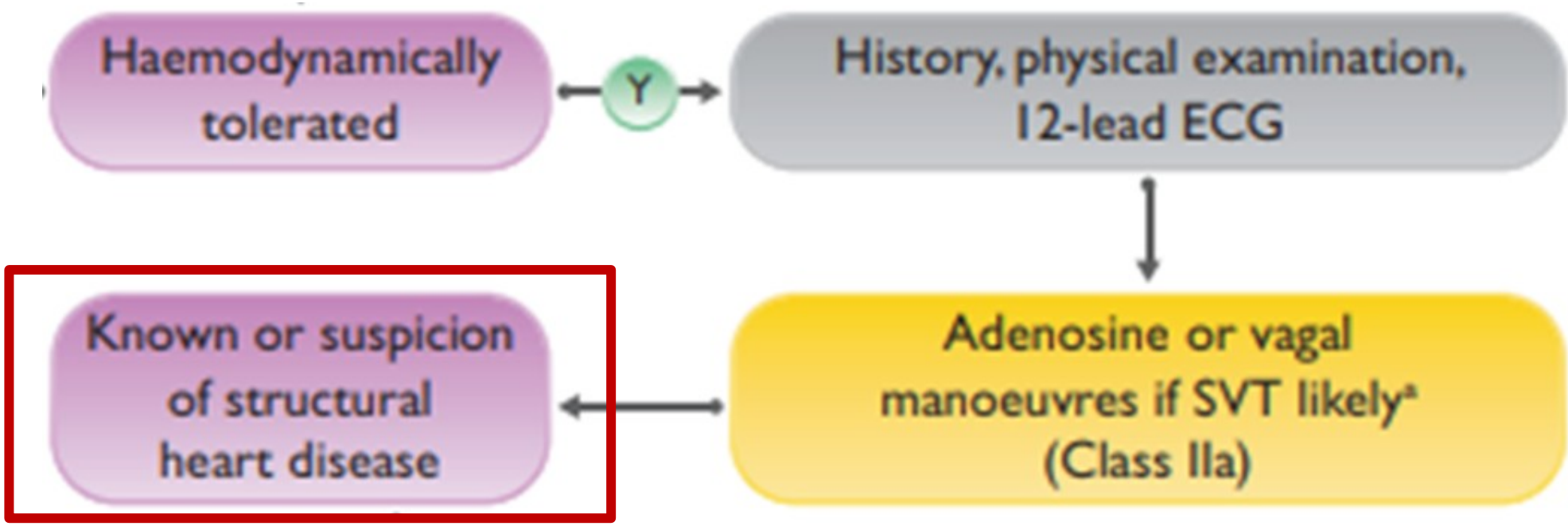

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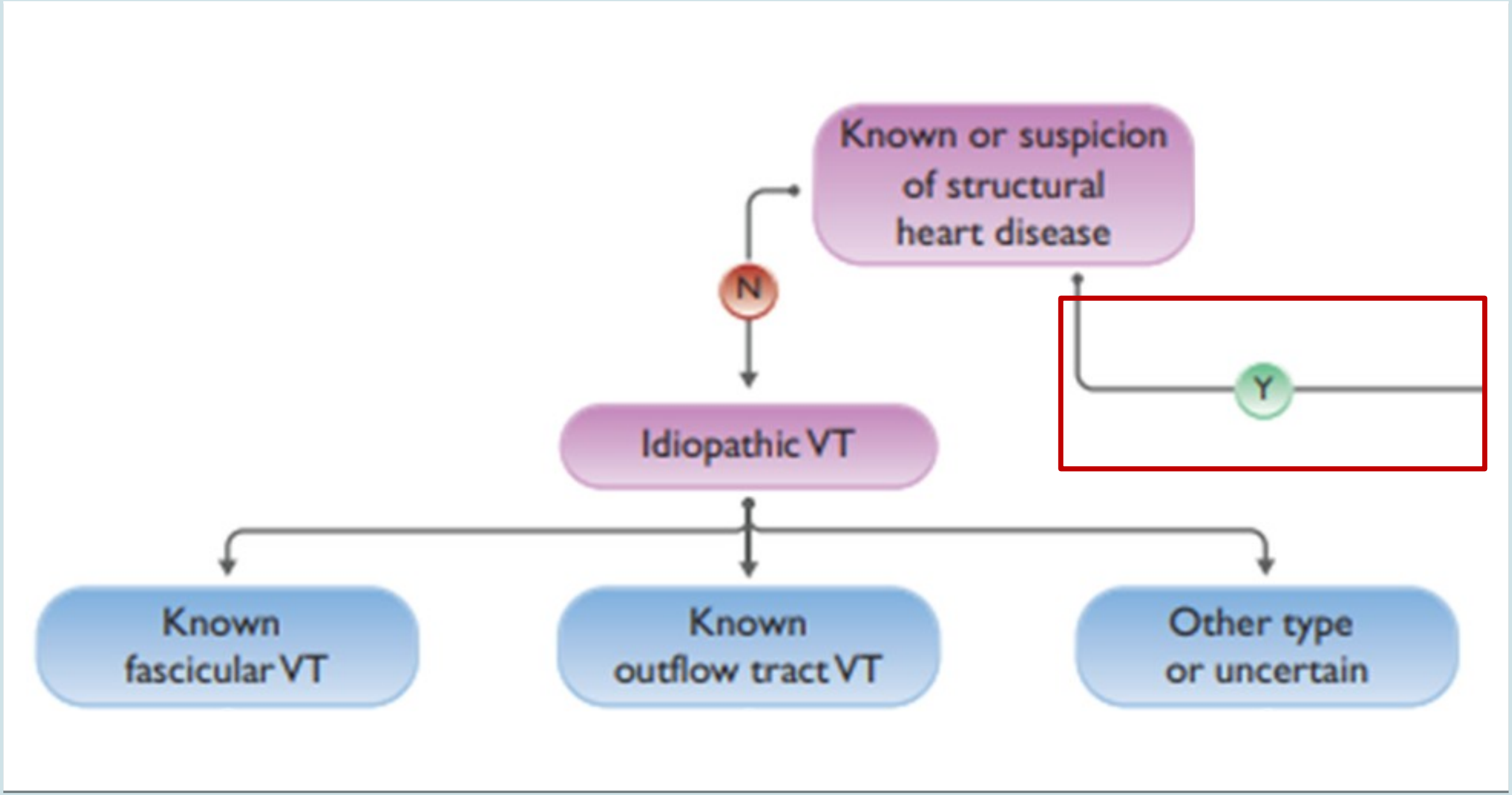

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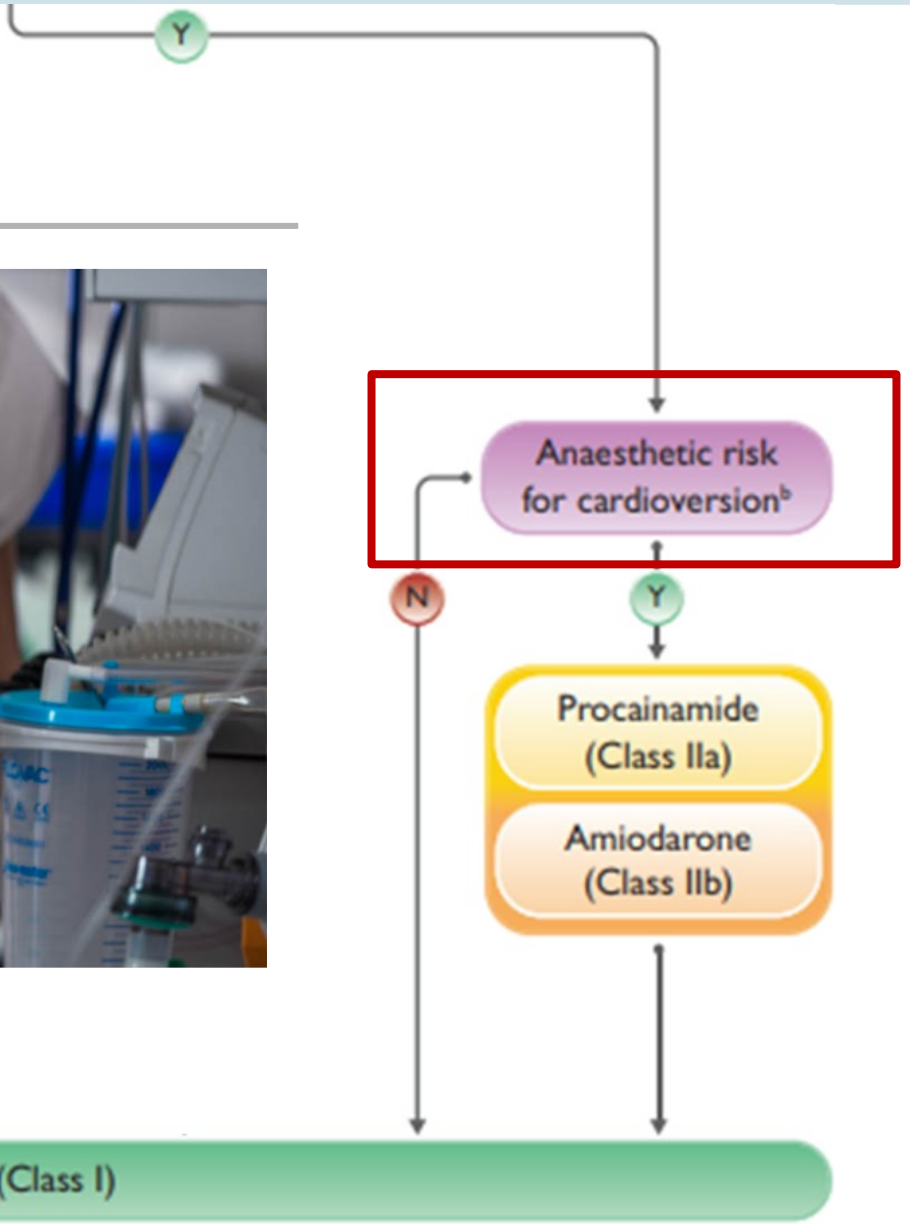

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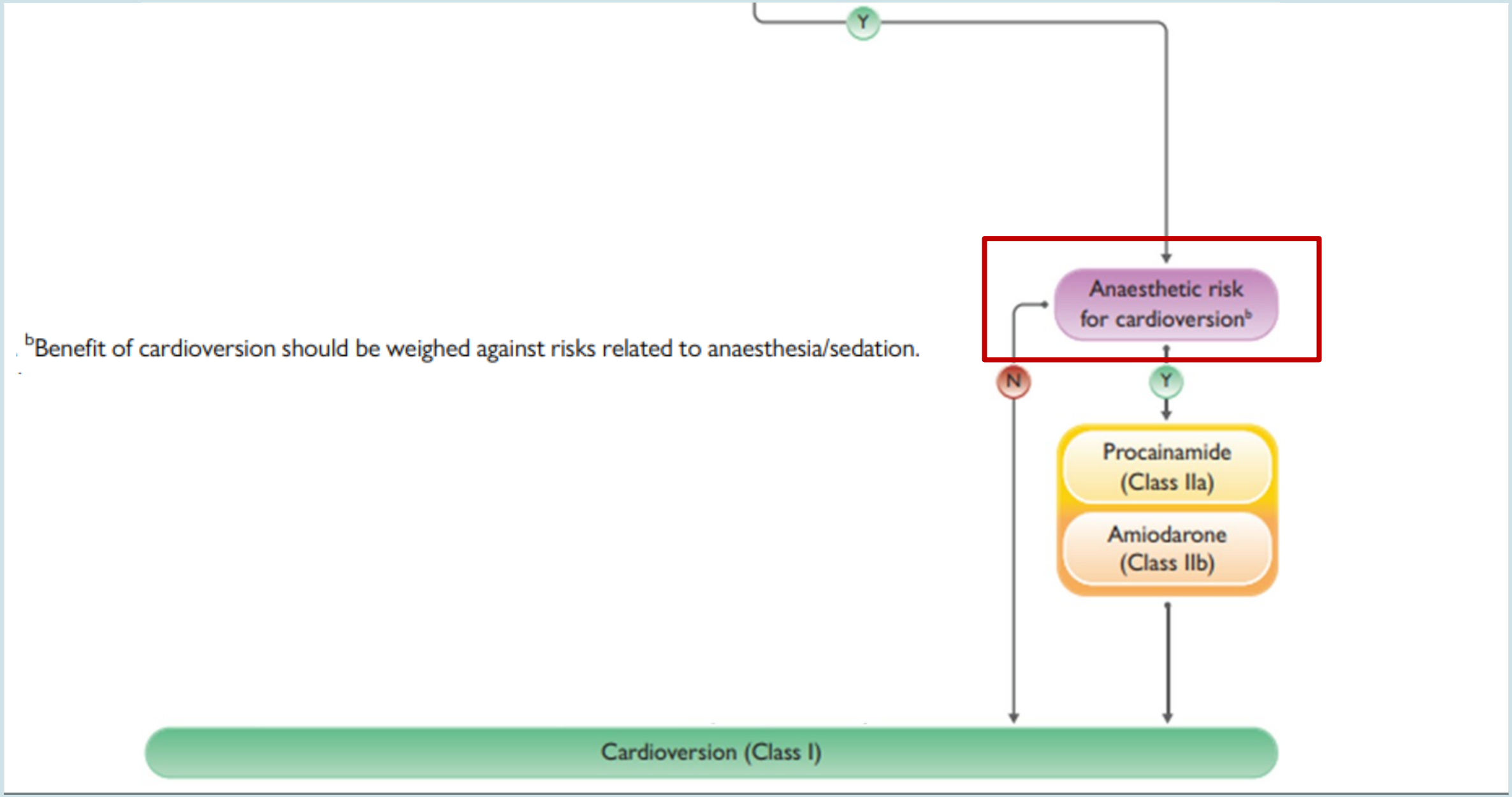

[b]Benefit of cardioversion should be weighed against risks related to anaesthesia/sedation.

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Y

Anaesthetic risk for cardioversion[b]

N

Y

Procainamide (Class IIa)

Amiodarone (Class IIb)

Cardioversion (Class I)

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In patients presenting with a haemodynamically tolerated SMVT and known or suspected SHD, intravenous procainamide should be considered.[303]	IIa	B
In patients presenting with a haemodynamically tolerated SMVT in the absence of an established diagnosis, intravenous amiodarone may be considered.[303]	IIb	B

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Table 8 **Anti-arrhythmic drugs (acute and chronic treatment)**

Anti-arrhythmic drug	Effects on ECG	Indications (specific indication)	Oral dose per day (i.v. dose)	Side effects	Contraindications, precautions, other considerations
Procainamide	Prolongs PR interval, QRS duration, and QT interval[a]	VT	(100 mg bolus, can be repeated after 5 min if no effect, max 500–750 mg [max 50 mg/min]. Then, 2–6 mg/min)	*Cardiac:* Sinus bradycardia, hypotension, TdP *Extracardiac:* Rash, myalgia, vasculitis, systemic lupus, agranulocytosis	*Contraindications:* Severe sinus node dysfunction, severe AV conduction disturbances, severe intraventricular conduction disturbances, severe LV dysfunction hypotension, BrS

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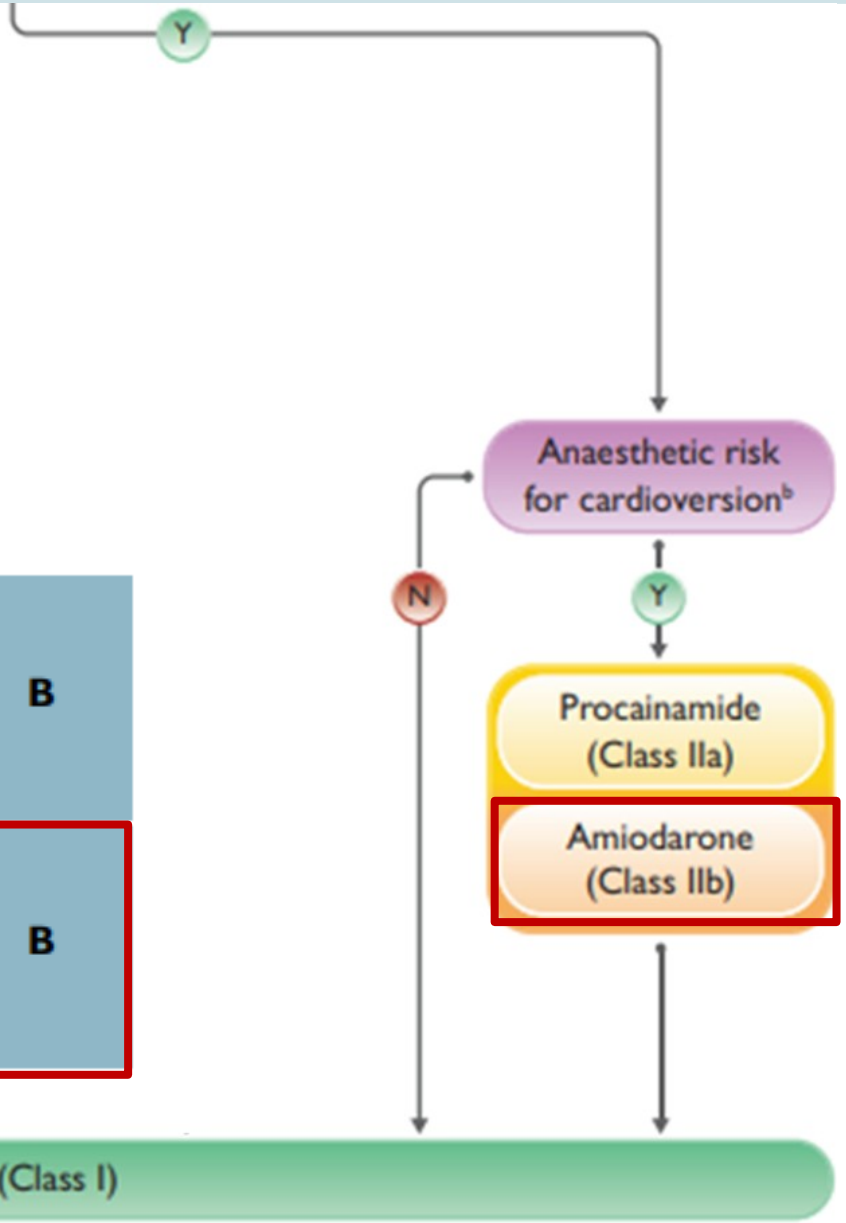
In patients presenting with a haemodynamically tolerated SMVT and known or suspected SHD, intravenous procainamide should be considered.[303]	IIa	B
In patients presenting with a haemodynamically tolerated SMVT in the absence of an established diagnosis, intravenous amiodarone may be considered.[303]	IIb	B



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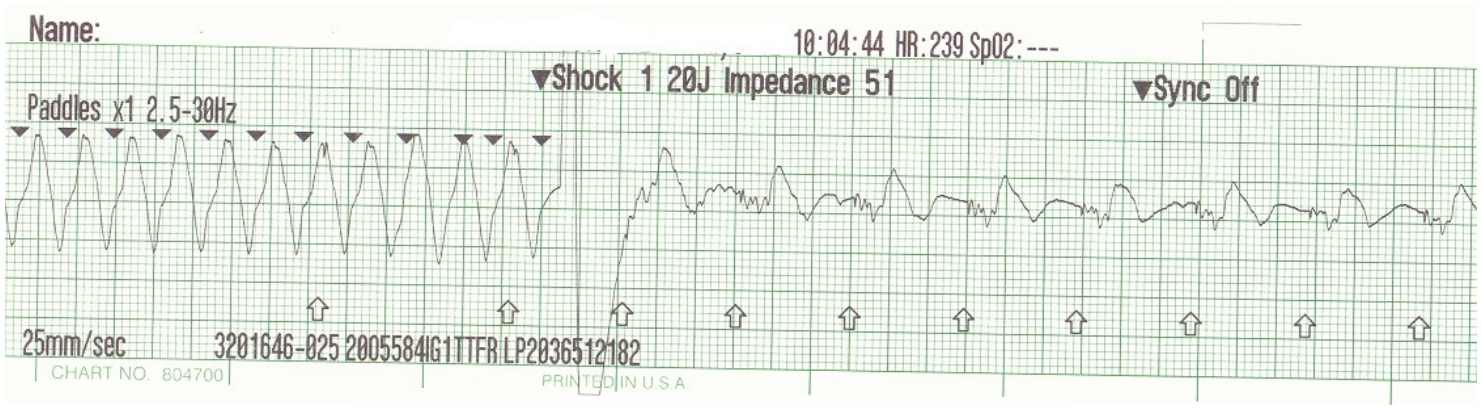

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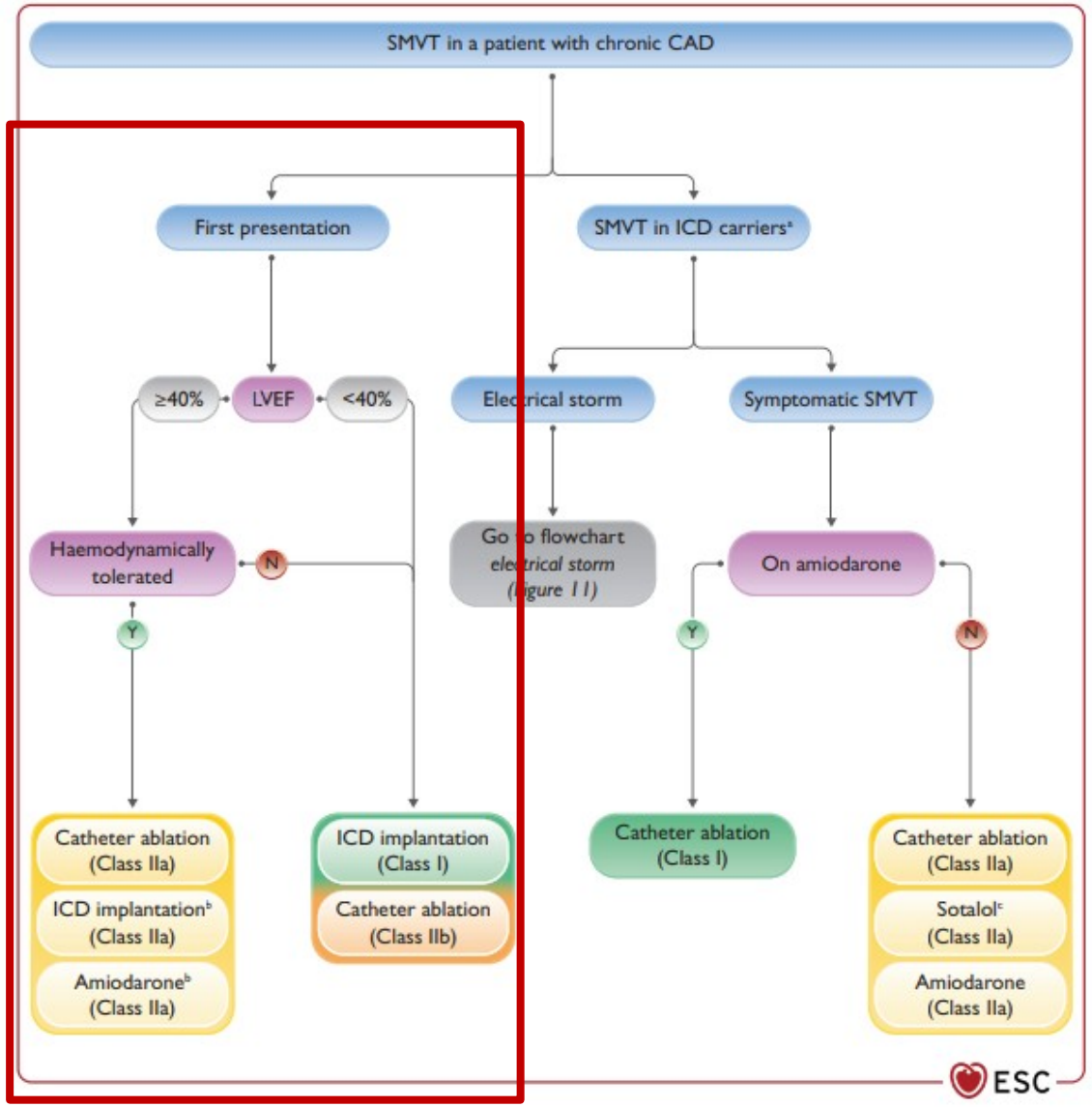

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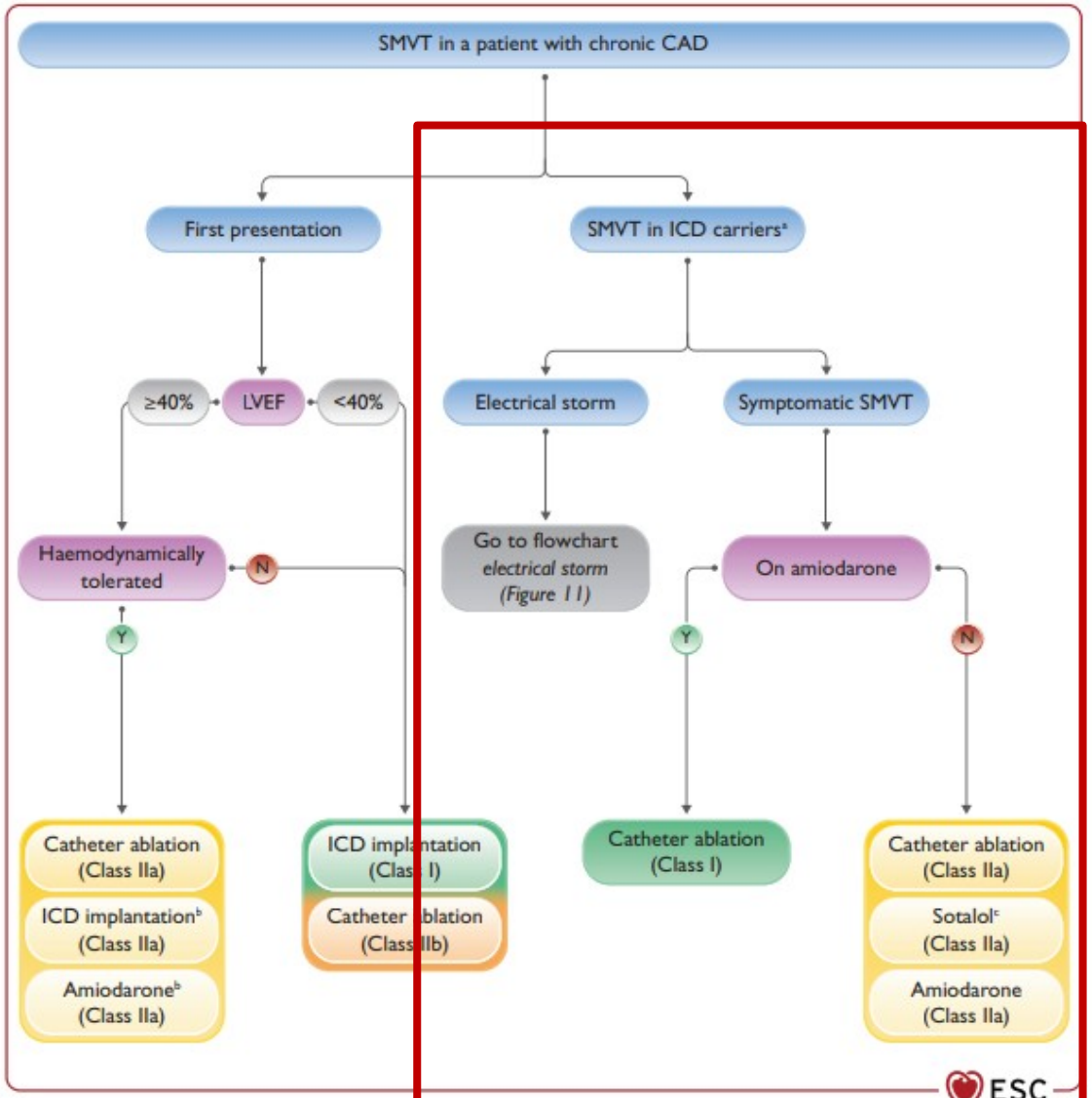

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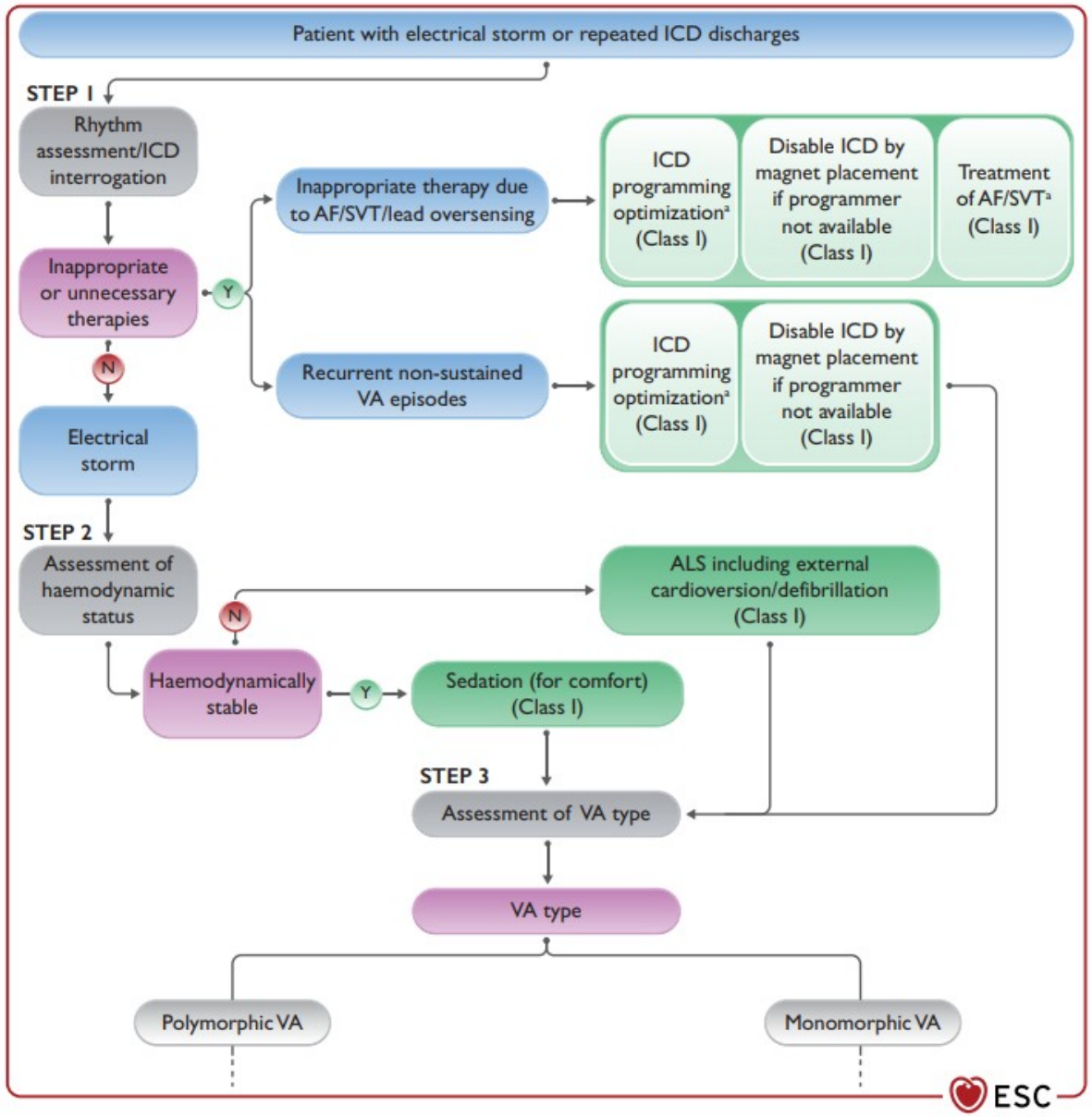
Ασθενής με εμφυτευμένο ICD και…

… ηλεκτρική θύελλα



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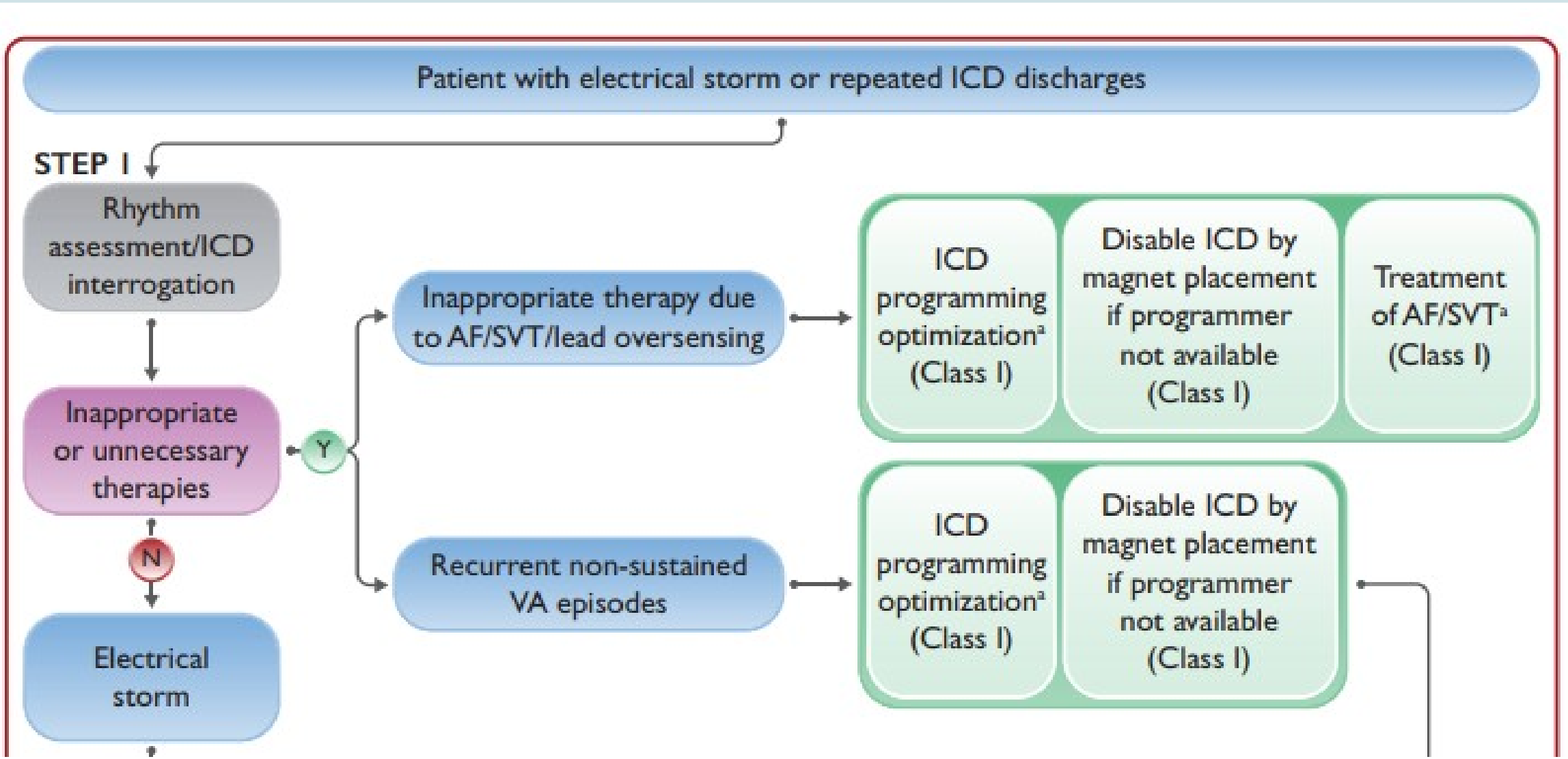

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Patient with electrical storm or repeated ICD discharges

STEP 1

Rhythm assessment/ICD interrogation

Inappropriate or unnecessary therapies

Y

N

Electrical storm

ICD programming optimization[a] (Class I)

Disable ICD by magnet placement if programmer not available (Class I)

Treatment of AF/SVT[a] (Class I)

ICD programming optimization[a] (Class I)

Disable ICD by magnet placement if programmer not available (Class I)

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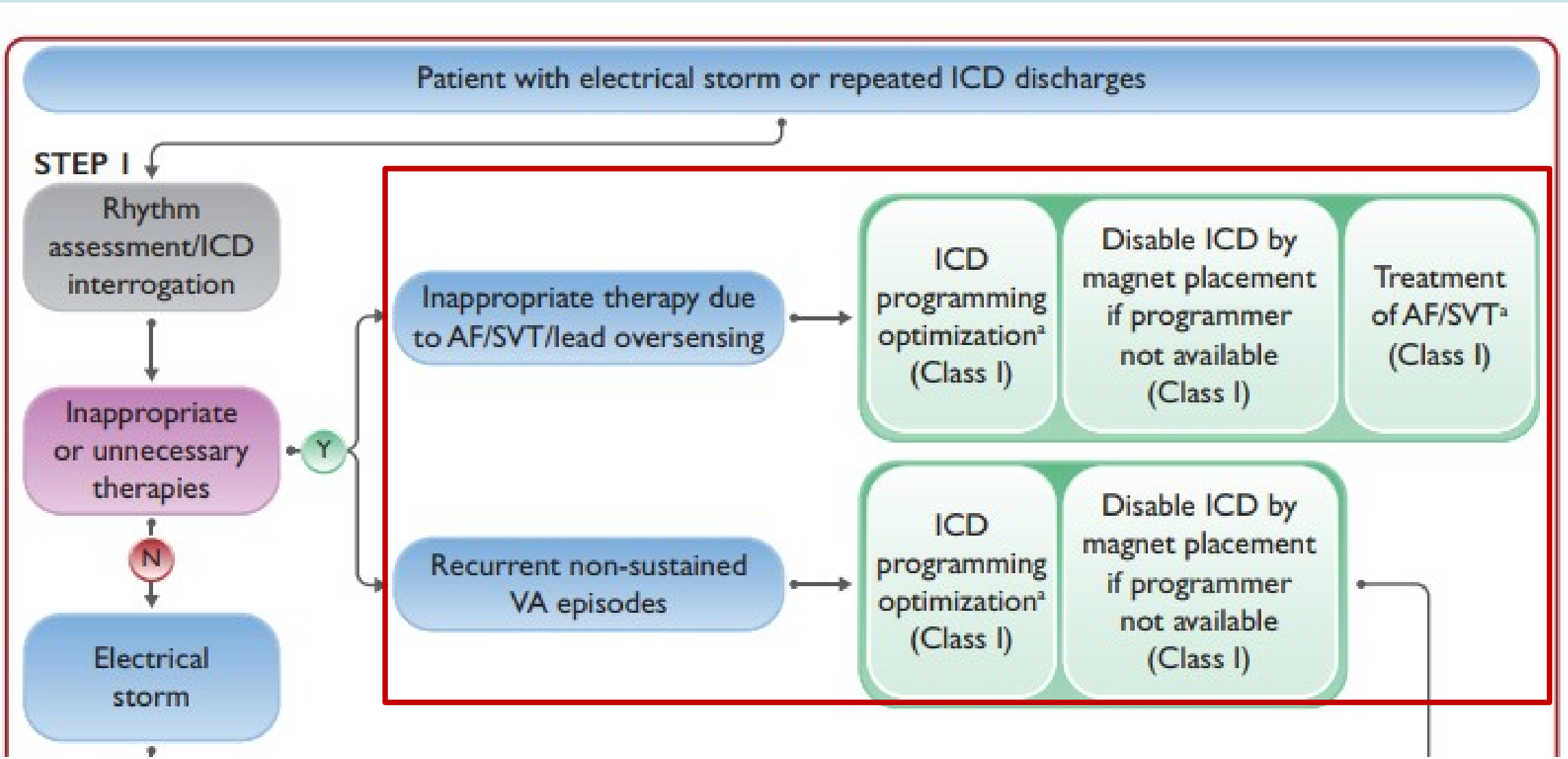

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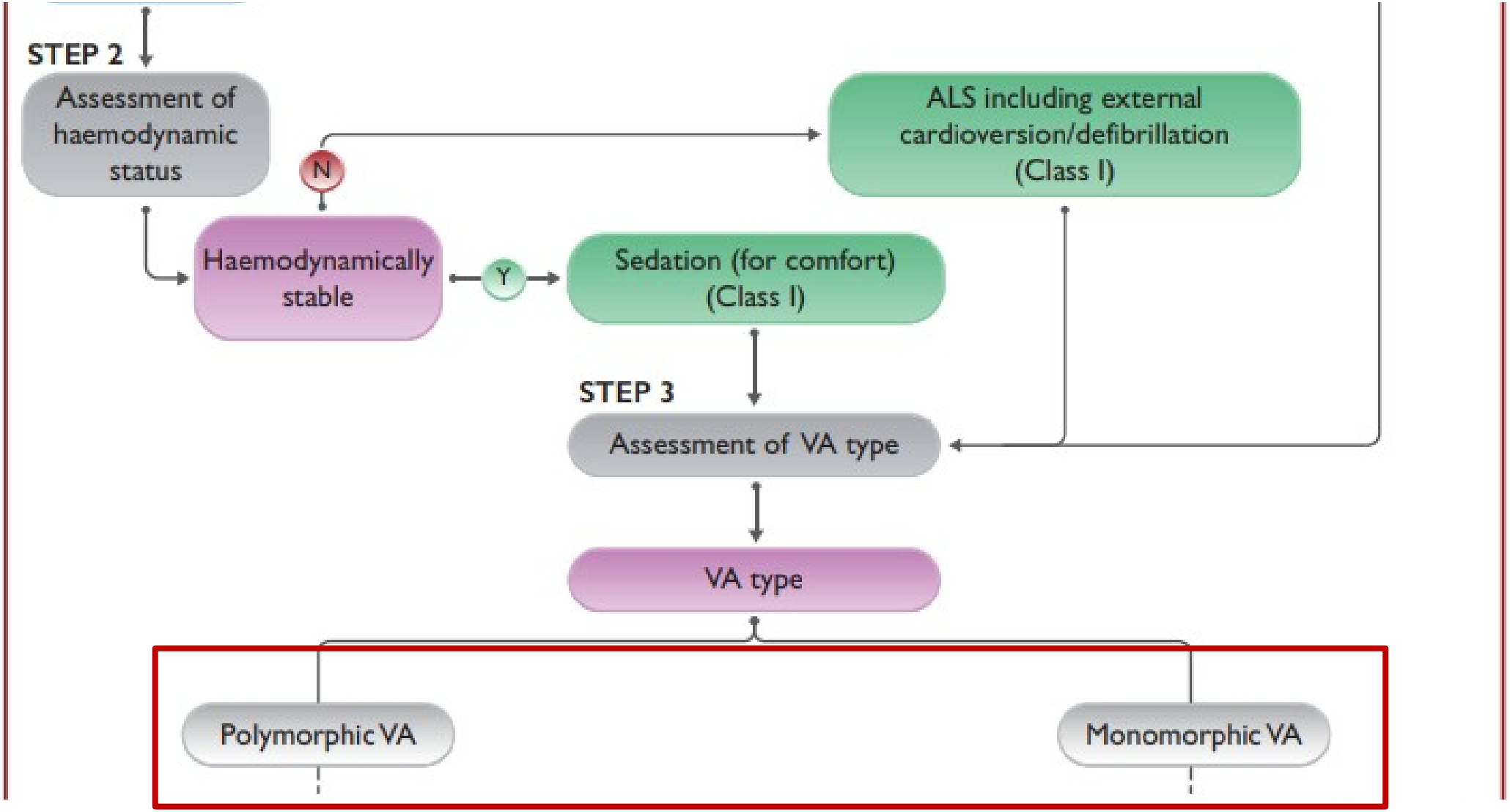

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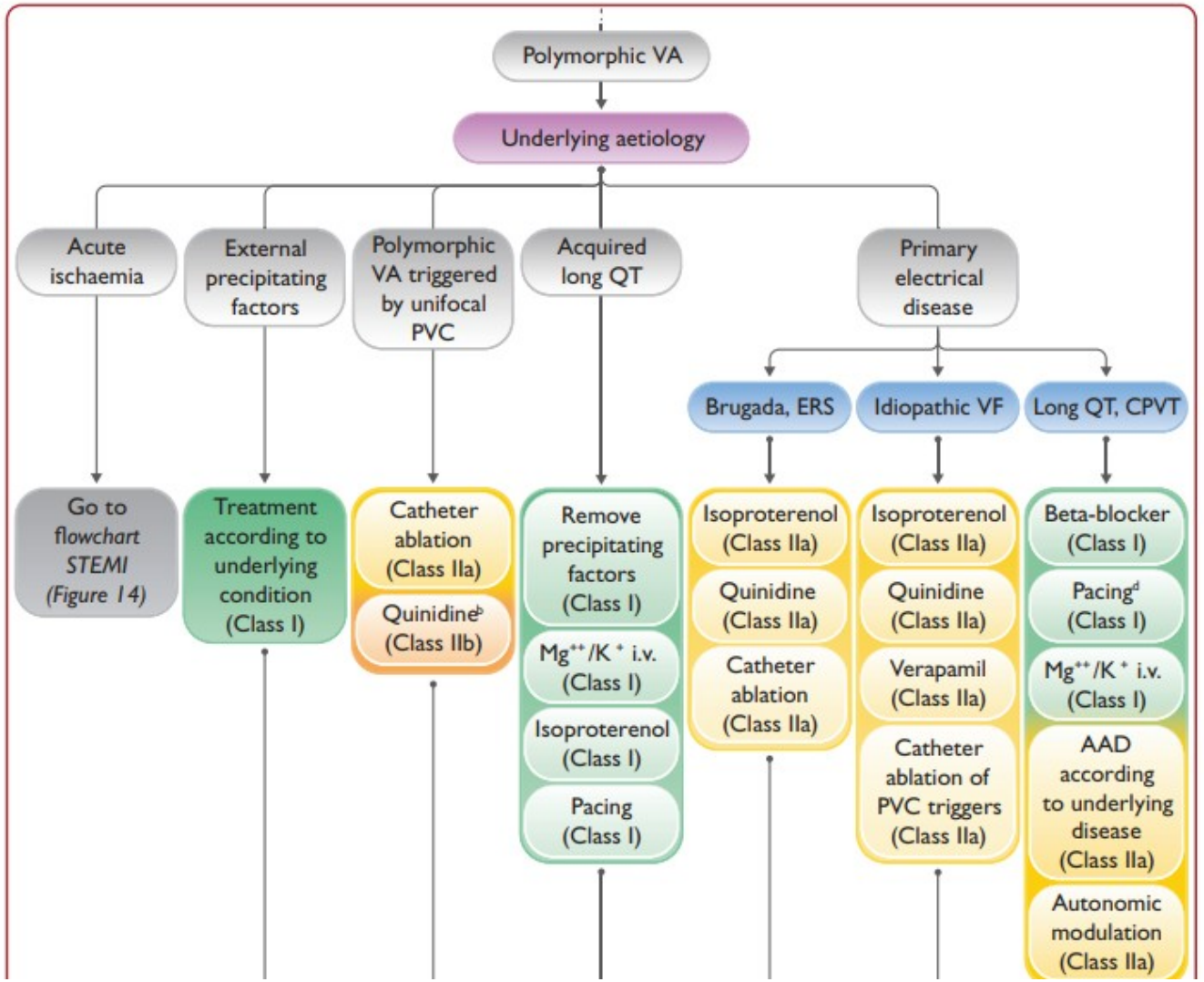

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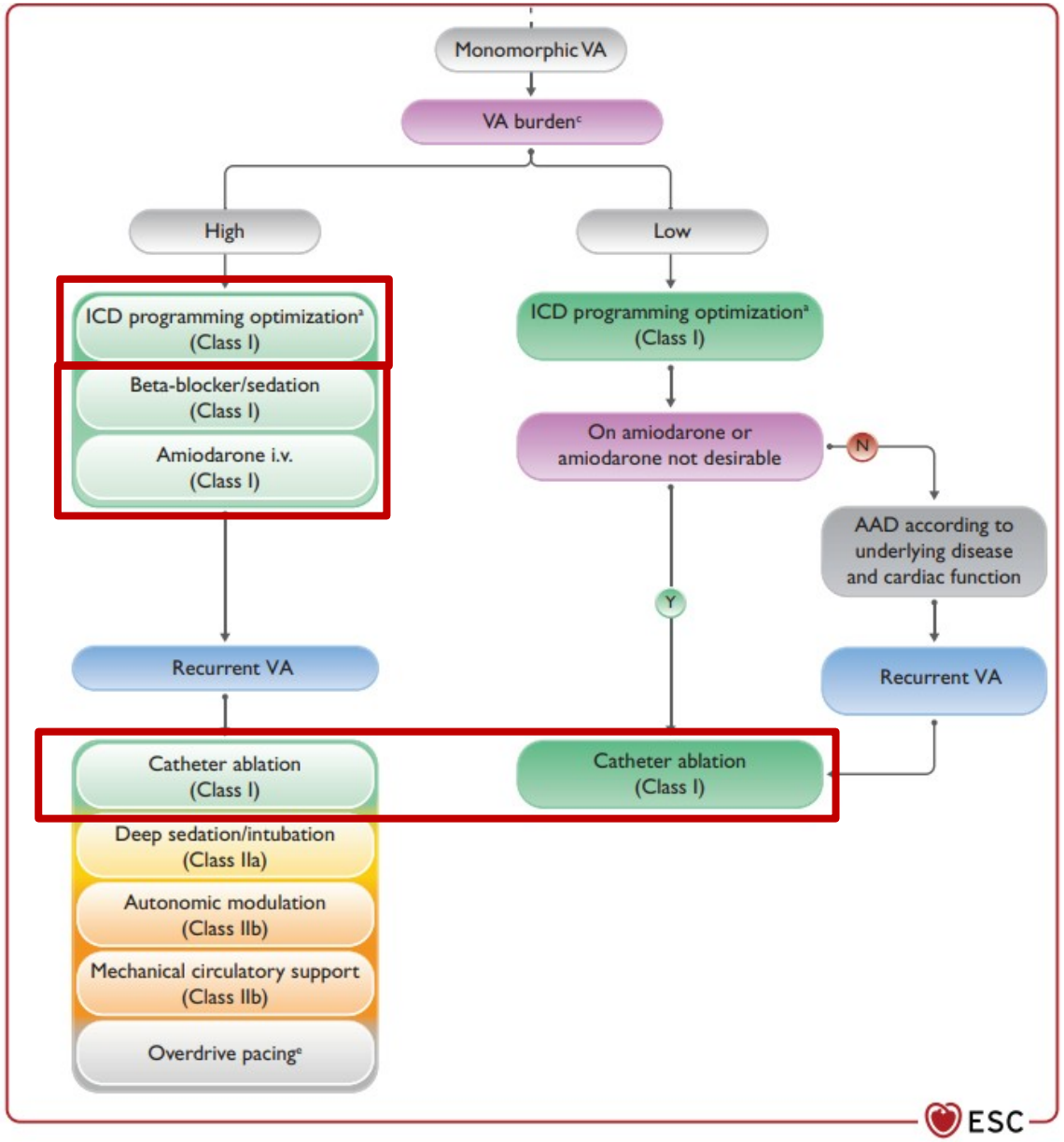

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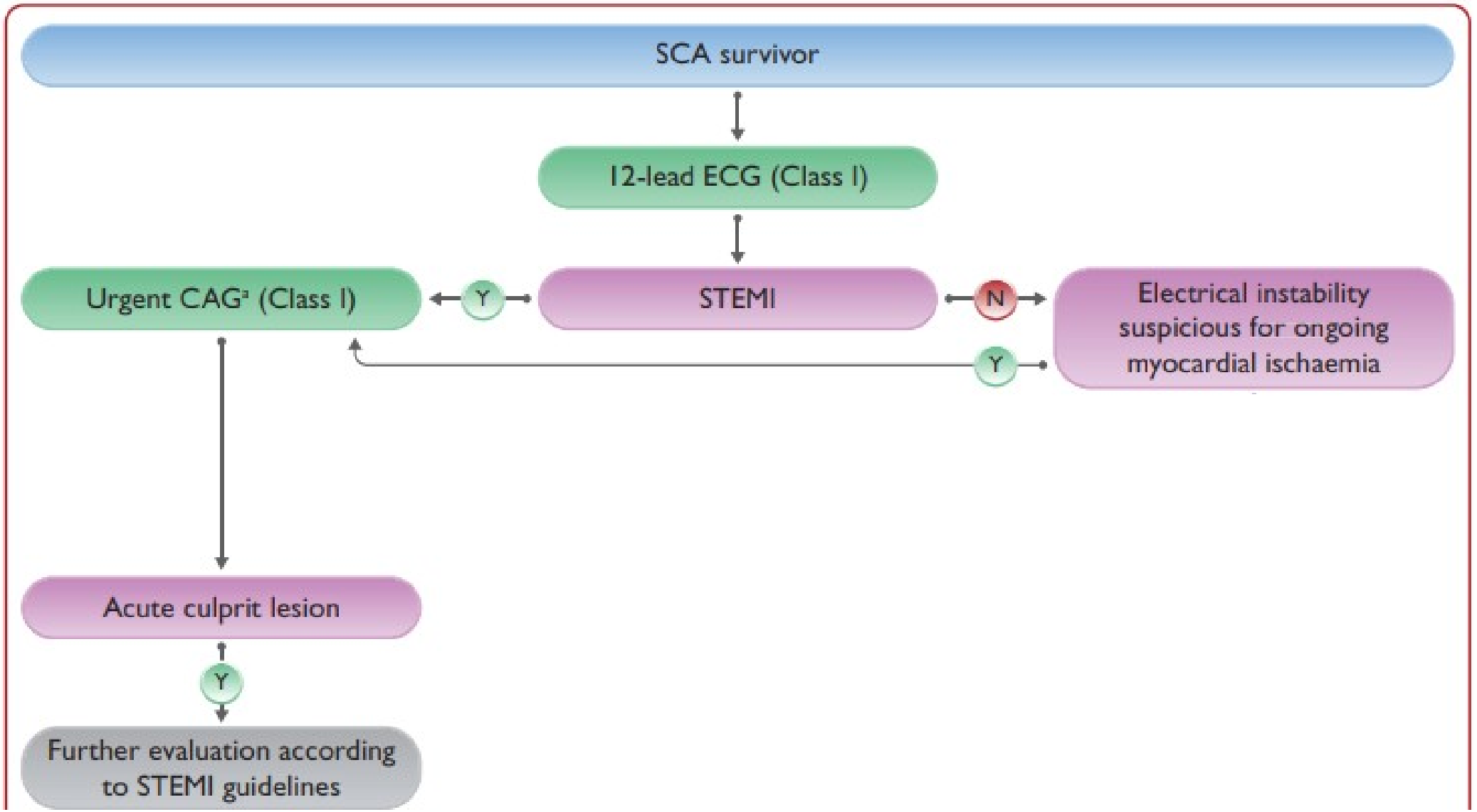
Επιζών από αιφνίδιο καρδιακό θάνατο…

… χωρίς γνωστή στεφανιαία νόσο



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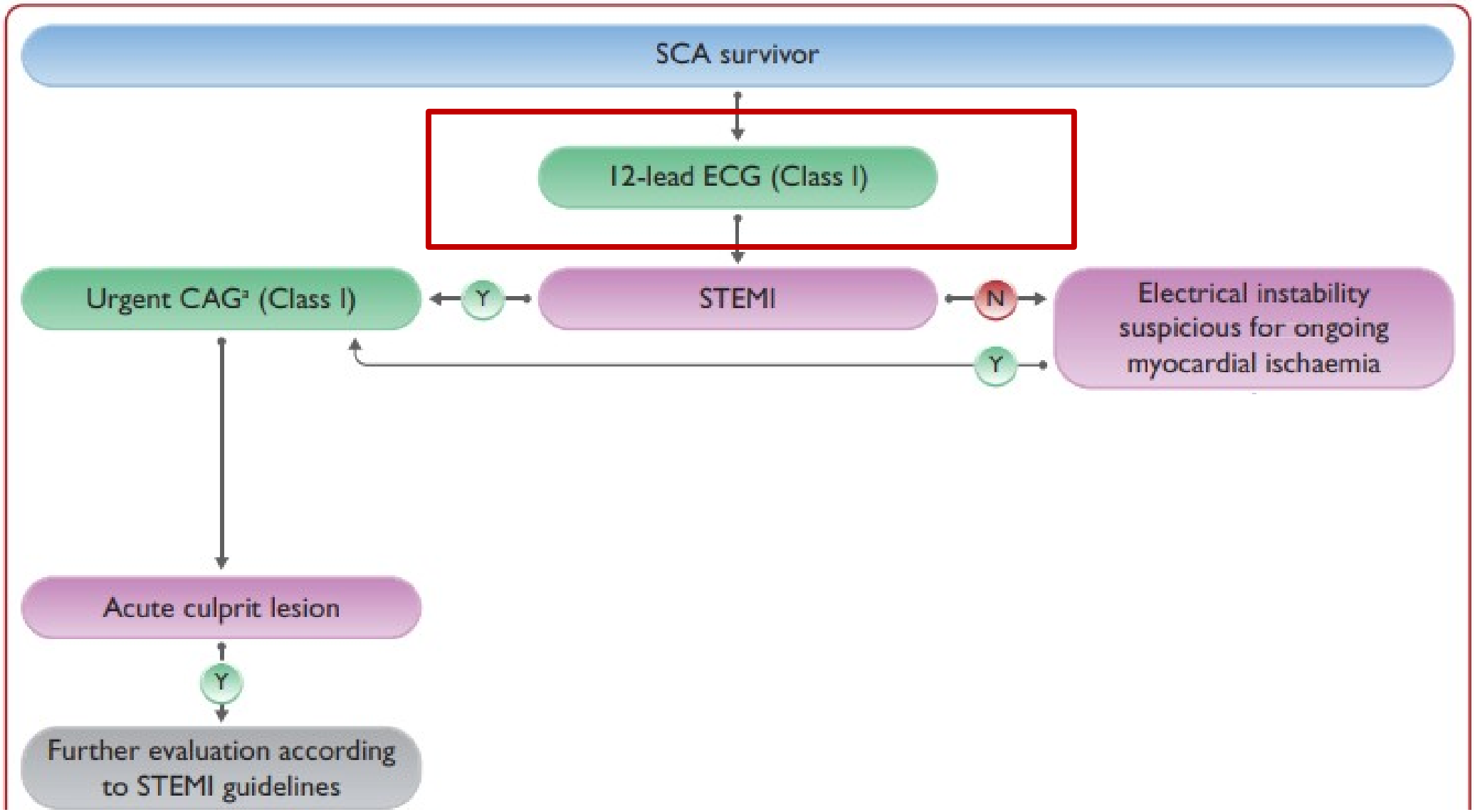

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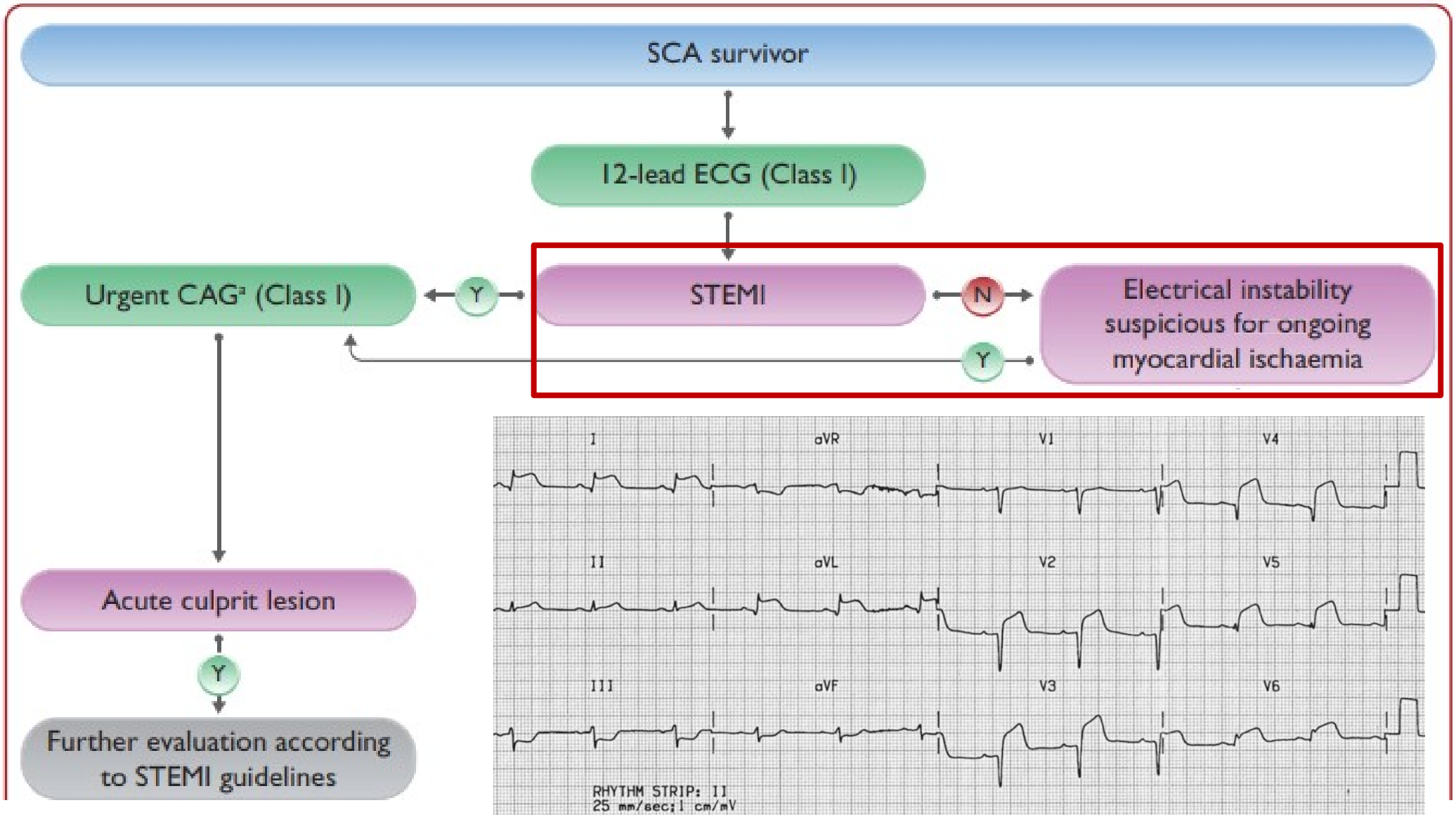

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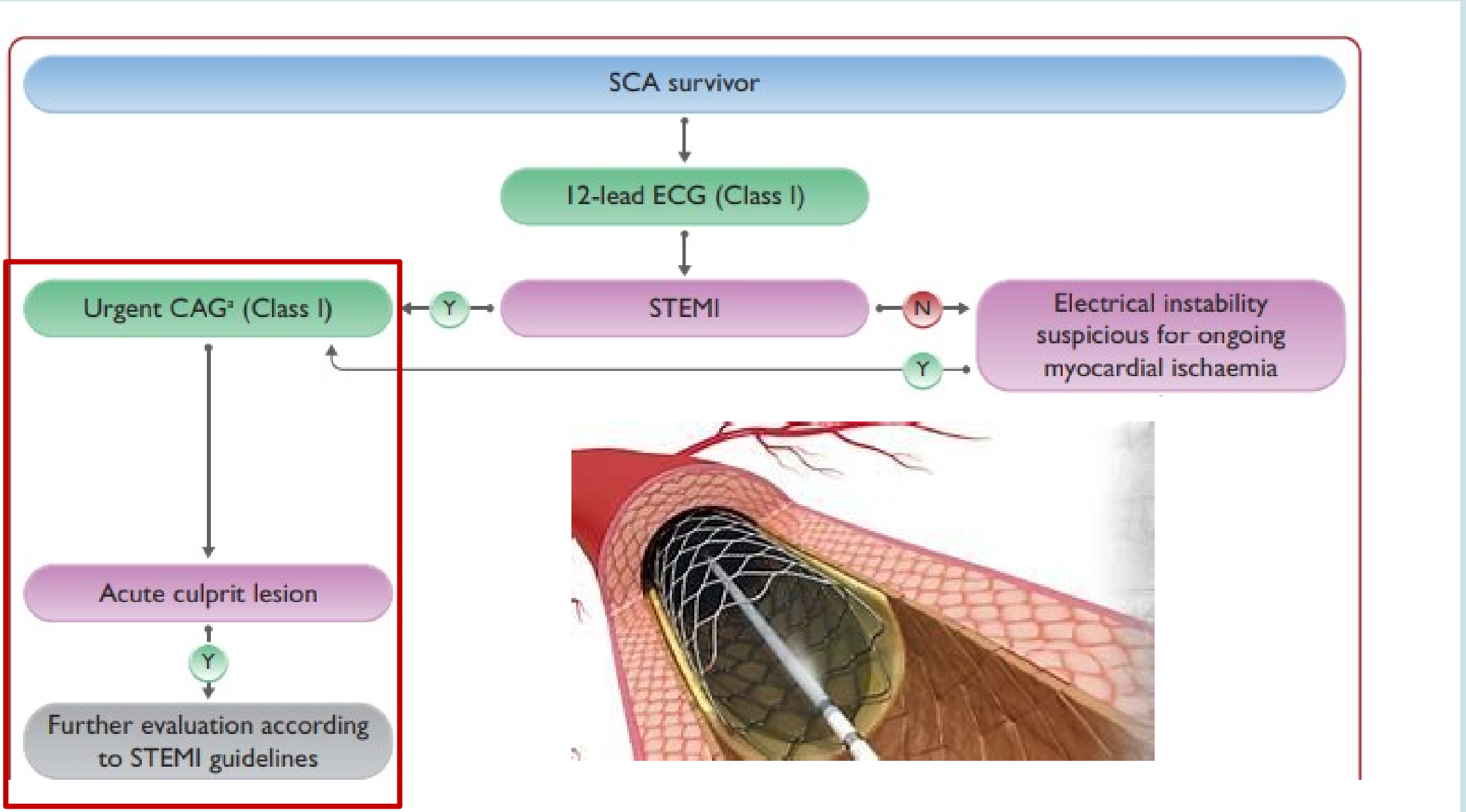

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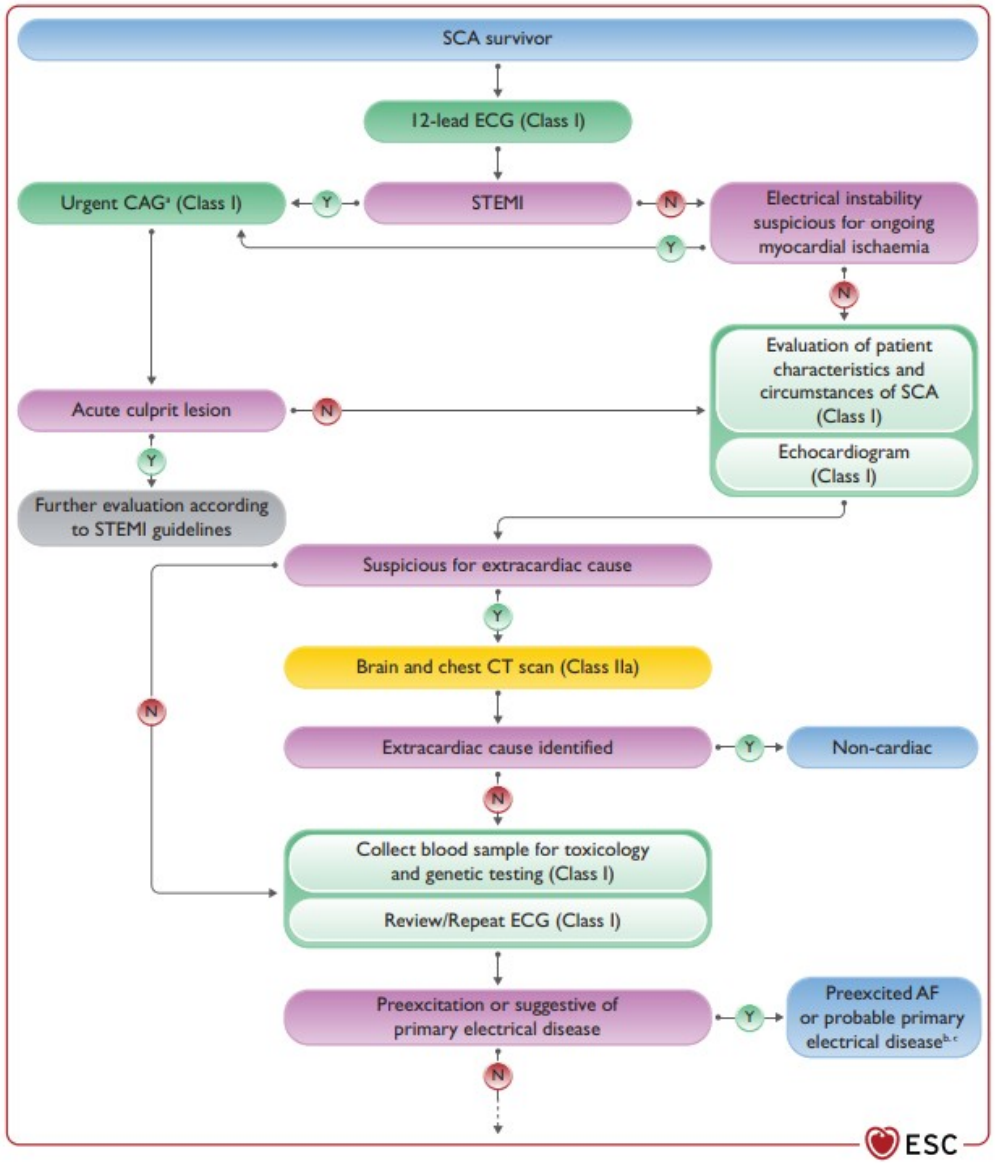

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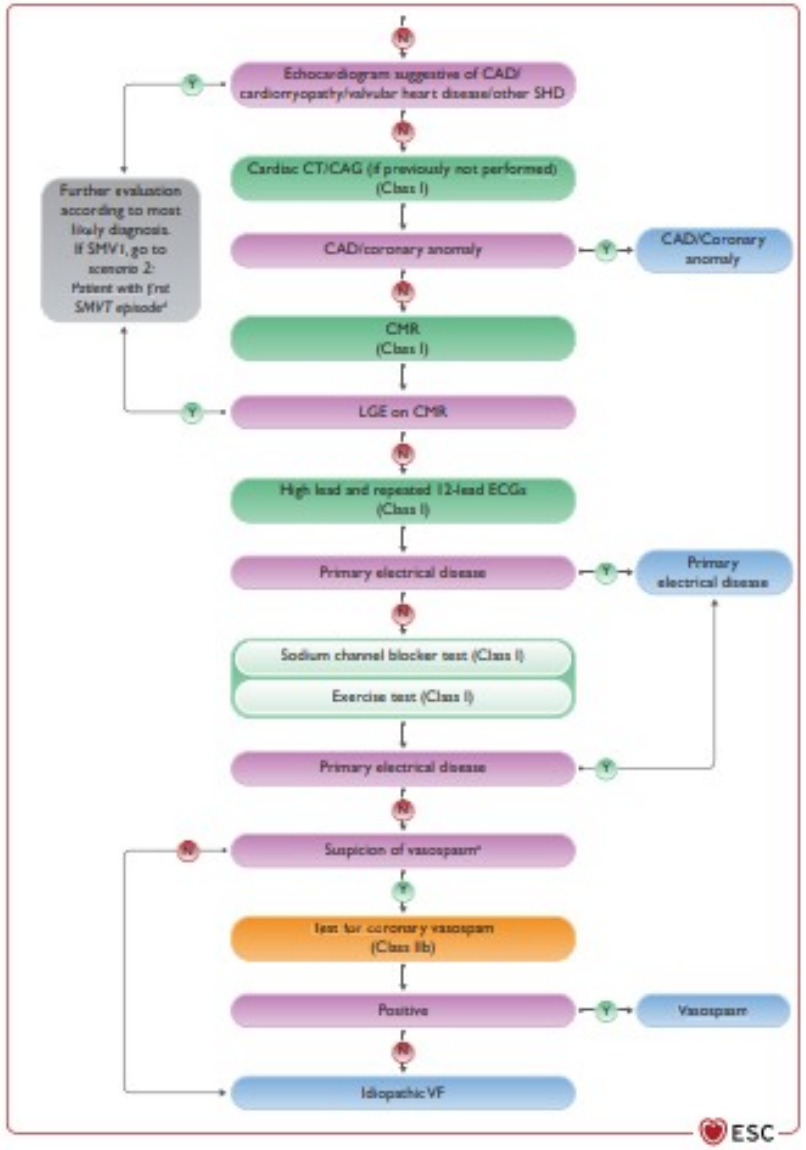

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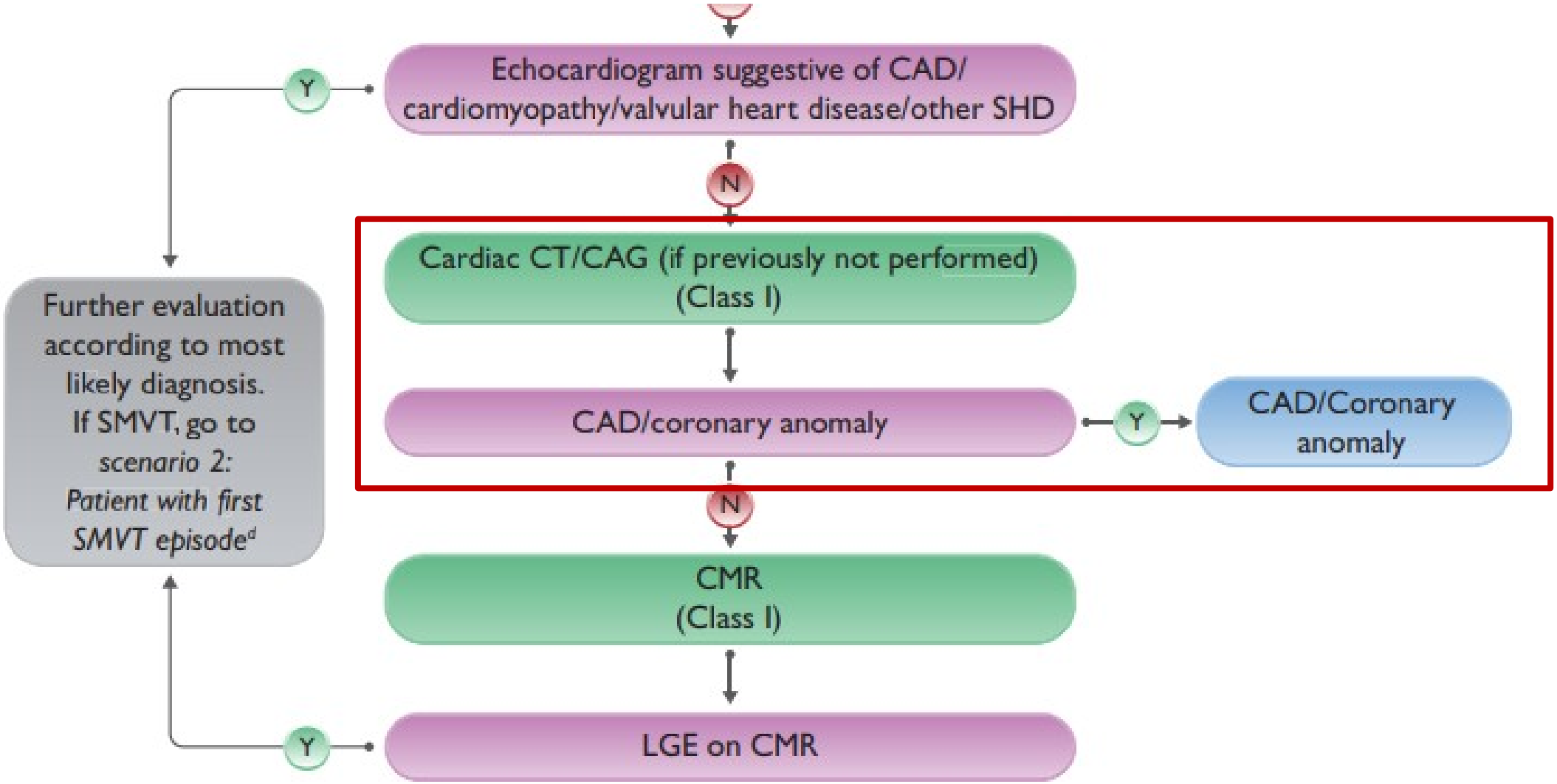

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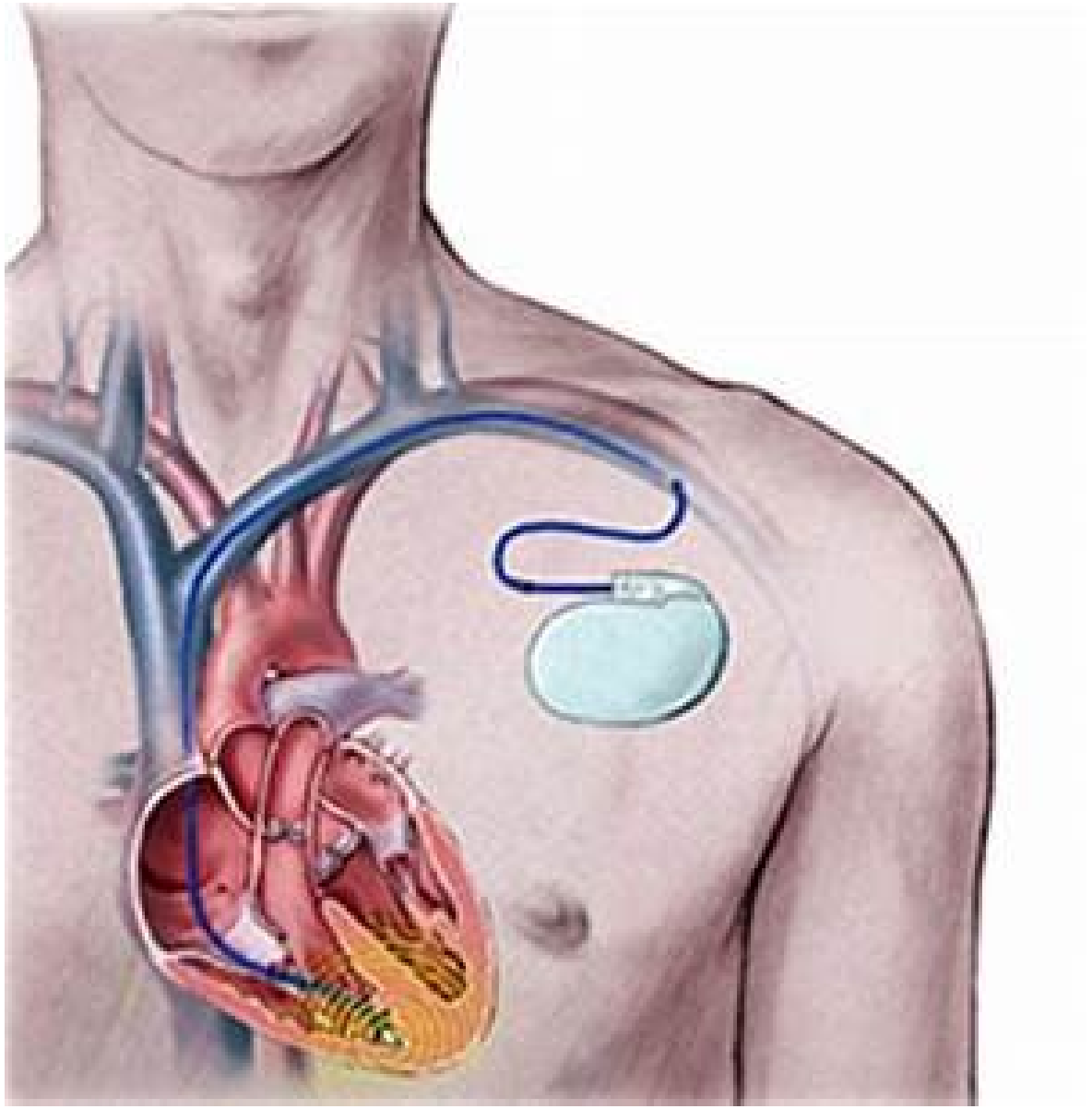
Prevention




LIFEPAK CR2
Defibrillator


60
DEMO
120/ 60
98

Σας ευχαριστώ!