

Troubles du rythme graves en réanimation

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Cadence ventriculaire ?

- ▶ Bradycardies
- ▶ Tachycardies
- ▶ Cas du patient porteur d'un stimulateur cardiaque

Bradycardies



- ▶ Rythme sinusal vs trouble conducteur :
- ▶ Chercher l'onde P !



- ▶ 1 onde P devant chaque QRS !

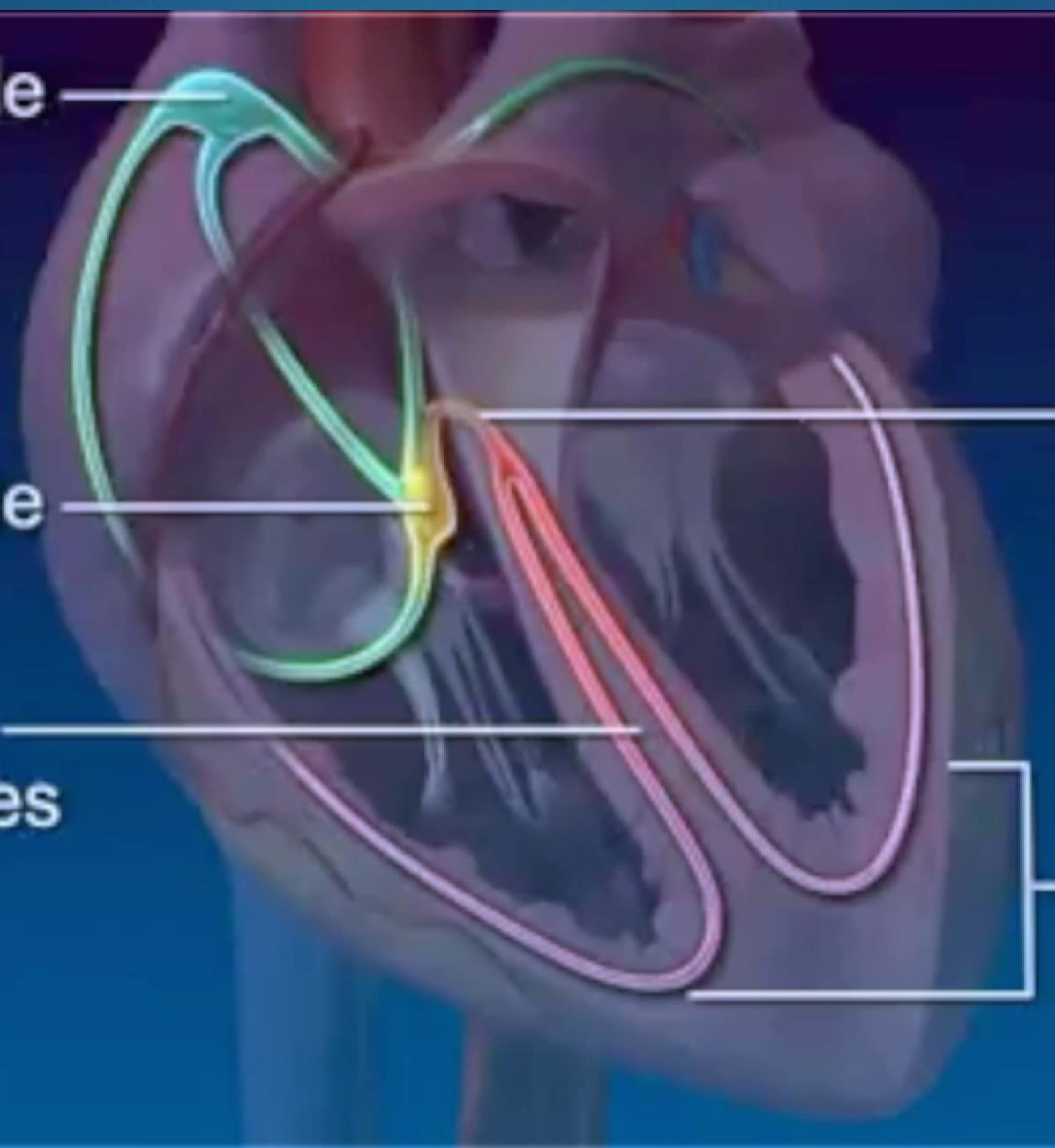
SA Node

AV Node

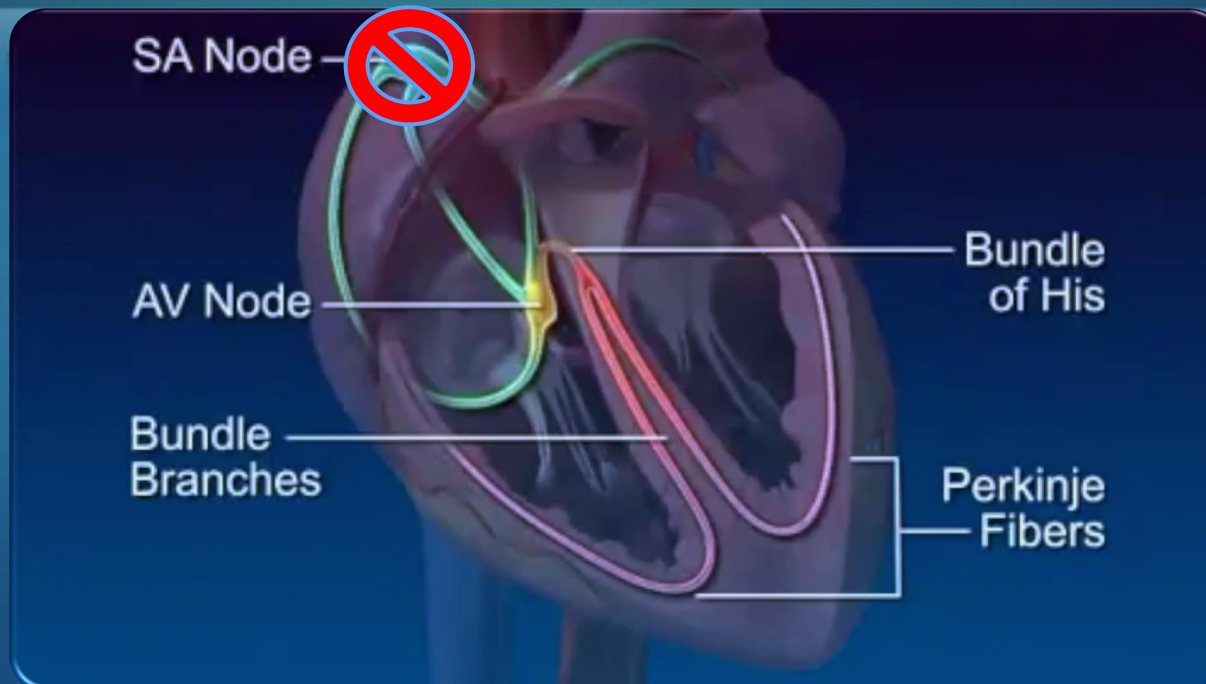
Bundle
Branches

Bundle
of His

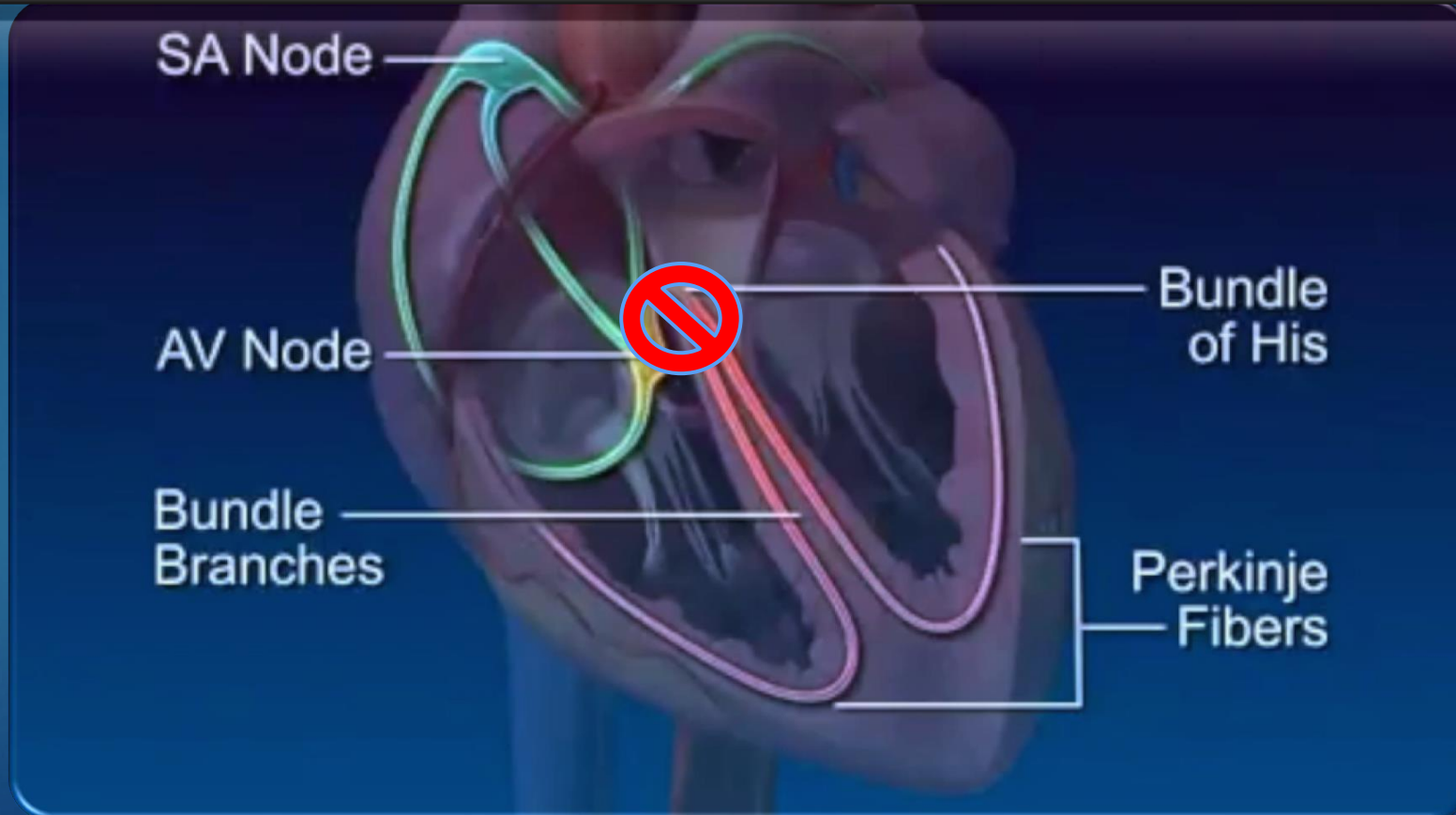
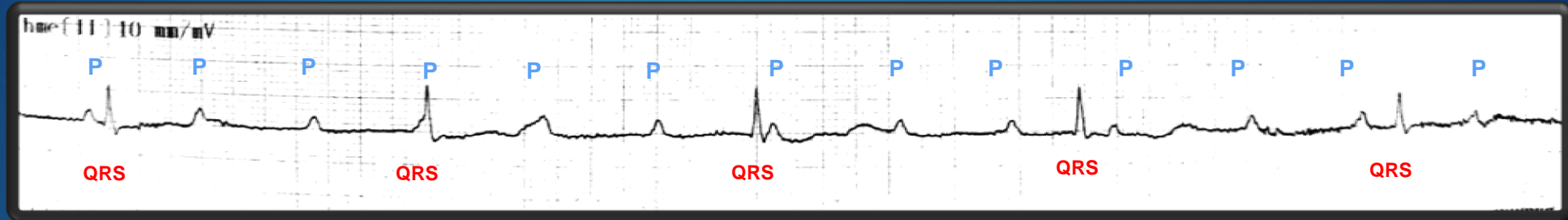
Perkinje
Fibers



Bradycardies : dysfonction sinusale



Bradycardies : BAV



Cas n°1

- ▶ Patient hospitalisé pour choc septique avec hémoc + staph
- ▶ 4h du matin : Appel des IDE car le scope sonne en bradycardie
- ▶ PA inchangée

Revue Alarme

06/09/2016 12:55:09 ***Brady 40 < 45

FC 65

ESV 3

PB ??(?)

ST-I -0.1

ST-II 0.5

ST-III 0.6

ST-aVR -0.2

ST-aVL -0.4

ST-aVF 0.6

ST-V1 0.3

ST-V2 0.5

ST-V3 0.4

ST-V4 0.3

ST-V5 0.2

ST-V6 0.1

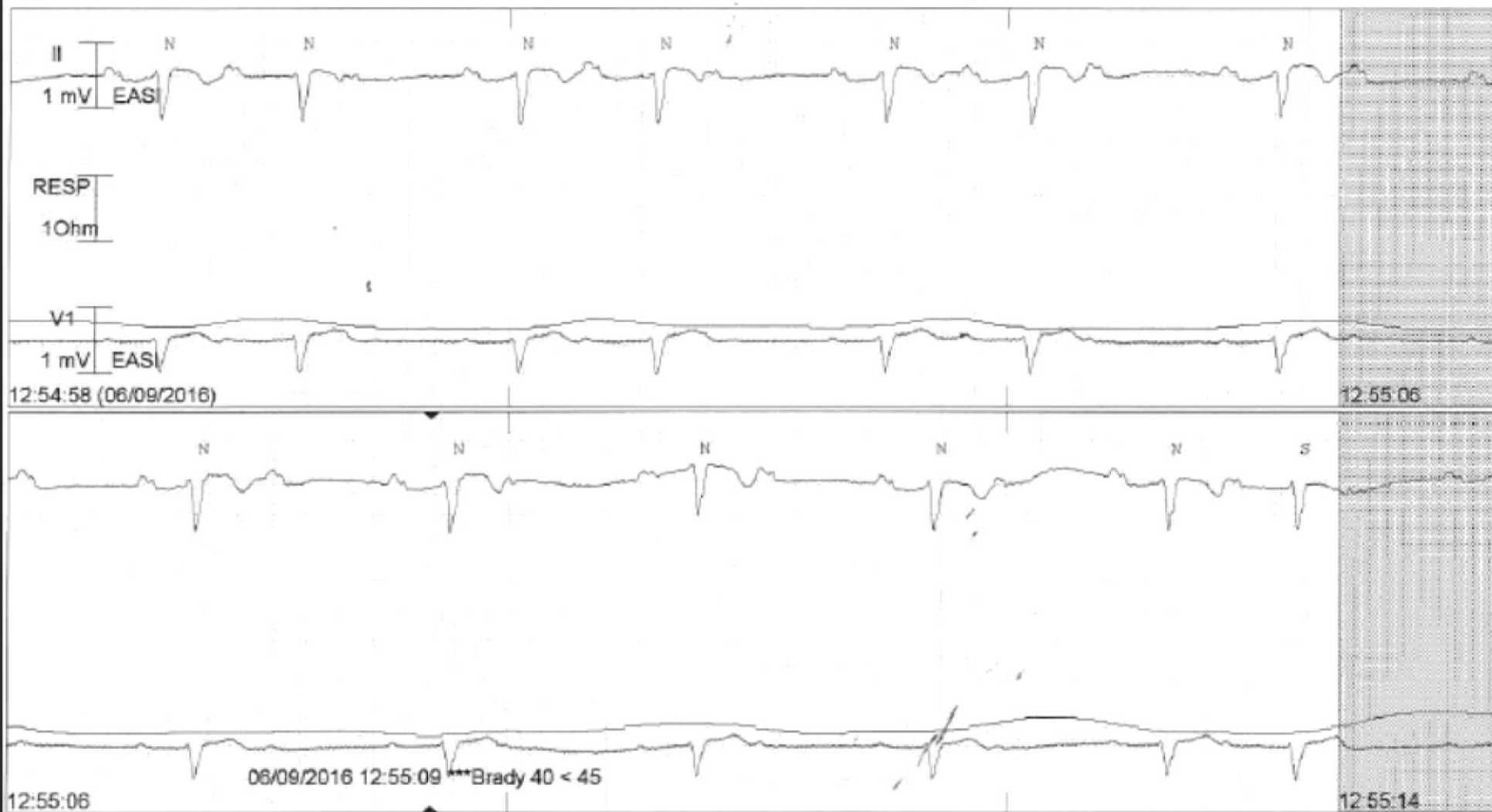
indxST 1.3

QTc ?

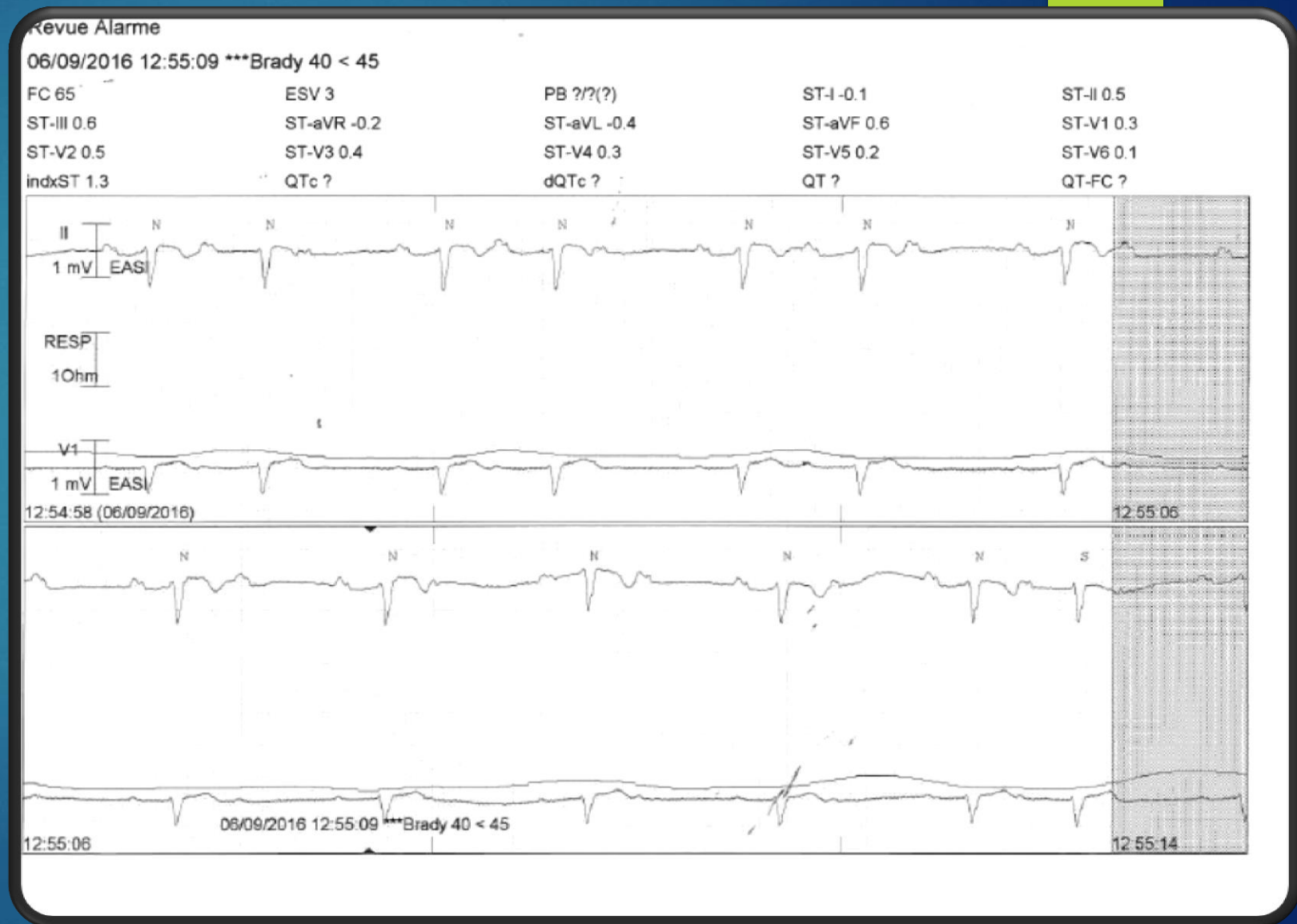
dQTc ?

QT ?

QT-FC ?



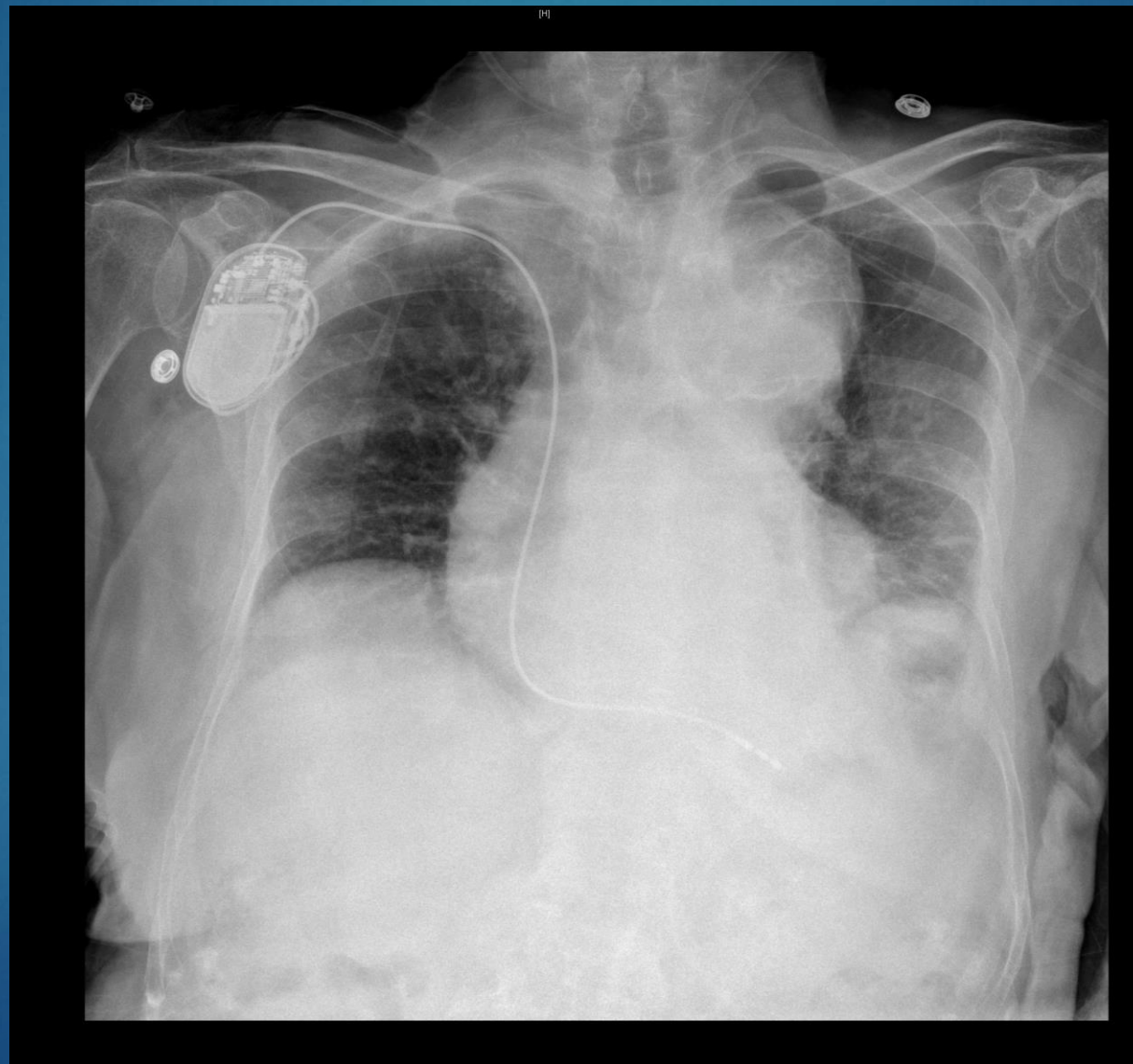
- ▶ Diagnostic ?
- ▶ CAT ?



Traitement des bradycardies

- ▶ Correction troubles métaboliques / arrêt bradycardisants
- ▶ **Atropine** 0.5 à 1 mg en IV lente
- ▶ **Isoprénaline** :
 - ▶ Dilution de 5 ampoules de 0.2 mg pour 1 ml (soit 1 mg) dans 250 ml de soluté glucosé isotonique à 5 % ; administration par PSE pour ajustement de la dose plus aisée. - Vitesse de perfusion à adapter à la réponse ventriculaire débuter à la vitesse de 10 cc/h avec augmentation de 5 en 5 selon la fréquence cardiaque observée.
- ▶ **Sonde d'entraînement électrosystolique**

Patient avec stimulateur cardiaque



09/09/2016 15:57:21 * Pause

FC 70

%SpO2 96

ESV 0

PB ??(?)

ST-I ?

ST-II ?

ST-III ?

ST-aVR ?

ST-aVL ?

ST-aVF ?

ST-V1 ?

ST-V2 ?

ST-V3 ?

ST-V4 ?

ST-V5 ?

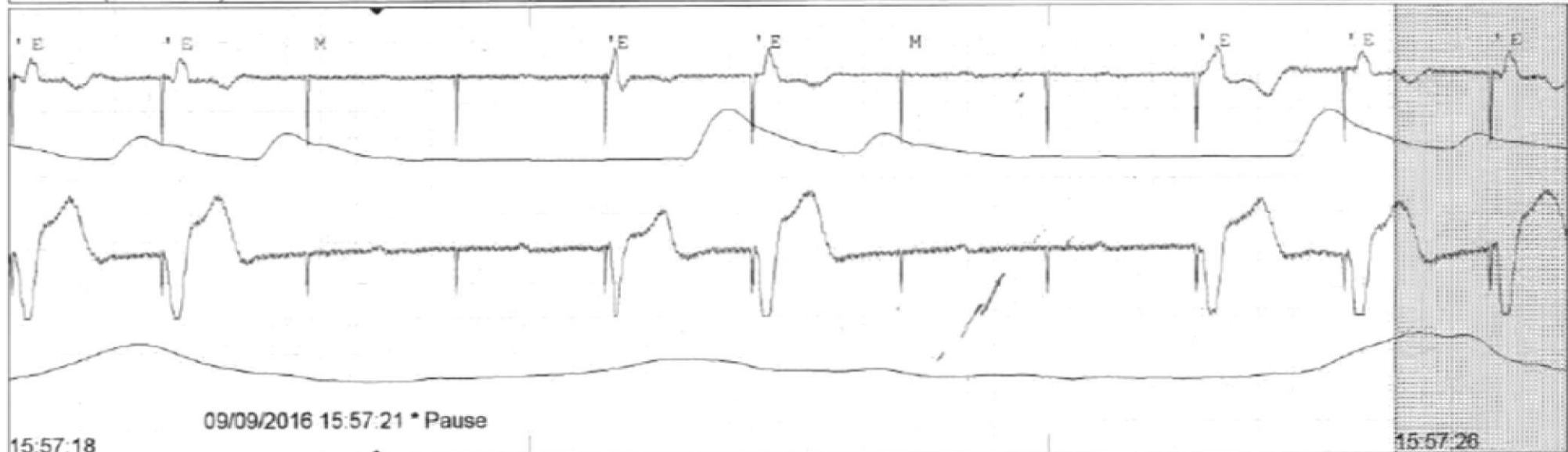
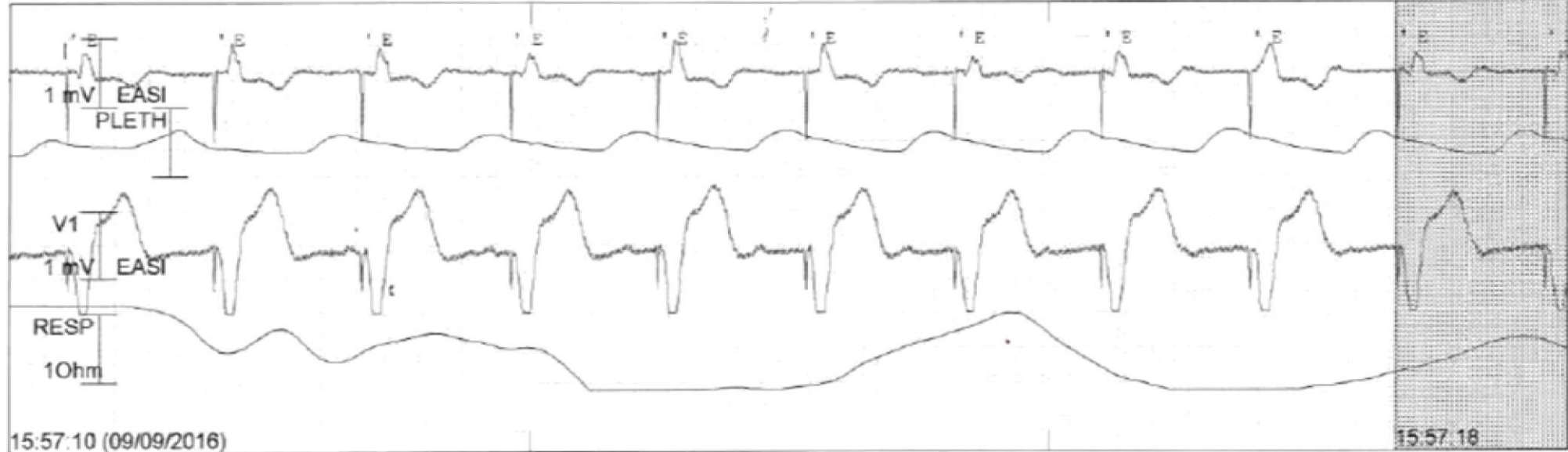
ST-V6 ?

indxST ?

QTc ?

dQTc ?

QT ?

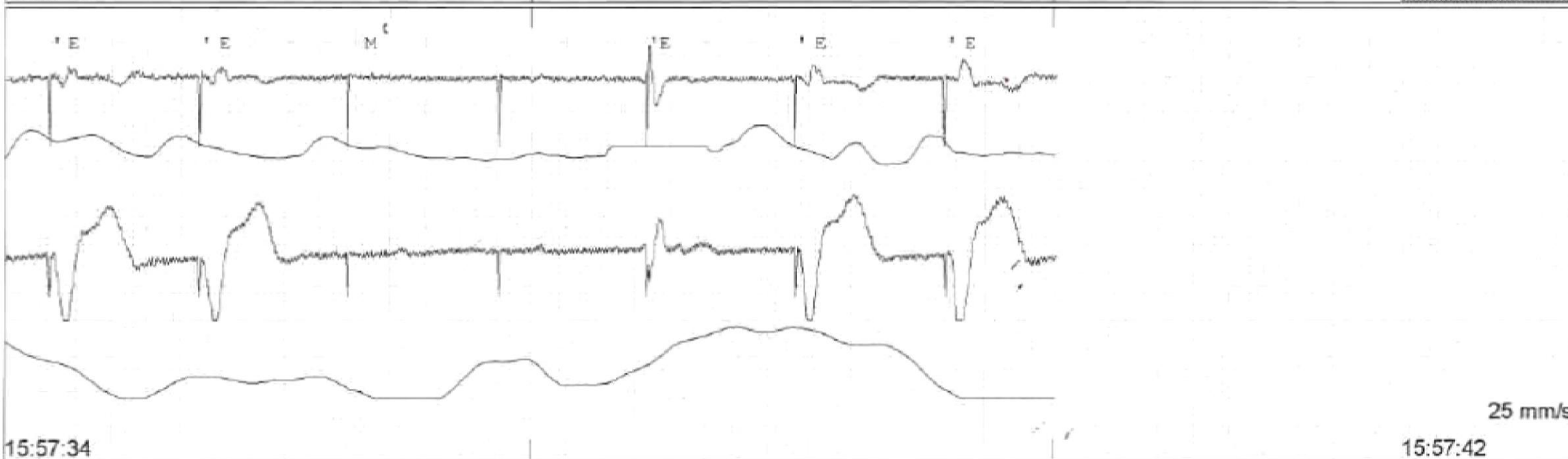
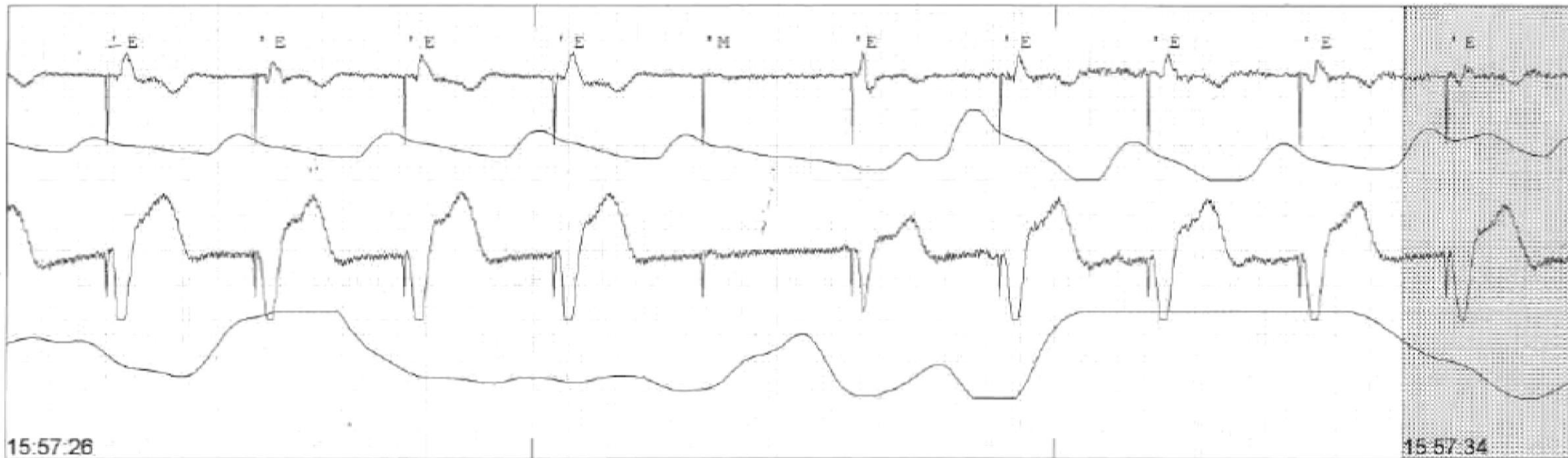


09/09/2016 15:57:21 * Pause

15:57:18

15:57:26

Revue Alarme



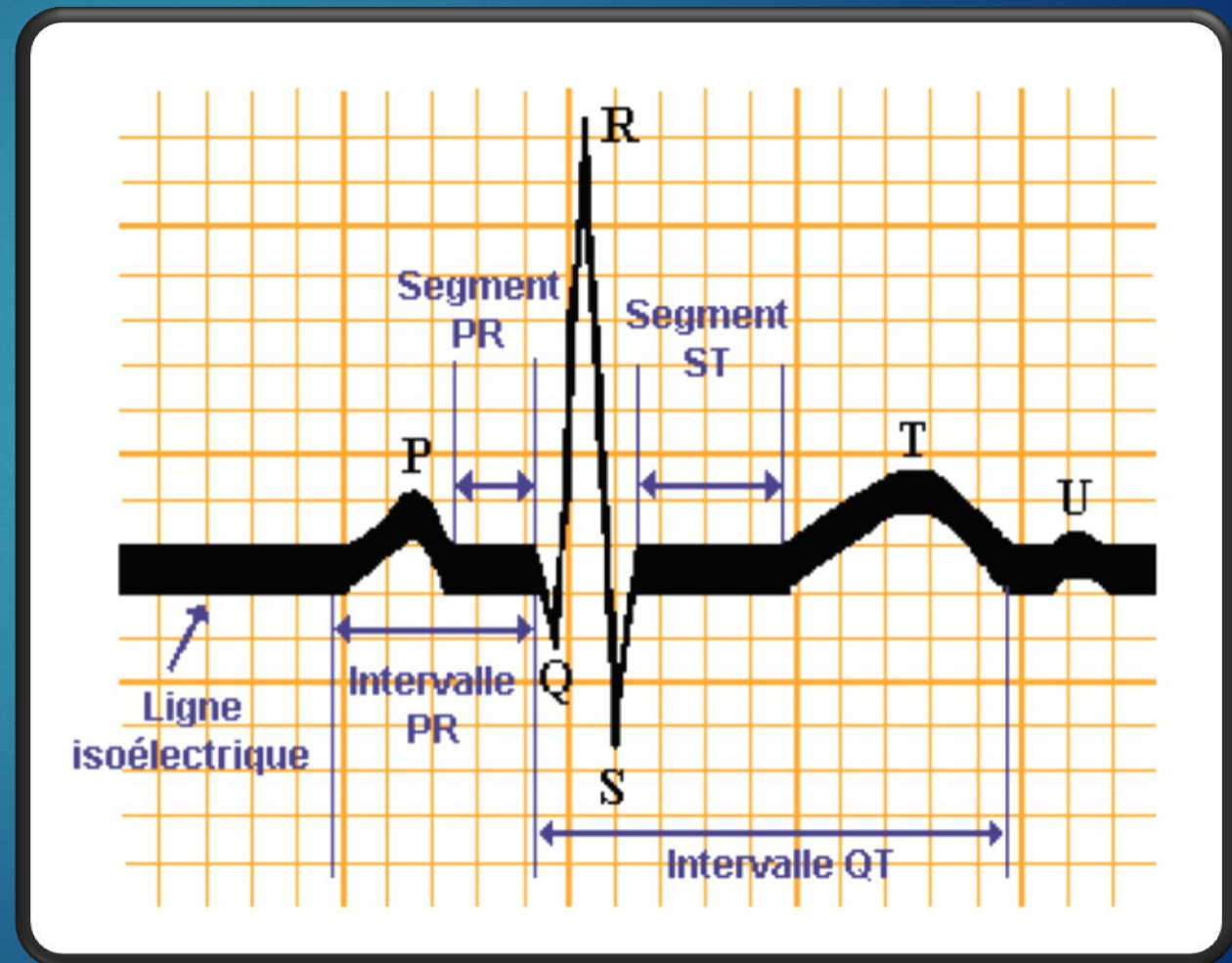
25 mm/s

15:57:34

15:57:42

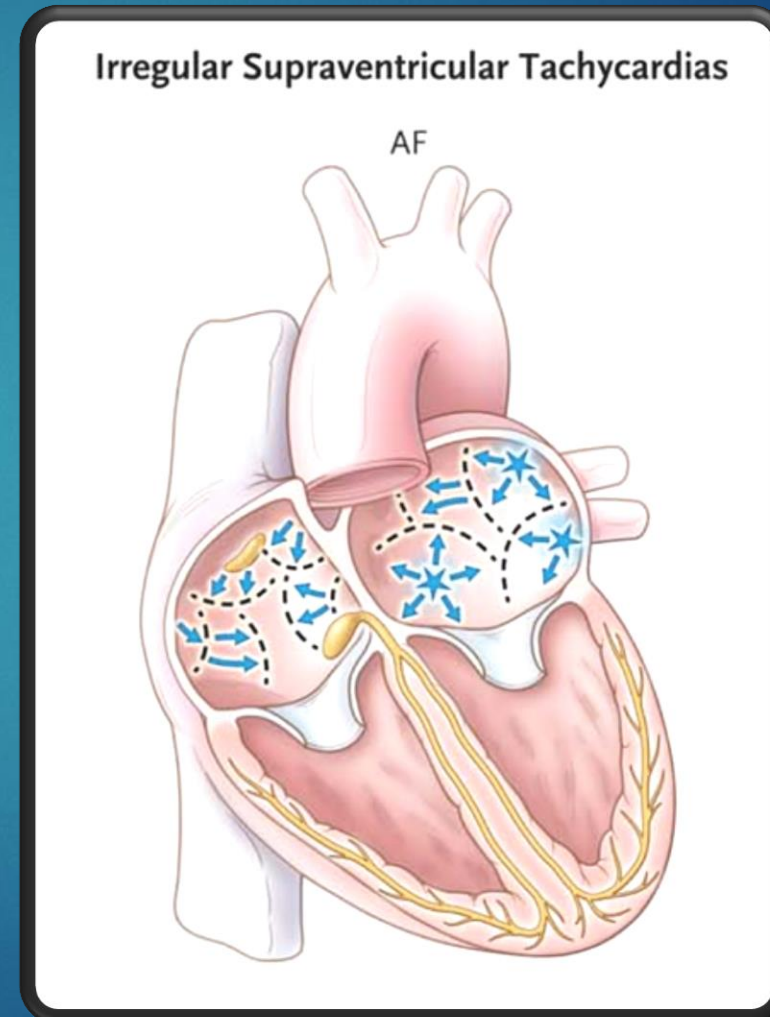
Tachycardies

- ▶ > 150 BPM
- ▶ Largeur des QRS :
 - ▶ < 120 ms : fins
 - ▶ > 120 ms : larges

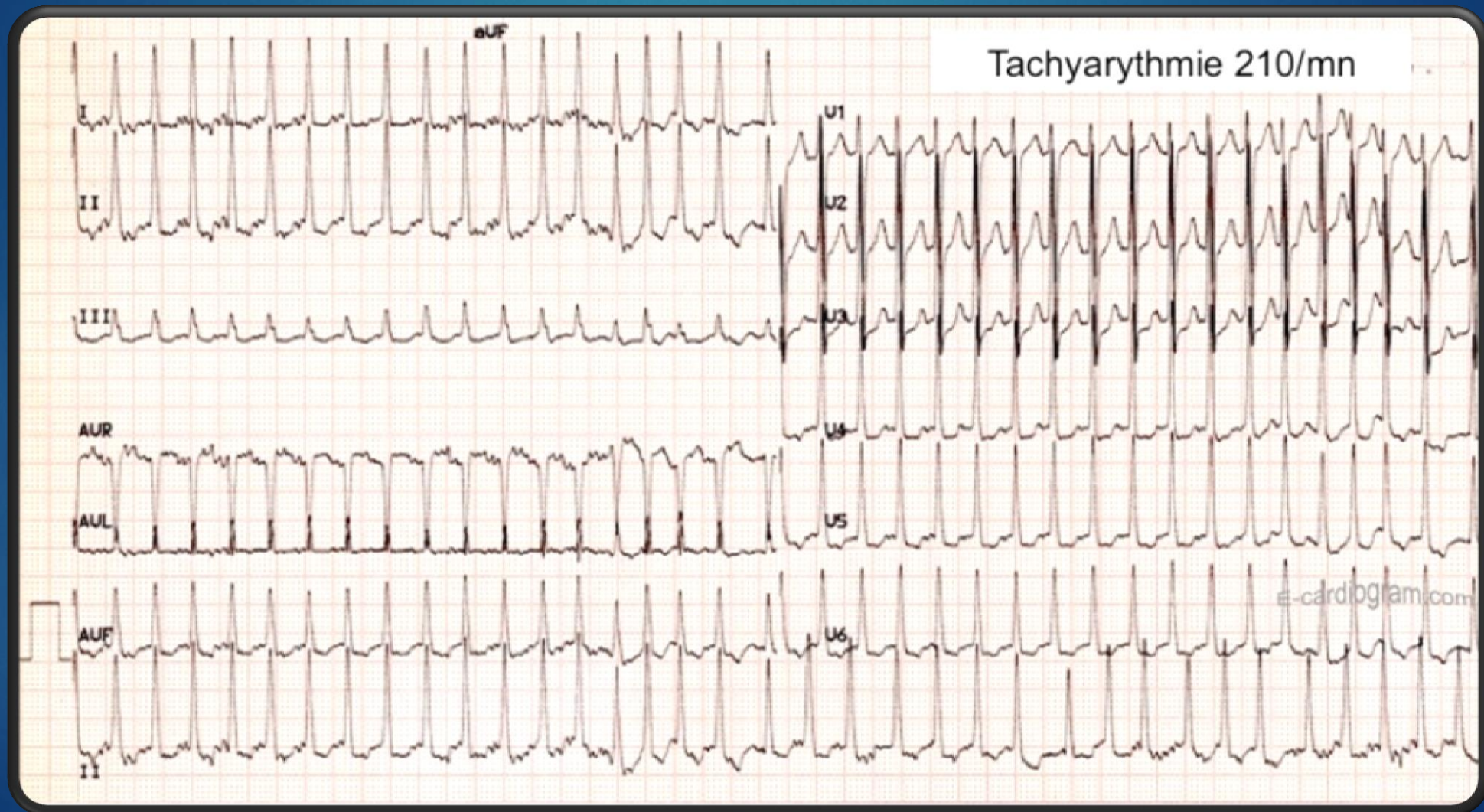


Tachycardies à QRS fins

- ▶ = supraventriculaire
 - ▶ Irrégulier : FA +++



QRS irréguliers : Fibrillation atriale



FA en réa : faut-il la traiter ?

- ▶ Systole atriale :
 - ▶ 20% du VES au repos
 - ▶ Jusqu'à 30% en conditions de stress
 - ▶ Age, cardiopathie diastolique sous jacente
- ▶ Cadences ventriculaires rapides :
 - ▶ Augmentation des pressions de remplissage
 - ▶ Majoration de la consommation en oxygène du myocarde → ischémie
- ▶ Irrégularité des RR et activation neuro hormonale
- ▶ → la FA aggrave les troubles hémodynamiques !



Traiter : pourquoi ?

Table 3. Association Between New-Onset AF and Adverse Outcomes

Model	Outcomes	
	In-Hospital Ischemic Stroke, Odds Ratio (95% CI)	In-Hospital Mortality, Relative Risk (95% CI)
Age-, sex-, and race/ethnicity-adjusted	4.05 (3.09-5.30)	1.36 (1.32-1.41)
Demographics- and comorbidity-adjusted ^a	3.84 (2.93-5.04)	1.33 (1.28-1.37)
Demographics- and acute factor-adjusted ^b	2.84 (2.15-3.76)	1.09 (1.06-1.13)
Combined multivariable-adjusted ^c	2.70 (2.05-3.57)	1.07 (1.04-1.11)
New-onset AF, probability-matched ^d	2.75 (1.76-4.29)	1.13 (1.08-1.19)

Abbreviation: AF, atrial fibrillation.

^aAdjusted for age, sex, race/ethnicity, and history of diabetes mellitus, hypertension, obesity, heart failure, stroke, myocardial infarction, chronic obstructive pulmonary disease, and metastatic or hematologic malignancy.

^bAdjusted for age, sex, race/ethnicity, and sepsis-associated factors including number of organ failures, presence of electrolyte disturbances, source of sepsis, type of organ failure, type of pathogenic organism, and use of right heart catheterization.

^cAdjusted for all variables from both the comorbidity-adjusted and sepsis-associated factor-adjusted models.

^dCohorts matched on calculated probability of risk of new-onset AF.

Traiter : pourquoi ?

Study or Subgroup	New Atrial Fibrillation		Sinus Rhythm		Weight	Risk Ratio
	Events	Total	Events	Total		M-H, Random, 95% CI
Christian	11	16	102	256	6.3%	1.73 [1.20, 2.48]
Meierhenrich	10	23	6	27	1.3%	1.96 [0.84, 4.56]
Salman	12	25	15	56	2.5%	1.79 [0.99, 3.25]
Seguin	2	8	3	28	0.4%	2.33 [0.47, 11.64]
Walkey	1629	2896	13652	36200	62.3%	1.49 [1.44, 1.54]
Wells	95	132	189	333	27.3%	1.27 [1.10, 1.46]
Total (95% CI)		3100		36900	100.0%	1.45 [1.32, 1.60]
Total events	1759		13967			
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 6.57$, $df = 5$ ($P = 0.25$); $I^2 = 24\%$						
Test for overall effect: $Z = 7.67$ ($P < 0.00001$)						

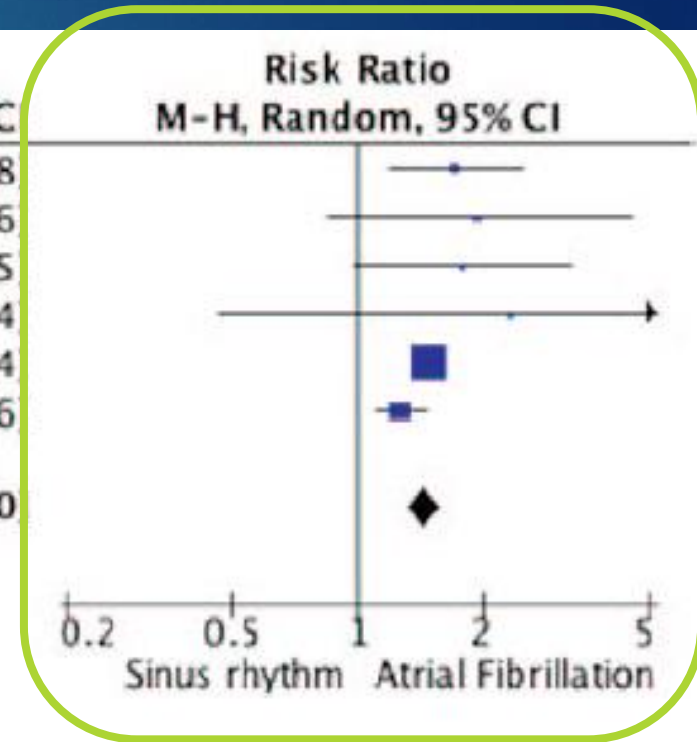


Fig. 2 In-hospital mortality of patients with new-onset atrial fibrillation and sepsis

Traiter : pourquoi ?

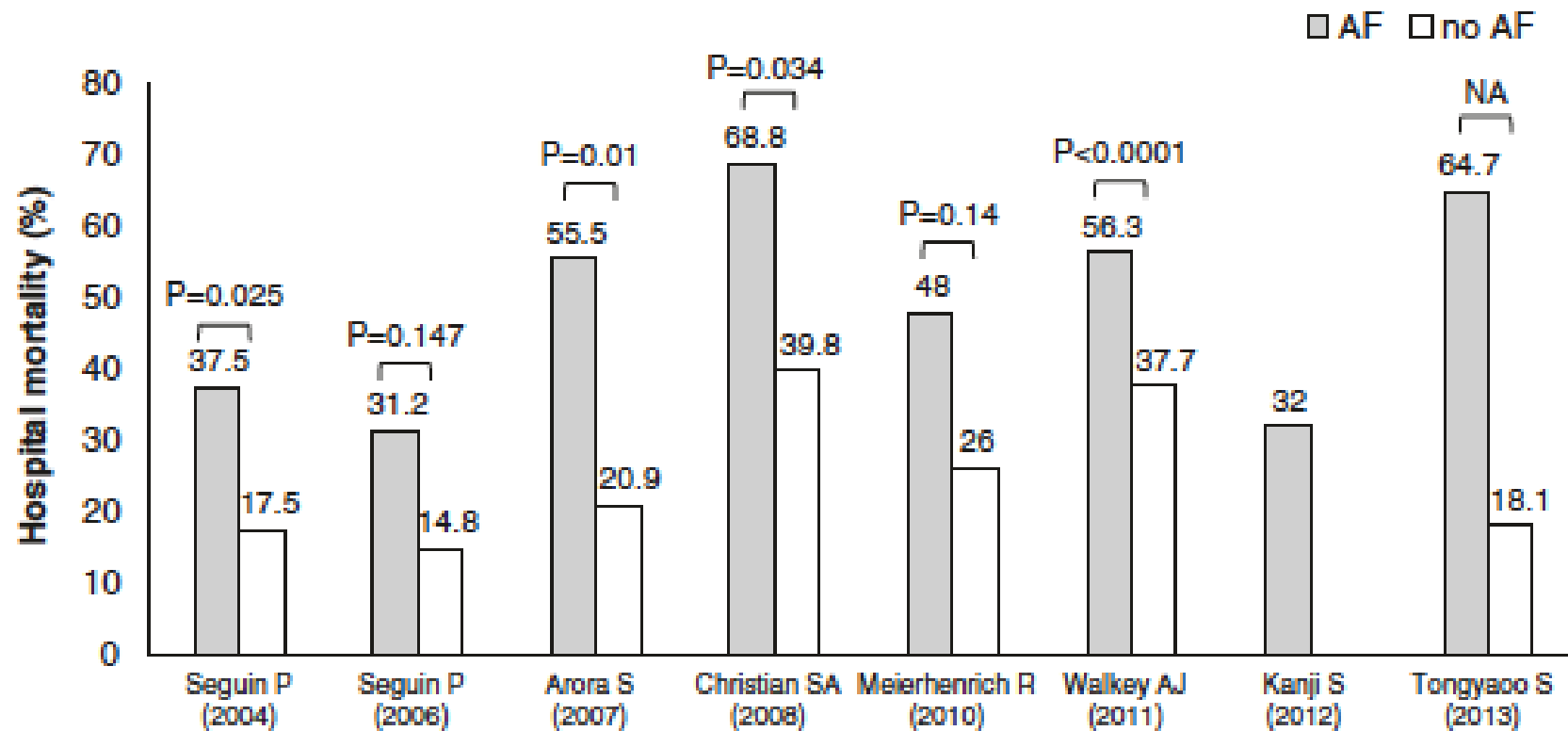
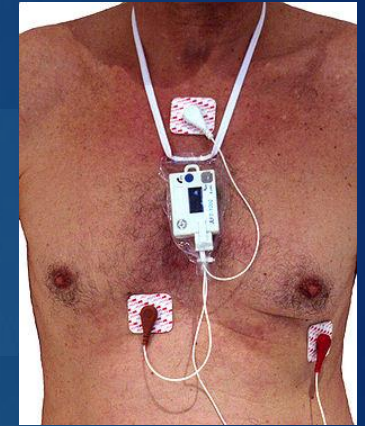


Figure 2 Reported hospital mortality rates in patients with and without atrial fibrillation. AF: atrial fibrillation, gray bar: AF patients, white bar: non-AF patients.

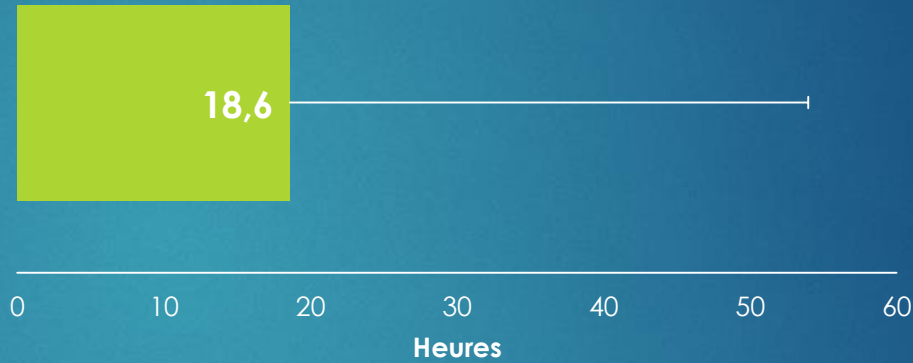
Traiter oui, mais laquelle ?



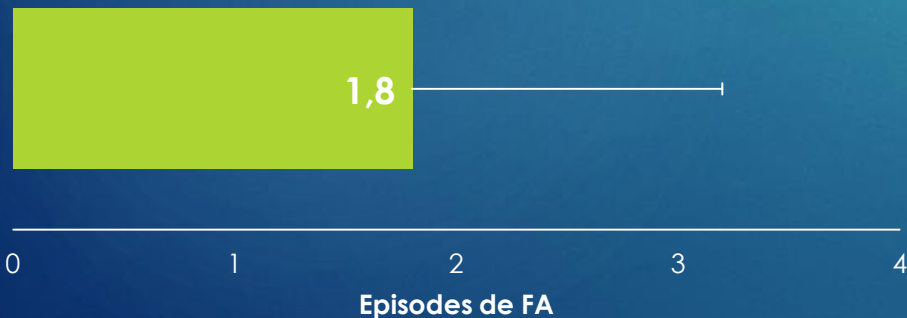
Délai admission - premier épisode de FA



Charge en FA

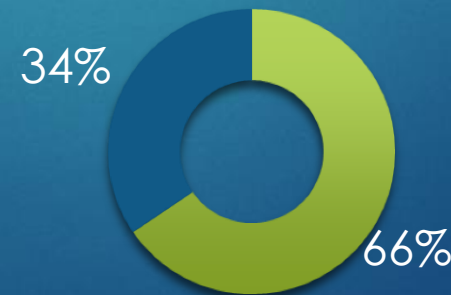


Nombre d'épisodes de FA par patient



Type de FA

■ FA symptomatique ■ FA silencieuse



Citation: Guenancia C, Binquet C, Laurent G, Vinault S, Bruyère R, Prin S, et al. (2015) Incidence and Predictors of New-Onset Atrial Fibrillation in Septic Shock Patients in a Medical ICU: Data from 7-Day Holter ECG Monitoring. PLoS ONE 10(5): e0127168. doi:10.1371/journal.pone.0127168

Traiter oui, mais comment ?

- ▶ Ralentir ou réduire ?
- ▶ Anticoagulation préventive ou curative ?

Hindawi Publishing Corporation
Critical Care Research and Practice
Volume 2014, Article ID 840615, 10 pages
<http://dx.doi.org/10.1155/2014/840615>



Review Article

Management of Atrial Fibrillation in Critically Ill Patients

Mattia Arrigo, Dominique Bettex, and Alain Rudiger

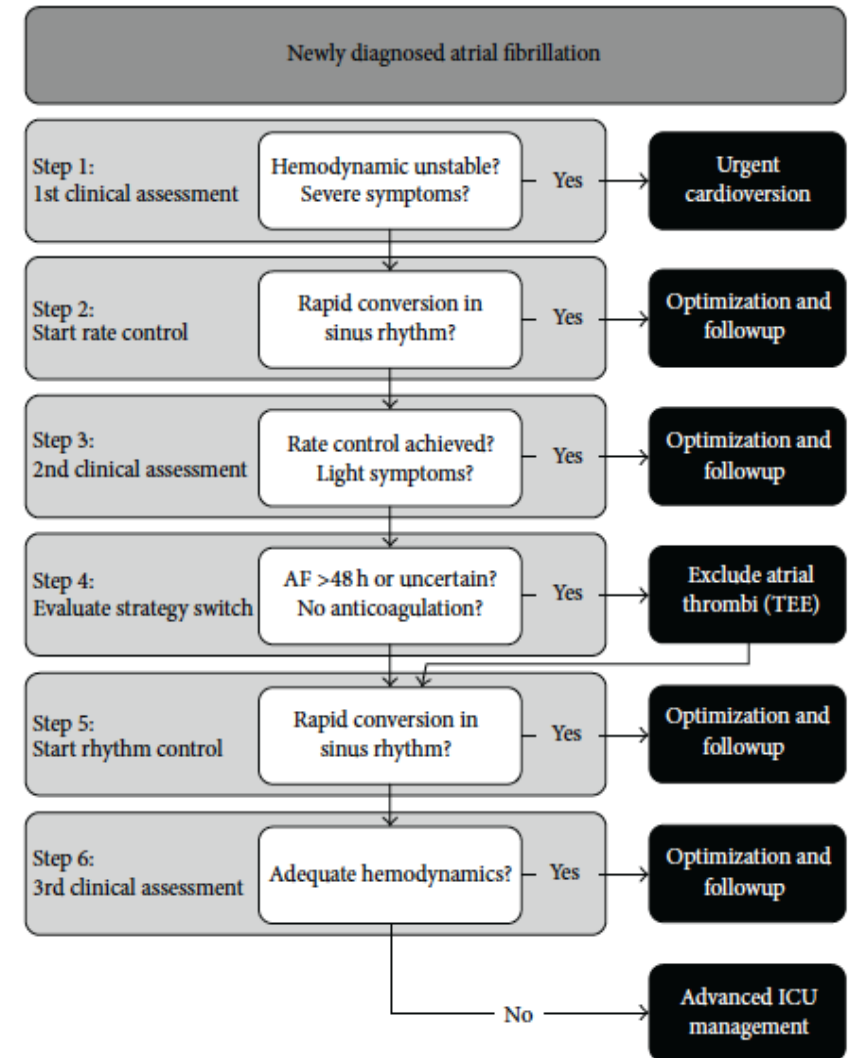
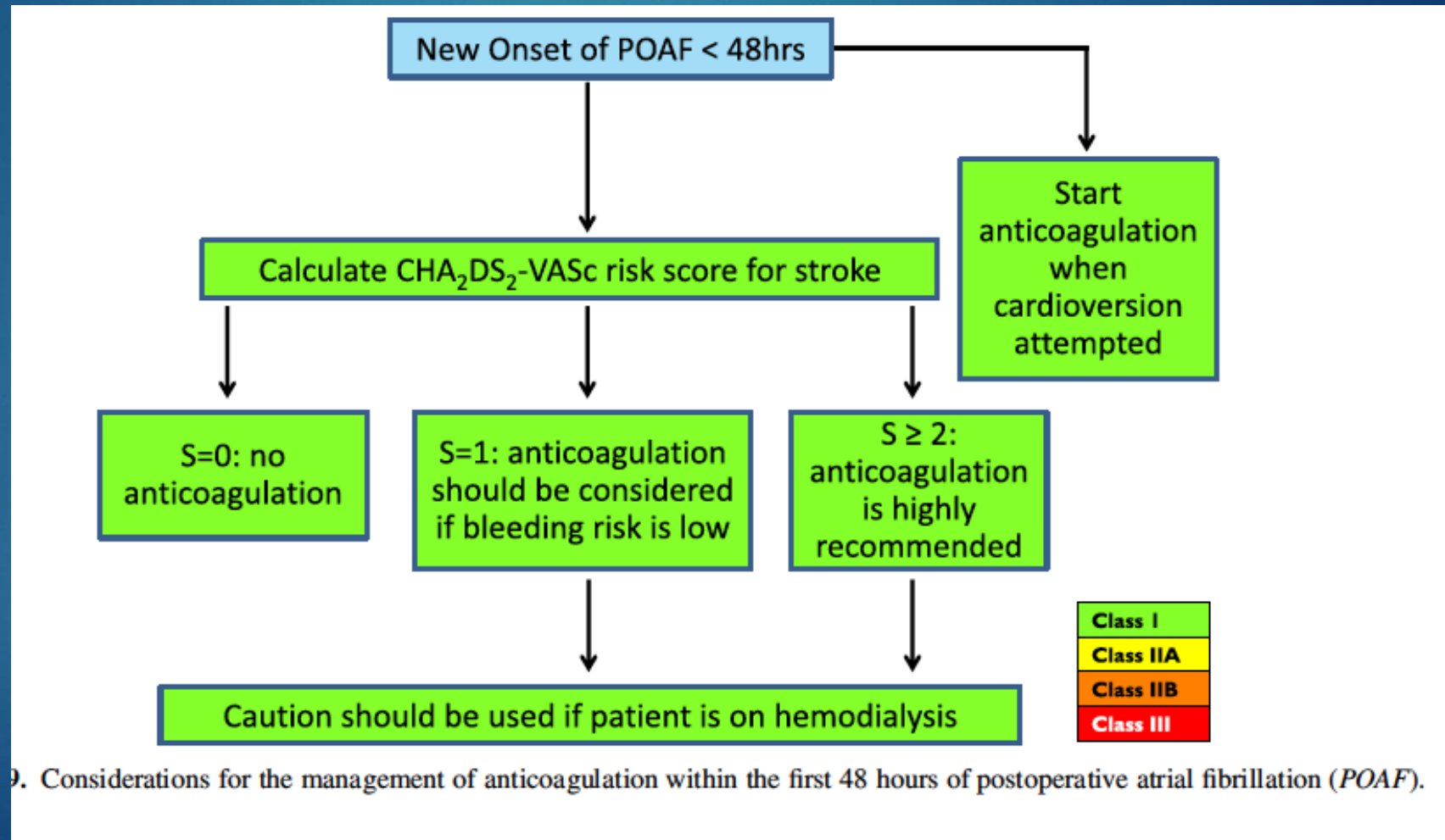


FIGURE 1: Management algorithm. Legend: ICU intensive care unit. Algorithm modified from [2, 4].

Anticoagulation ?

2014 AATS guidelines for the prevention and management of perioperative atrial fibrillation and flutter for thoracic surgical procedures



Anticoagulation ?

- ▶ Série française prospective
- ▶ 4 thrombi intra auriculaires / 108 FA <48h
- ▶ Seul facteur indépendant associé aux évènements thromboemboliques:
 - ▶ Atcd d'AVC

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.jccjournal.org

CHADS2 and CHA2DS2-VASc scores can predict thromboembolic events after supraventricular arrhythmia in the critically ill patients^{☆,☆☆}

Sébastien Champion, MD^{a,b,*}, Yannick Lefort, MD^a, Bernard-Alex Gaüzère, MD^a, Didier Drouet, MD^a, Bruno Julien Bouchet, MD^a, Guillaume Bossard, MD^a, Sabina Djouhri, MD^a, David Vandroux, MD^a, Kushal Mayaram, MD^a, Bruno Mégarbane, MD, PhD^{b,c,*}

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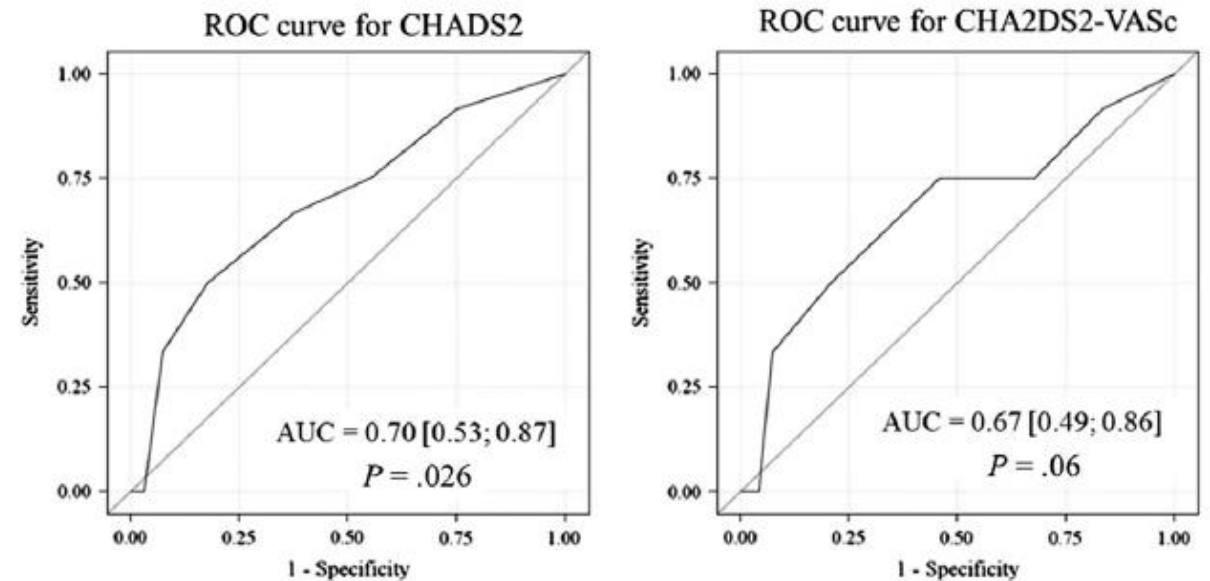
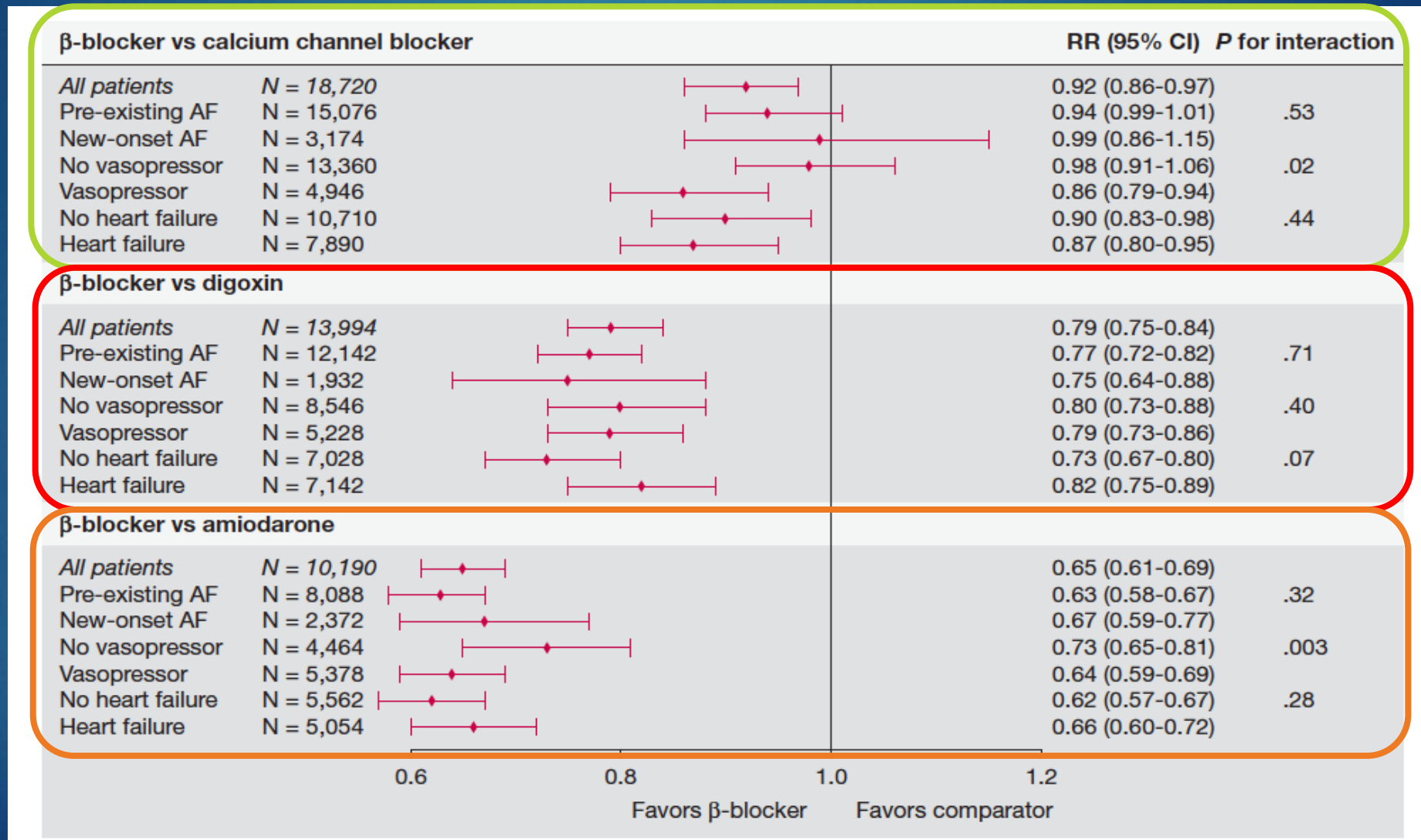


Fig. 1. The receiver operator characteristics ROC curve of CHADS2 (left) and CHA2DS2-VASc (right) scores to predict the onset of any ATE. AUC, area under the curve.

Anticoagulation ?

- ▶ 38 582 FA + sepsis
- ▶ 13611 traités par anticoagulants IV ou SC curatifs
- ▶ CHA₂DS₂VASc mauvais prédicteur d'AVC dans ce contexte
- ▶ Cohorte de 27010 patients ajustés sur score de propensité anticoag vs pas:
 - ▶ Taux d'AVC ischémique intra hospitalier identique (1.3 vs 1.4%)
 - ▶ Plus de saignements 8.6 vs 7.2 %
 - ▶ Risque d'AVC indépendant de l'ancienneté de la FA (de novo ou ancienne)

Ralentissement ?



Contrôle du rythme ?

Table 6 Efficacy of treatment for new-onset atrial fibrillation

Author, year [ref]	Study design	Severity score	Observation period	Intervention	Conversion rate	Hospital mortality (%)		
Balsler JR, 1998 [58]	Randomized controlled	APACHE III	59	Within 2 h	Esmolol	59.1% [20/34] $p=0.067$	31	
					Diltiazem	27.3% [6/22]	38	
Seguin P, 2006 [51]	Prospective observational	SAPS II	47	10 ± 10 h	DC	100% [3/3]	NA	
					Amiodarone	100% [4/4]	31.2	
					Digoxin	100% [1/1]		
					No intervention	100% [4/4]		
Sleeswijk ME, 2008 [59]	Prospective observational	APACHE II	19	Within 24 h	MgSO ₄ -amiodarone step-up scheme	93.1% [27/29]	NA	37.9
Meierhenrich R, 2010 [53]	Prospective observational	SAPS II	31 ^a	NA	DC (17/49)	85.7% [42/49] ^c	NA	48 ^{ad}
					Amiodarone (36/49)		23 ^{bd}	
					Digitalis (31/49)			
Kanji S, 2012 [55]	Retrospective observational	APACHE II	22.6	Within 24 h	DC ^e	26.9% [7/26]	NA	32
					Amiodarone ^f	87.4% [90/103]		
					Sotalol	100% [2/2]		
					Rate control	75% [21/28]		

AF atrial fibrillation, DC direct current cardioversion, LOS length of stay, MgSO₄ magnesium sulfate, NA not available.

^aNew-onset AF, no septic shock.

^bNew-onset AF and septic shock.

^cThe efficacy of each intervention was unknown because of a combination of these interventions.

^dSixty-day mortality.

^eEighteen of 26 had received amiodarone.

^fAmiodarone alone.

Contrôle du rythme ?

TABLE 2: Frequently used intravenous antiarrhythmic substances in the ICU.

Substance	Dosing	Half-life	Commentary
Esmolol	1.0 mg/kg in boluses of 10–20 mg iv, followed by continuous infusion (start with 0.05 mg/kg/min, increase dose every 30 minutes if necessary)	7–10 min	Good efficacy in high adrenergic state. Positive effect on cardiovascular comorbidities. Consider negative inotropic effects
Diltiazem	0.25 mg/kg iv over 2 minutes, followed by continuous infusion (10–15 mg/h) if necessary	2–4 h	Longer half-life as esmolol. No beta-blocking effects. Consider negative inotropic effects
Amiodarone	150–300 mg iv, followed by a continuous infusion (900–1200 mg daily) up to 0.1 g/kg Maintenance dose 200 mg daily	20–100 d	Good efficacy, safe in patients with structural heart disease. Extreme long half-life up to 80 days. Consider extracardiac side effects
Digoxin	0.25–0.5 mg iv every 4–8 h up to 1 mg, followed by maintenance dose of 0.25 mg daily	20 h–6 d	Positive inotropic effect. Reduce dose in renal dysfunction. Check digoxin plasma levels to avoid toxicity

Cardioversion électrique

Disappointing Success of Electrical Cardioversion for New-Onset Atrial Fibrillation in Cardiosurgical ICU Patients*

Mattia Arrigo, MD^{1,2}; Natalie Jaeger, MD¹; Burkhardt Seifert, PhD³; Donat R. Spahn, MD, FRCA¹; Dominique Bettex, MD¹; Alain Rudiger, MD¹

DOI: 10.1097/CCM.0000000000001257

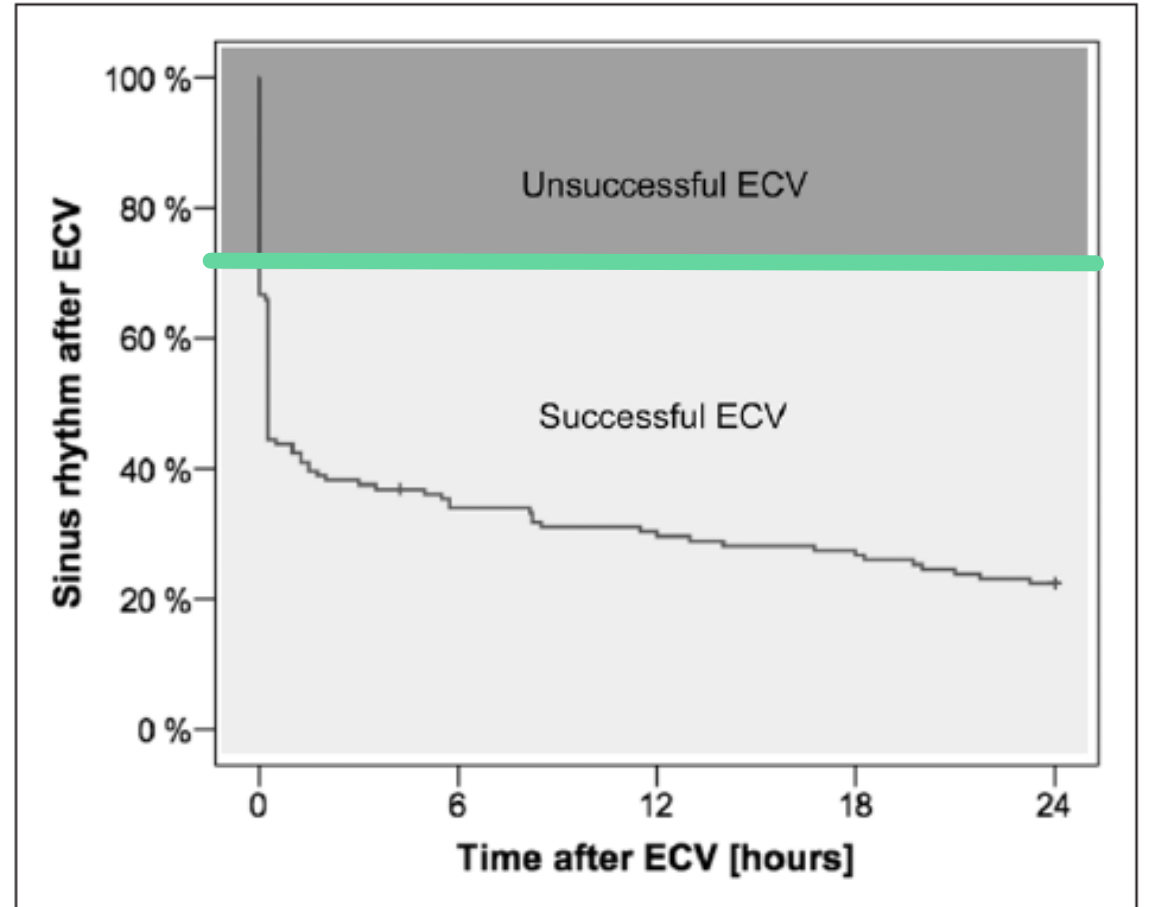


Figure 2. Percentage of sinus rhythm after electrical cardioversion (ECV). The figure illustrates the overall frequency of sinus rhythm after ECV. Atrial fibrillation persisted after 29% of sessions (unsuccessful ECV), whereas ECV was initially successful in restoring sinus rhythm in 71% of sessions.

Traiter oui, mais quand ?

TABLE 2] Postdischarge Identification of AF by AF Status During Sepsis

Time From Sepsis Hospitalization	Rate of AF After Sepsis Hospitalization			
	No AF ^a (n = 95,536)	New-Onset AF ^a (n = 9,540)	Prior AF ^a (n = 33,646)	P Value ^b
1 y	7,315 (7.7)	4,193 (44.2)	19,147 (57.2)	< .001
2 y	9,760 (10.5)	4,651 (49.3)	20,304 (60.9)	< .001
3 y	11,315 (12.6)	4,874 (52.0)	20,695 (62.3)	< .001
4 y	12,394 (14.3)	4,987 (53.6)	20,877 (63.1)	< .001
5 y	13,080 (15.5)	5,074 (54.9)	20,967 (63.5)	< .001

Data are presented as No. of events (rate [%]). Rates were calculated using the cumulative incidence function, accounting for the competing risk of mortality. See Table 1 legend for expansion of abbreviation.

^aAF status during index sepsis hospitalization.

^bP value is for comparison among all three atrial fibrillation groups.

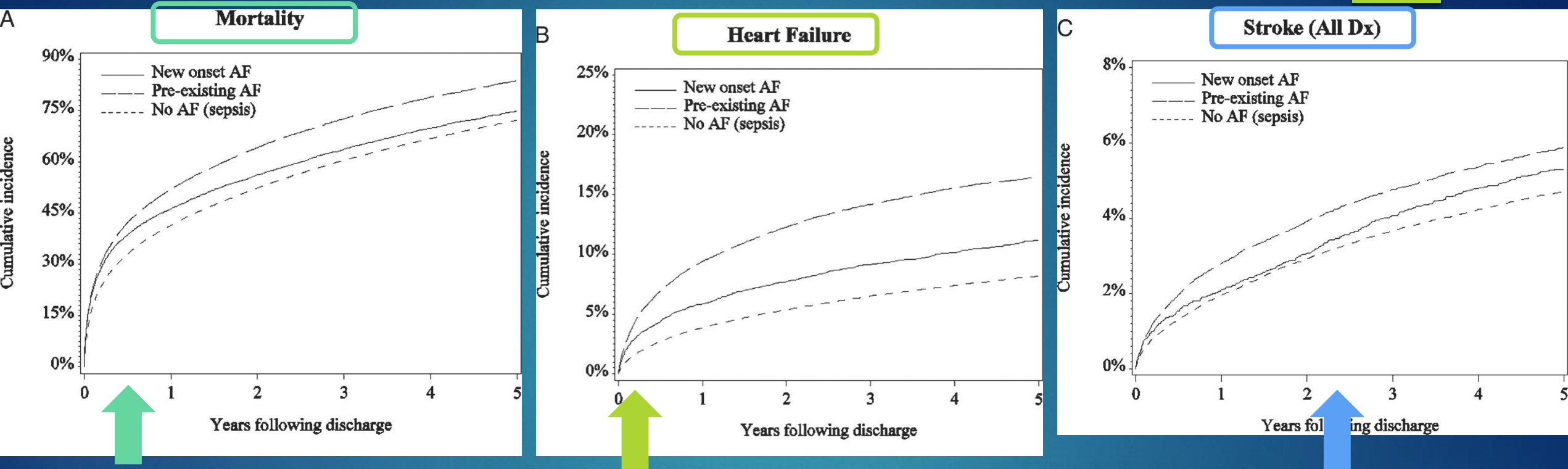
Allan J Walkey, Bradley G Hammill, Lesley H Curtis, Emelia J Benjamin

Long-term Outcomes Following Development of New-Onset Atrial Fibrillation During Sepsis

Chest, Volume 146, Issue 5, 2014, 1187–1195

<http://dx.doi.org/10.1378/chest.14-0003>

Traiter oui, mais quand ?



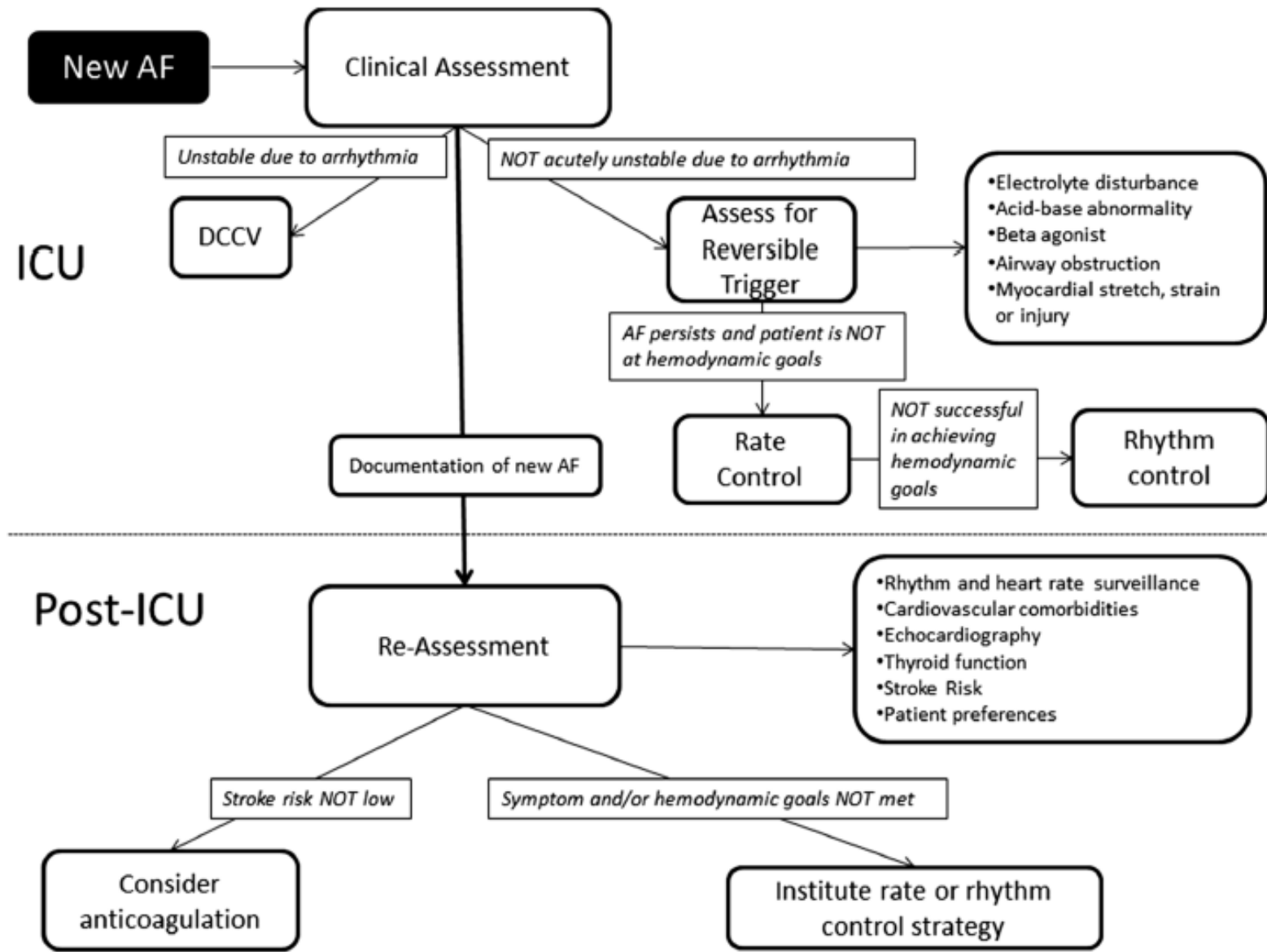
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<http://dx.doi.org/10.1378/chest.14-0003>

Stratégie proposée



[Commentary]

CHEST

Optimizing Atrial Fibrillation Management From ICU and Beyond

Allan J. Walkey, MD; D. Kyle Hogarth, MD, FCCP; and Gregory Y. H. Lip, MD

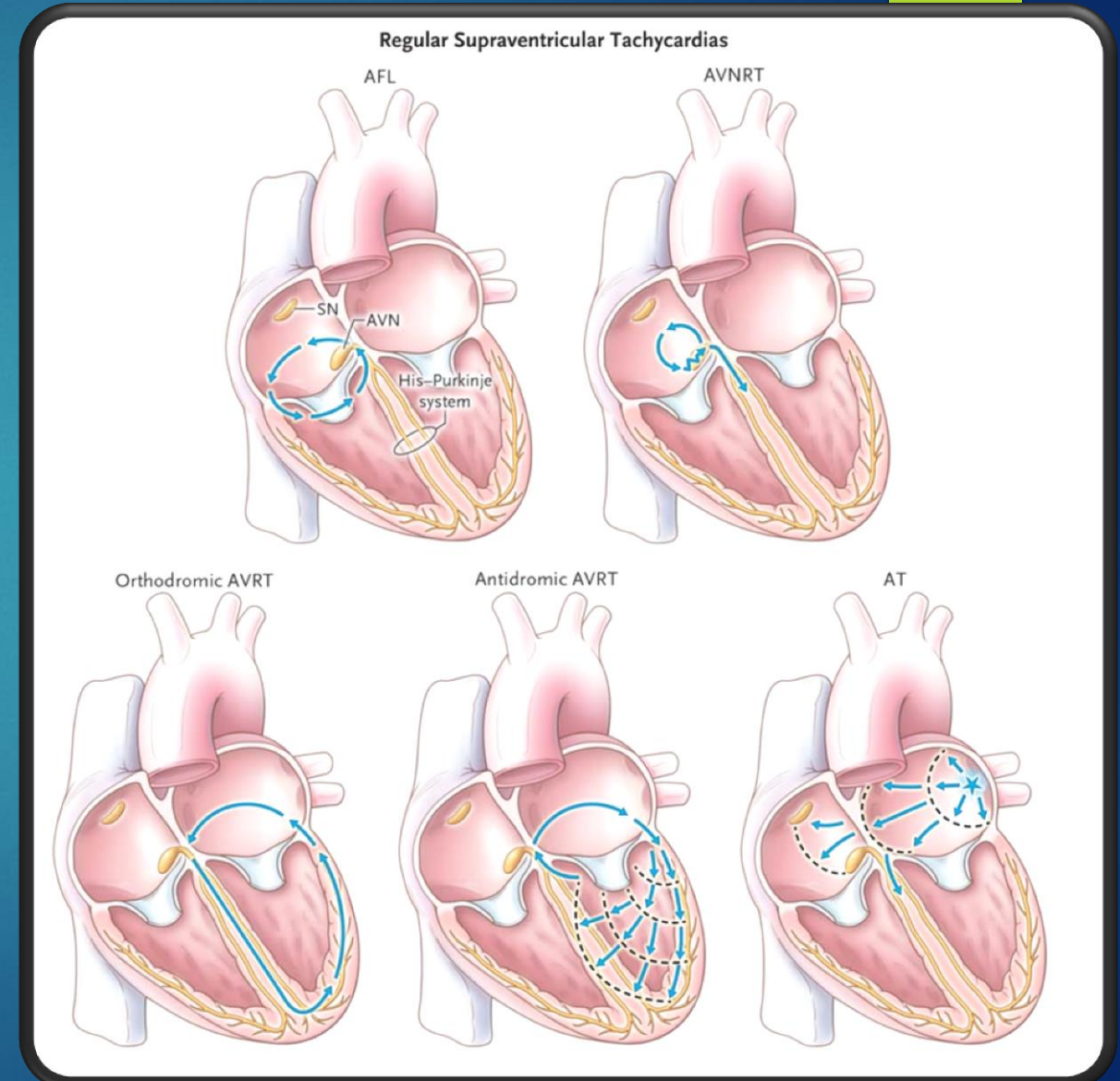
Figure 1 – Approach to the short-term and long-term management of new-onset AF during critical illness. The initial approach involves clinical assessment for hemodynamic and respiratory stability related to AF, with evaluation for reversible triggers and initiation of heart rate or rhythm control treatments to meet hemodynamic goals. After clinical improvement, patients should be systematically reevaluated for stroke risk (eg, CHA₂DS₂-VASc [congestive heart failure, hypertension, age ≥ 75 y, diabetes, previous stroke/transient ischemic attack, vascular disease, age 65–74 y, sex category] score) and evidence of AF recurrence to guide initiation of thromboembolism prophylaxis, rate control, or rhythm control. AF = atrial fibrillation; DCCV = direct current cardioversion.

Zones d'ombre ...

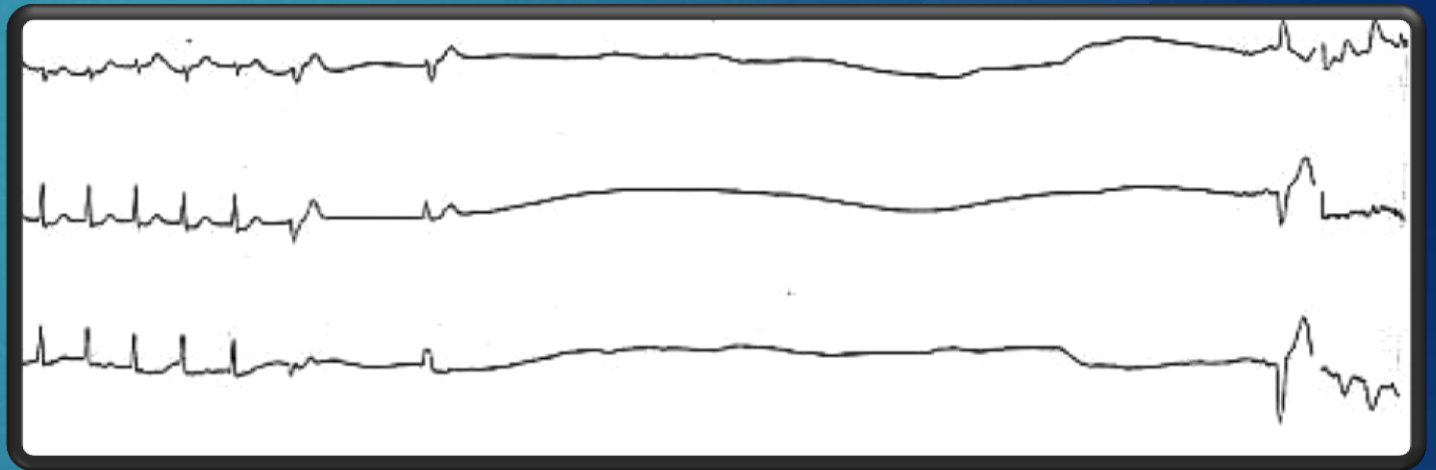
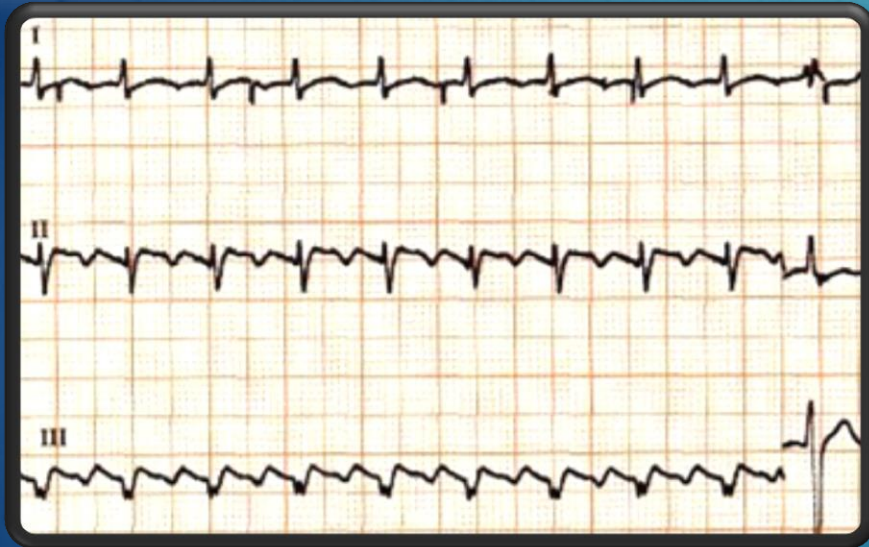
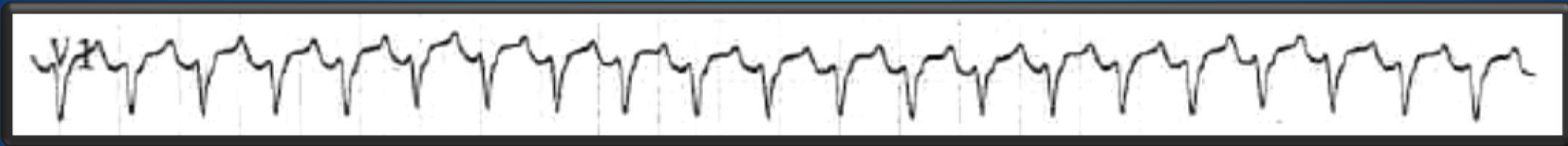
- ▶ FA en réanimation :
 - ▶ Quelle définition ?
 - ▶ Marqueur de gravité en phase hospitalière
 - ▶ Facteur pronostique à la sortie ?
- ▶ Ralentir vs réduire ?
- ▶ Anticoagulation curative ?
- ▶ Essais randomisés nécessaires, mais NSN très élevé ! Multicentrique
+++
 - ▶ 1500 par groupe HBPM préventive vs curative ...

Tachycardies à QRS fins

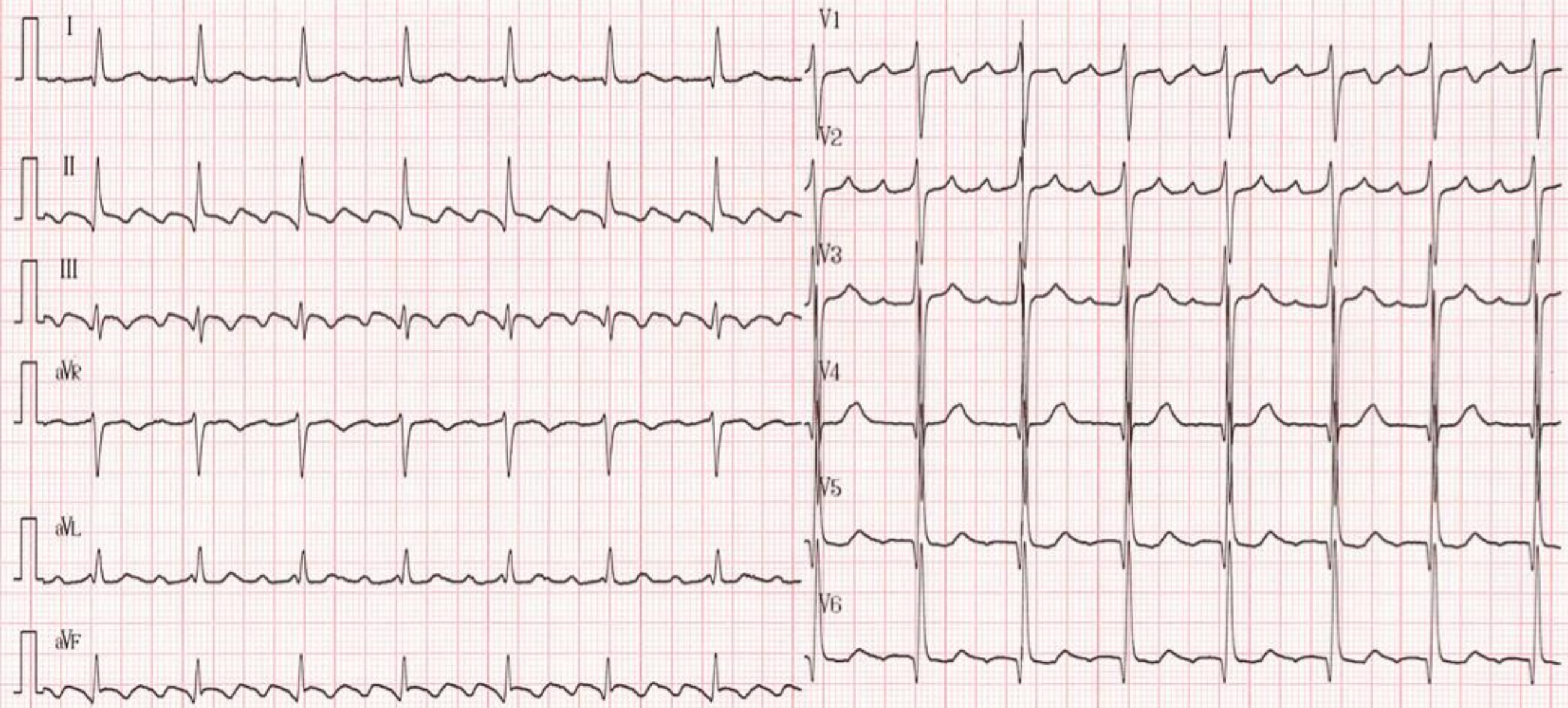
- ▶ → supraventriculaire
 - ▶ Irrégulier : FA +++
 - ▶ Régulier : début ?
 - ▶ Brutal : flutter, tachycardie atriale, tachycardie jonctionnelle
 - ▶ Progressif : sinusale



Tachycardies à QRS fins



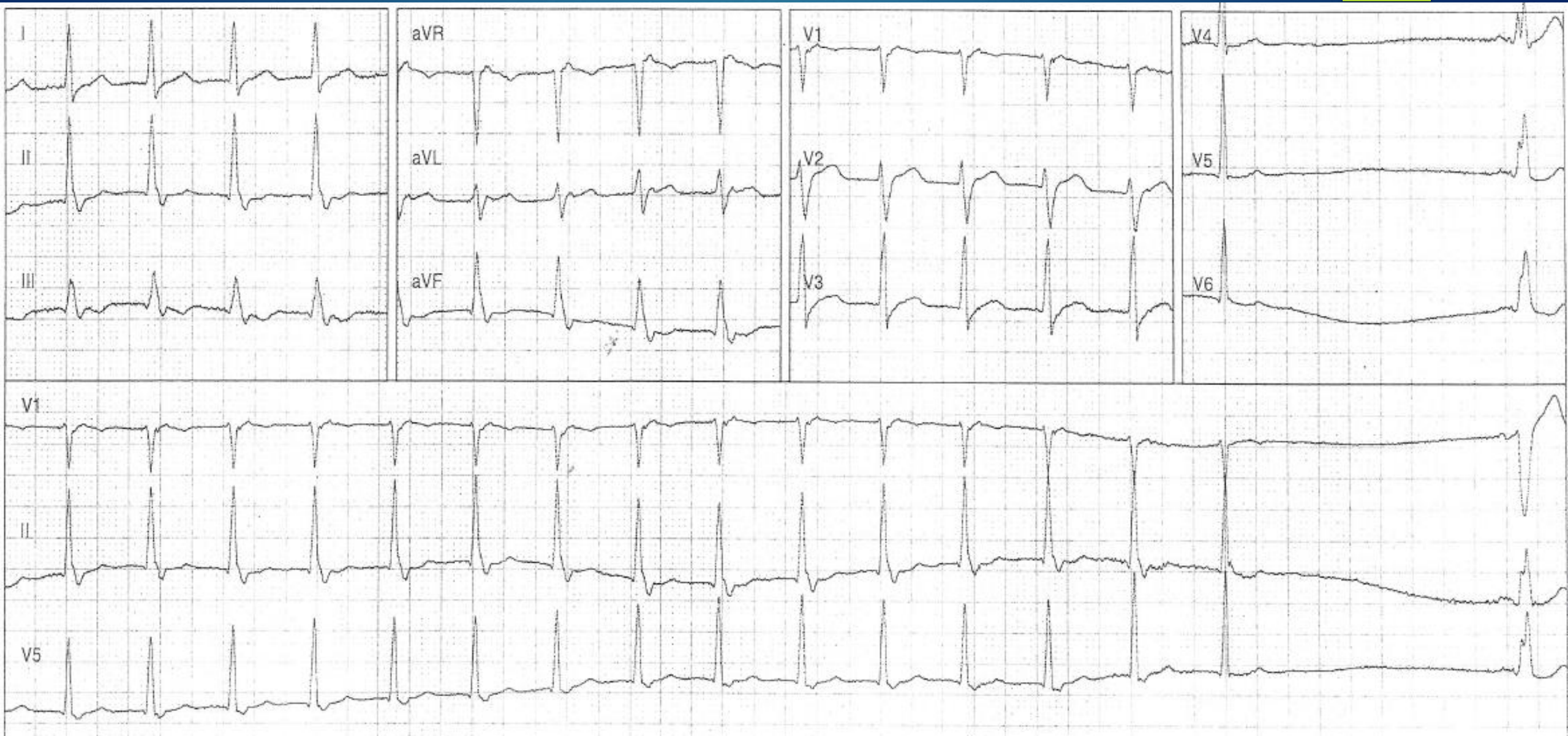
Flutter



Striadyne (adénosine)

- ▶ Adénosine : nucléotide endogène
- ▶ Blocage NAV
- ▶ Toujours avec atropine prête
- ▶ Durée d'action : 10 secondes
- ▶ 10 mg en bolus IVD avec rincage puis 20mg 2-3 min après si inefficace
- ▶ 91% de succès sur les TJ
- ▶ Contre-indications:
 - ▶ bloc auriculoventriculaire du deuxième ou du troisième degré, à l'exception des patients porteurs d'un stimulateur cardiaque,
 - ▶ dysfonctionnement sino-auriculaire (maladie de l'oreillette) à l'exception des patients porteurs d'un stimulateur cardiaque,
 - ▶ asthme,
 - ▶ hypersensibilité connue à l'adénosine.

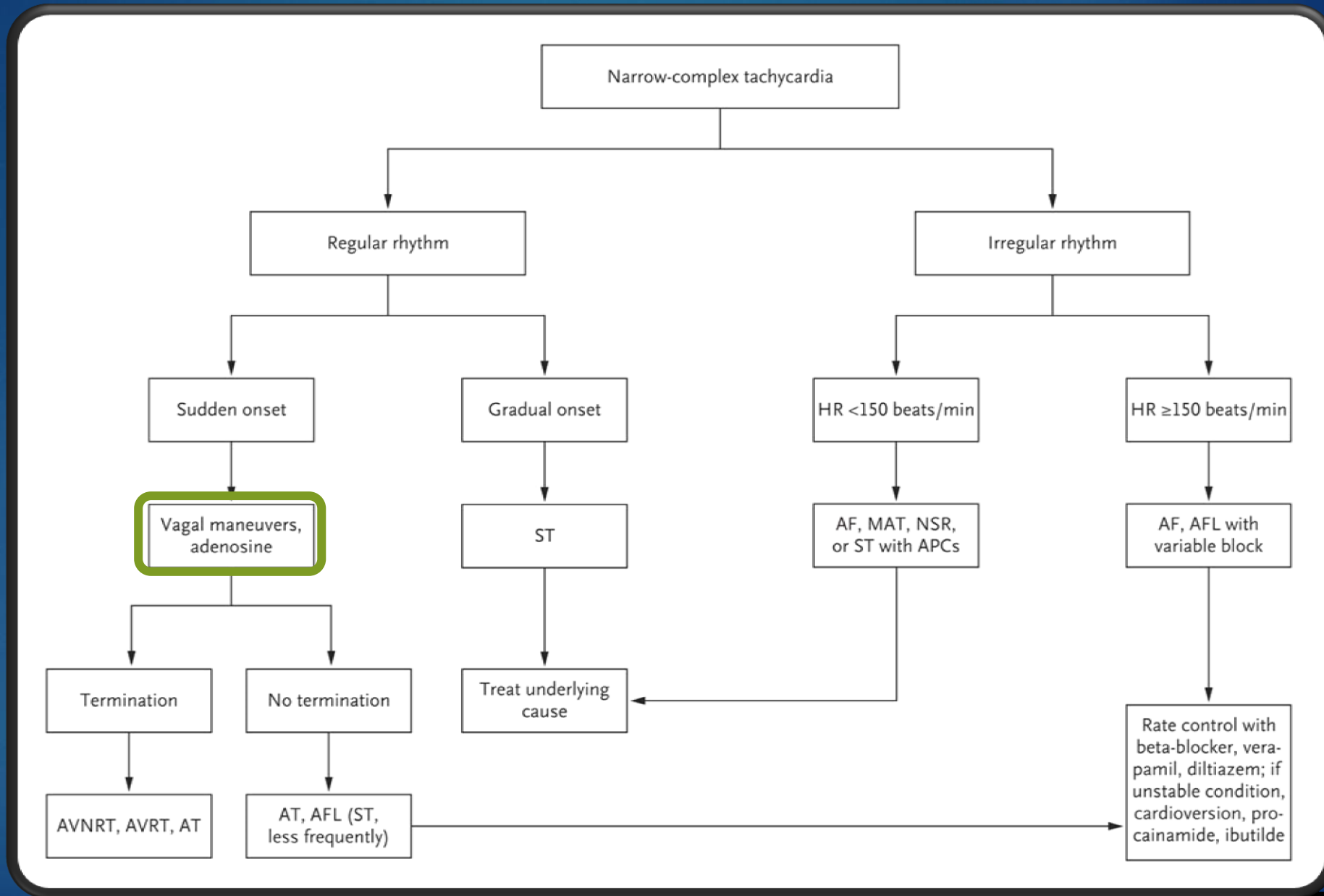
Striadyne !

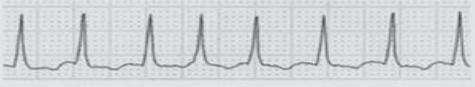

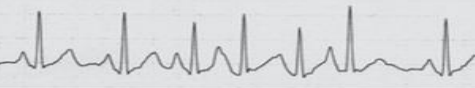


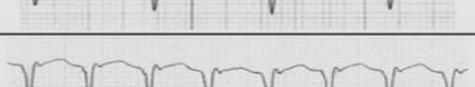
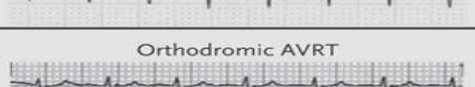
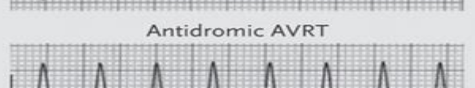
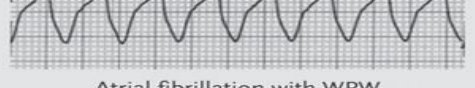


Striadyne !



Differential Diagnosis and Treatment of Narrow-Complex Tachycardias.



SVT	Underlying Causes	Regularity	Rate (beats/min)	Onset	Atrial Activity and P:QRS Relationship	Response to Adenosine	Electrocardiogram
Atrial fibrillation	Cardiac disease, pulmonary disease, pulmonary embolism, hyperthyroidism, postoperative	Irregular	100-220	Sudden or gradual (if in chronic atrial fibrillation)	Fibrillatory waves, no relationship to QRS	Transient slowing of ventricular rate	
Multifocal atrial tachycardia	Pulmonary disease, theophylline therapy	Irregular	100-150	Gradual	Changing P morphologic features before QRS	None	
Frequent atrial premature contractions	Caffeine, stimulants	Irregular	100-150	Gradual	P before QRS	None	
Sinus tachycardia	Sepsis, hypovolemia, anemia, pulmonary embolism, pain, fear, fright, exertion, myocardial ischemia, hyperthyroidism, heart failure	Regular	220 minus the patient's age	Gradual	P before QRS	Transient slowing	
Atrial flutter	Cardiac disease	Regular (occasionally irregular if variable AV conduction)	150	Sudden	Flutter waves, usually 2:1	Transient slowing of ventricular rate	
AV nodal reentrant tachycardia	None	Regular	150-250	Sudden	No apparent atrial activity or R' at termination of QRS	Termination of tachycardia	
AV reciprocating tachycardia	Rarely, Ebstein's anomaly	Regular	150-250	Sudden	In narrow complex, P after QRS; in wide complex, P rarely observed; in irregular rhythm (atrial fibrillation), no apparent P wave	Termination of tachycardia	<p>Orthodromic AVRT</p>  <p>Antidromic AVRT</p>  <p>Atrial fibrillation with WPW</p> 
Atrial tachycardia	Cardiac disease, pulmonary disease	Regular	150-250	Sudden	P before QRS	Termination of 60–80%	