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CONSENSUS CLINIQUE SUR L'ABLATION DE TACHYCARDIE VENTRICULAIRE PAR VOIE EPICARDIQUE

F Brigadeau CHU Lille

ufr3s faculté de médecine | Université de Lille

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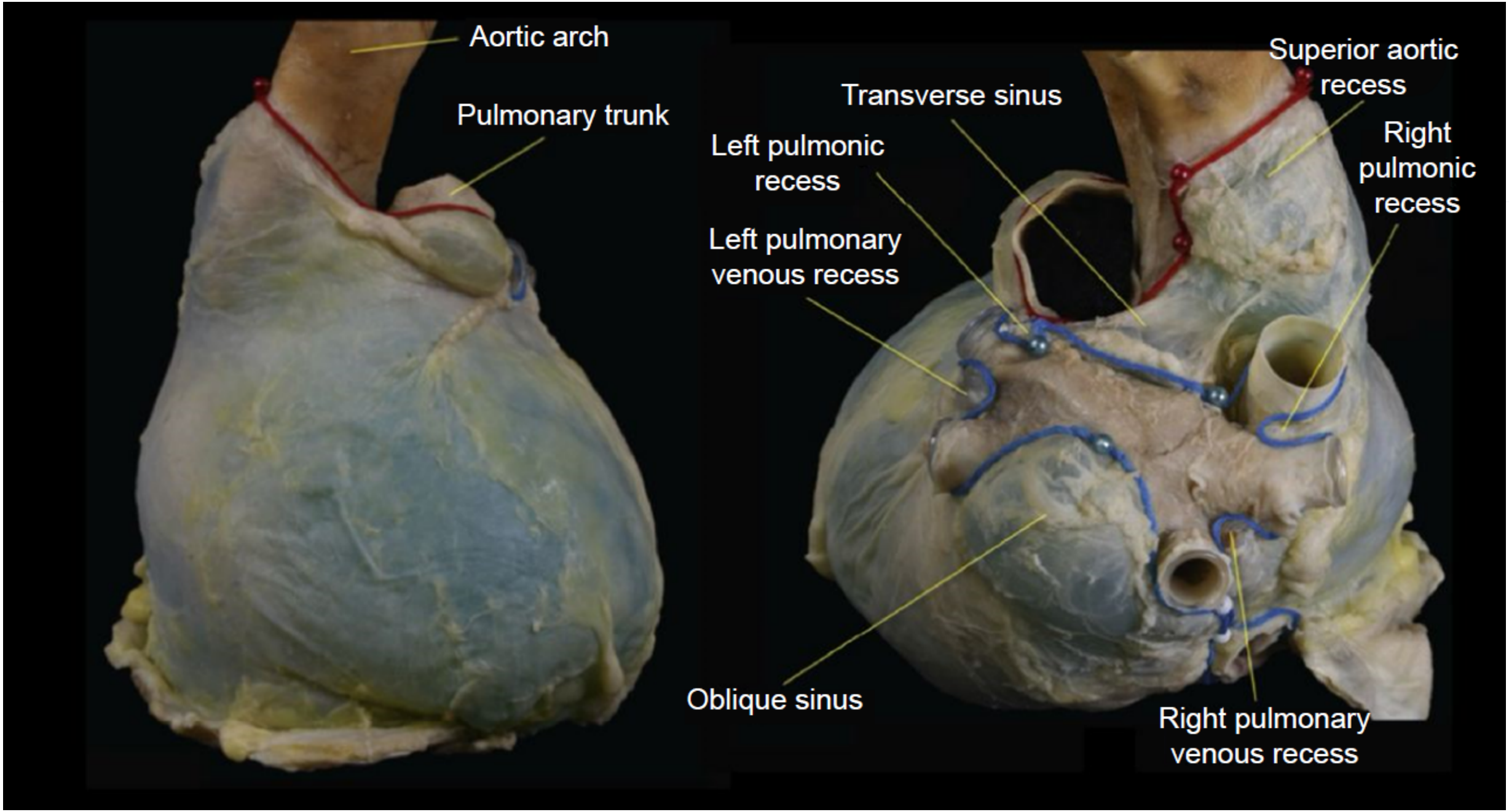
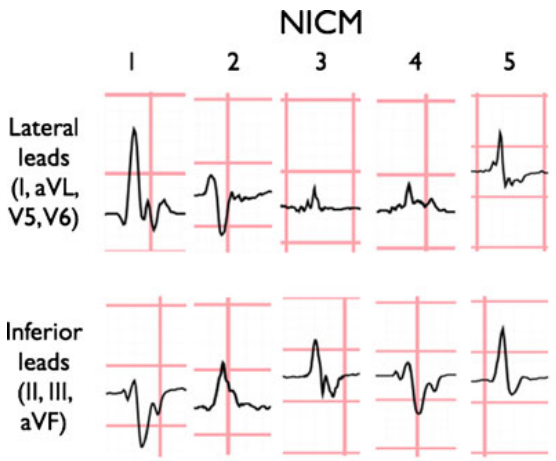
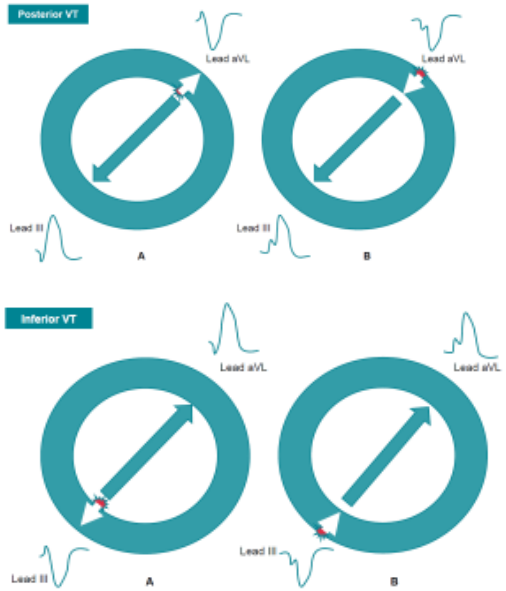
PAS DE CONFLIT D'INTERET POUR CETTE PRESENTATION

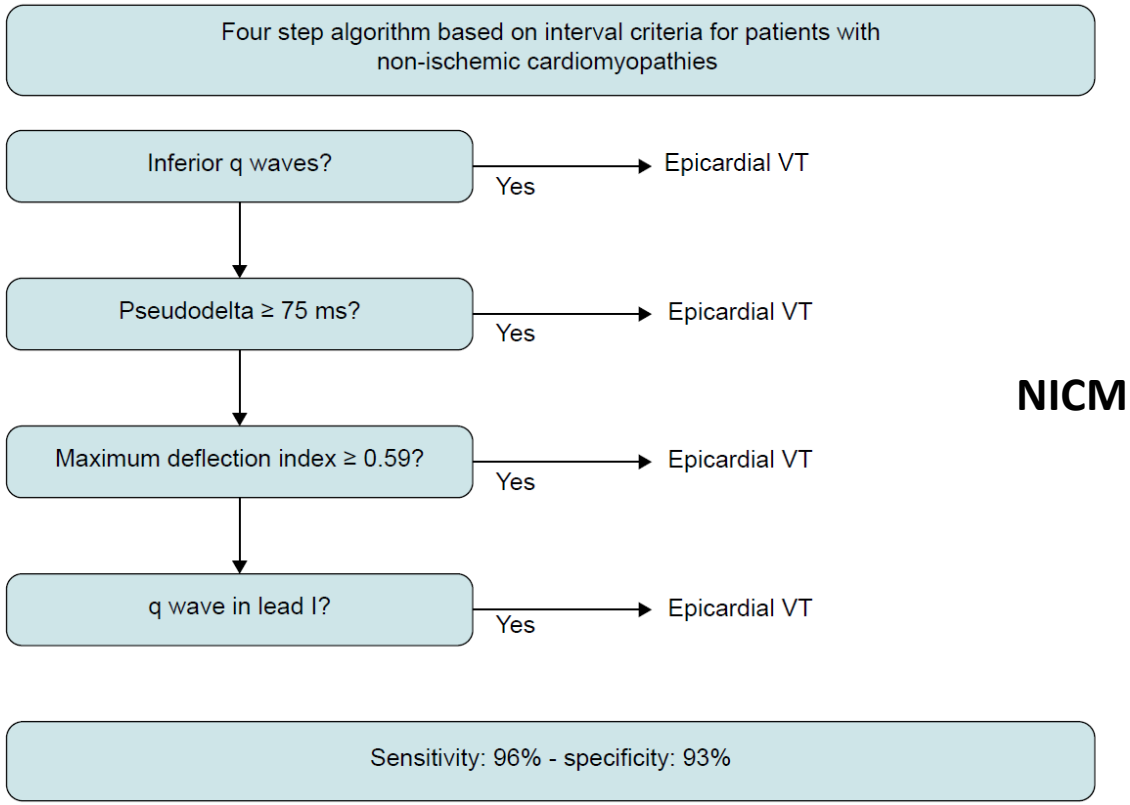

Aortic arch
Pulmonary trunk
Transverse sinus
Superior aortic recess
Left pulmonic recess
Right pulmonic recess
Left pulmonary venous recess
Oblique sinus
Right pulmonary venous recess

AVANT LA PROCEDURE L'ECG pré-procédure

However, while ECG criteria provide valuable insights, they are not infallible and should not be used as the sole determinant for selecting the epicardial ablation approach. They are notably less reliable in patients with extensive scars from prior myocardial infarction.[19]







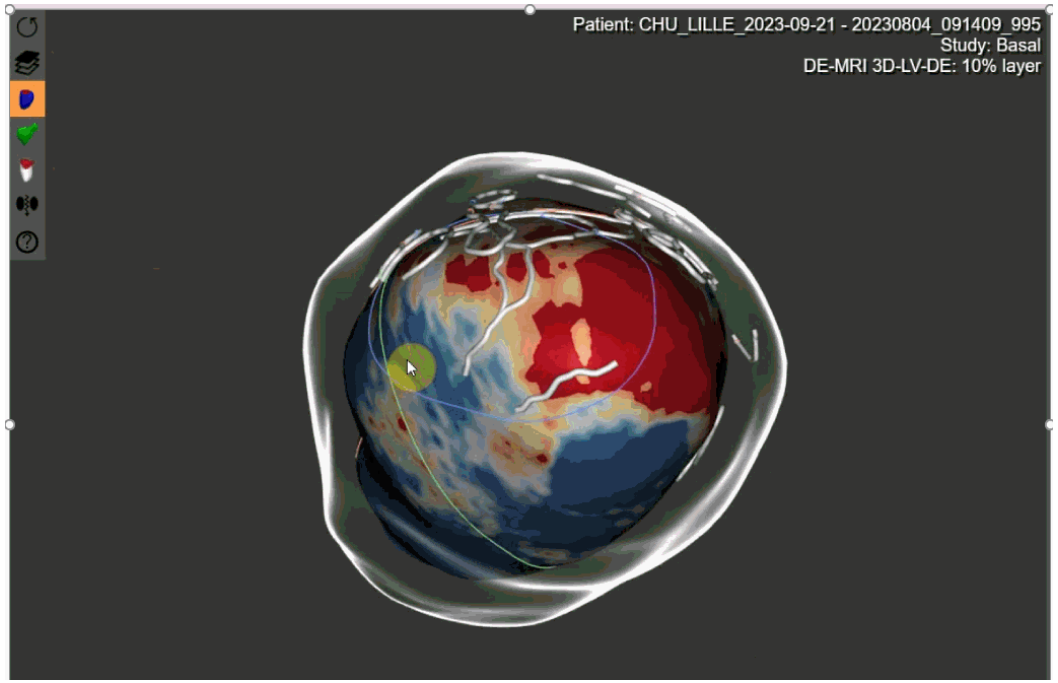
NICM

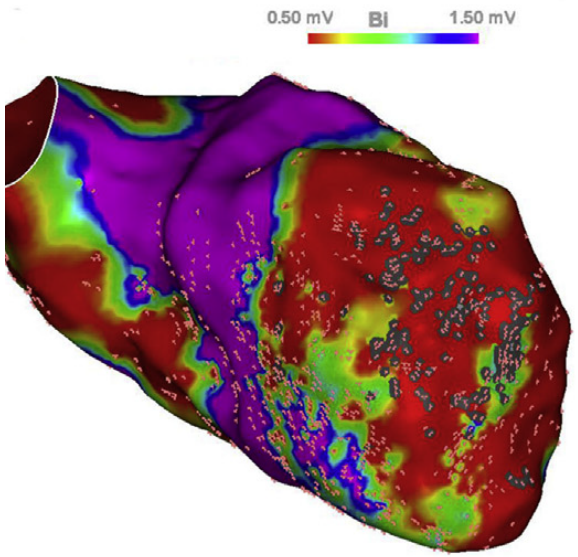
Betensky et al J Interv Card electrophysiol 2012;35:311-21

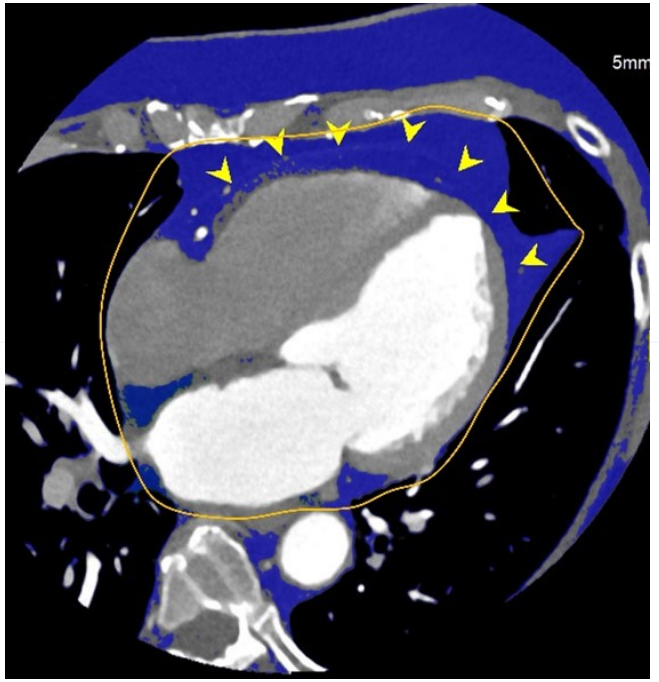
Vallès et al Circ arrhythm Electrophysiol 2010;363-71

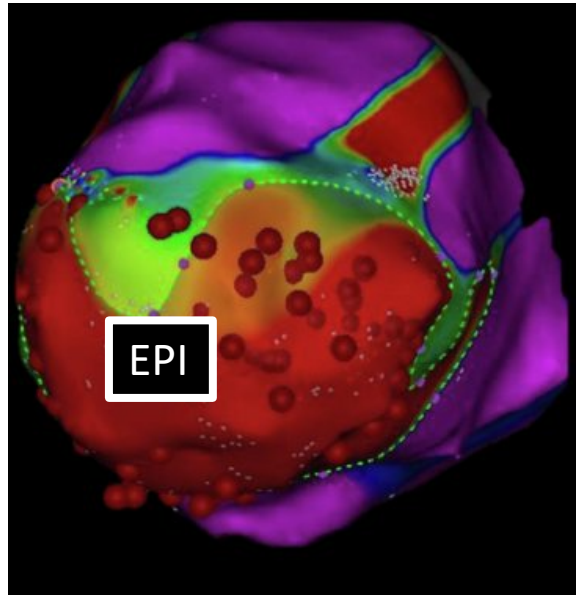
IMAGERIE PRE-PROCEDURE

Advice	Strength of evidence
Advice TO DO	
Routine pre-procedural cardiac MRI to assess the presence, location, distribution, and extent of ventricular scars is advised in patients with non-ischaemic cardiomyopathy[55,72–80]	









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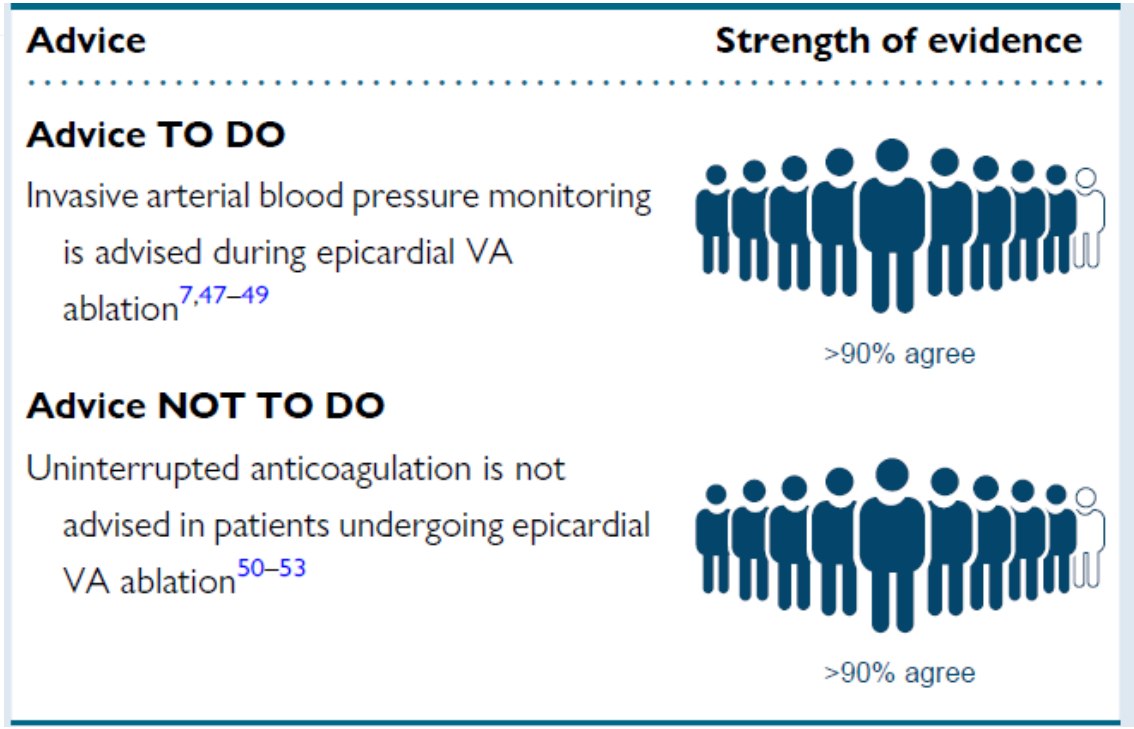
LA PROCEDURE D'ABLATION EPICARDIQUE

- ARRET DES AC (J-1 pour les AOD, INR 1,5)
- Pas d'HNF si procédure uniquement épicardique
- Si procédure endo/épi, HNF ACT 350 après accès épicardique

- AG ou sédation profonde
- +/- support hémodynamique
- Inductibilité, précarité HD



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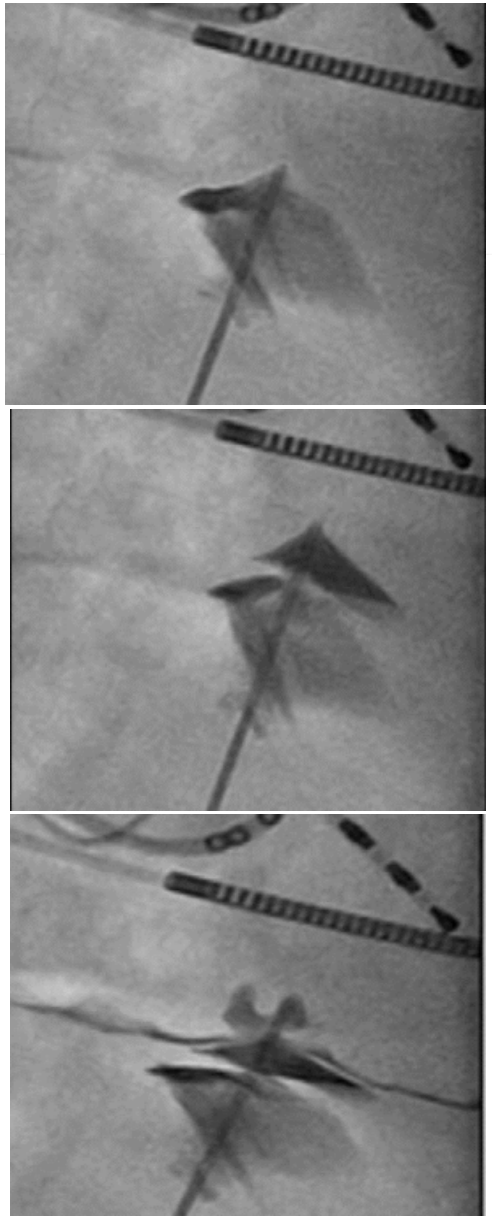
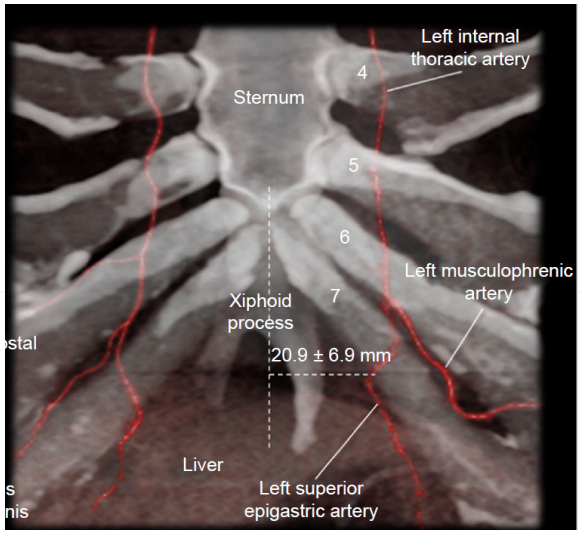
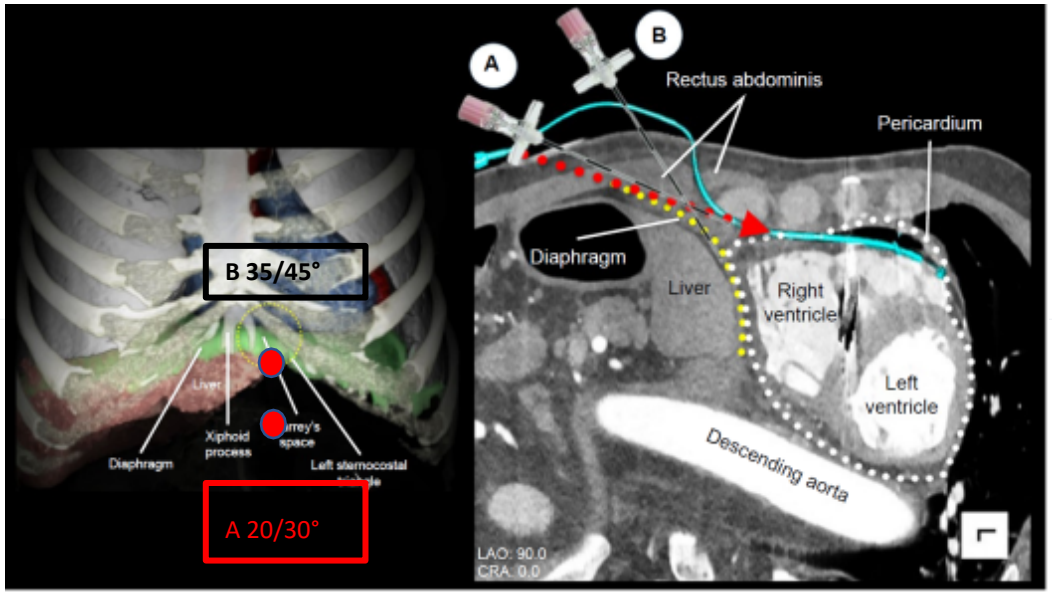
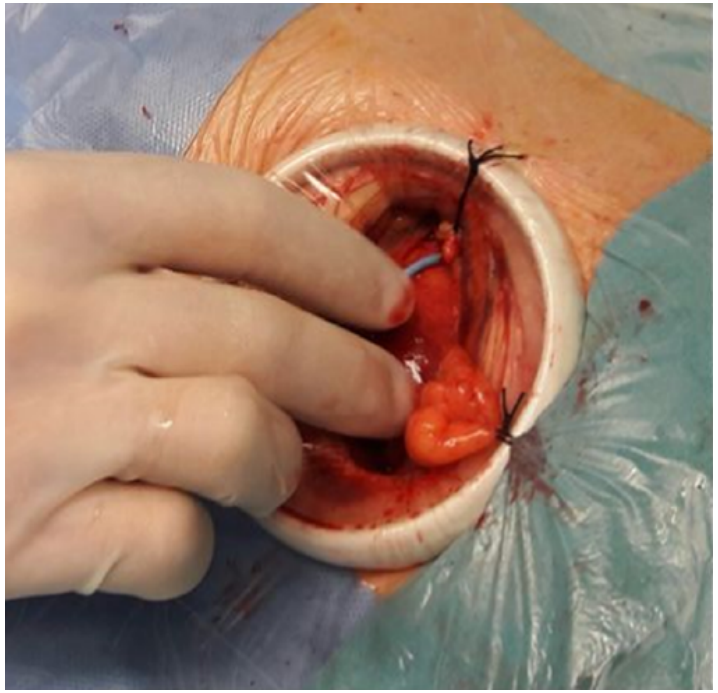








The dry pericardial puncture technique remains essentially unchanged since its original description in 1995…

- Ponction en profil G en apnée
- Aiguille de Tuohy 17 ou 18G ou microponction double aiguille
- Ne pas trop injecter de contraste…
- Gaine orientable ++ tjrs + KT +++
- Aspirations régulières
- Laisser un drain

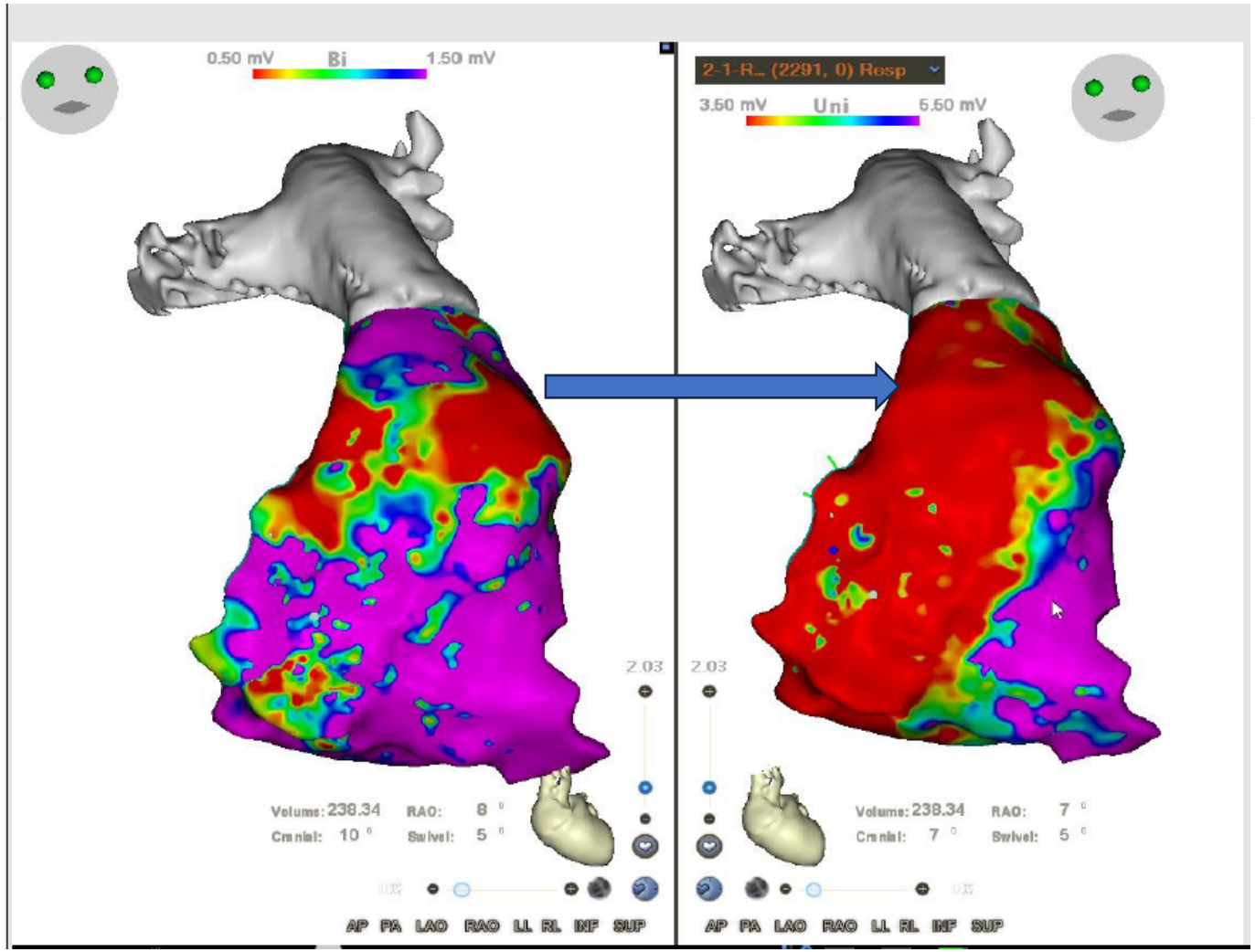
LES DONNEES DE CARTOGRAPHIE

Table 5 Unipolar voltage criteria based on conventional mapping catheter to identify epicardial substrate during endocardial mapping

Chamber	Unipolar threshold (mV)
Right ventricle	<5.5[a]
Left ventricle (non-ischaemic cardiomyopathy)	<8.3
Left ventricle (ischaemic cardiomyopathy)	<4.0–5.0

- Précision de l'unipolaire très dépendant du contact +++
- Dépendant de l'épaisseur myocardique
- Pas de différenciation mid et épicardique

CAVD = Abord épicardique essentiellement sur les TV infundibulaires +++
Notamment en cas d'endocarde sain



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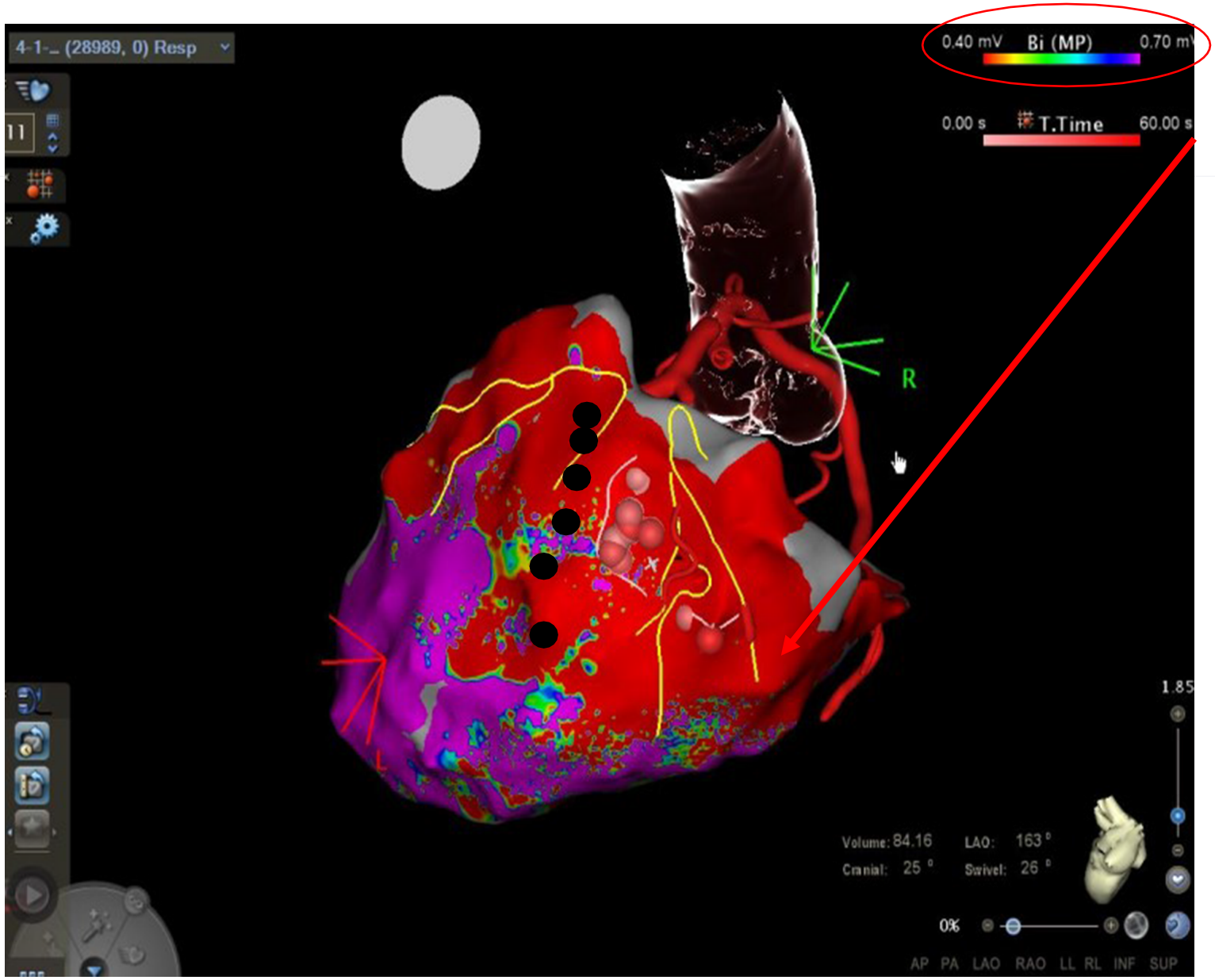
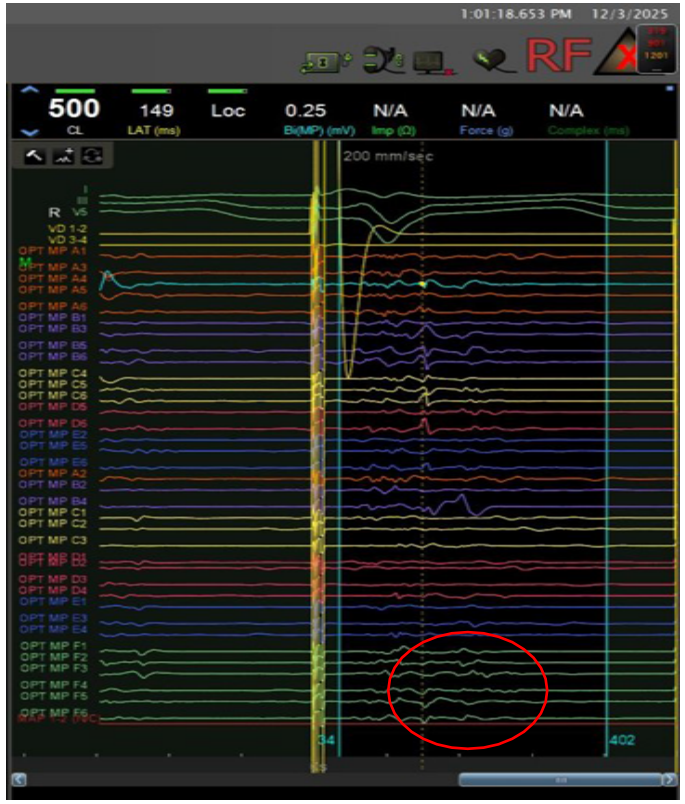
NICM = Abord épicardique essentiellement sur les TV inférolatérales +++



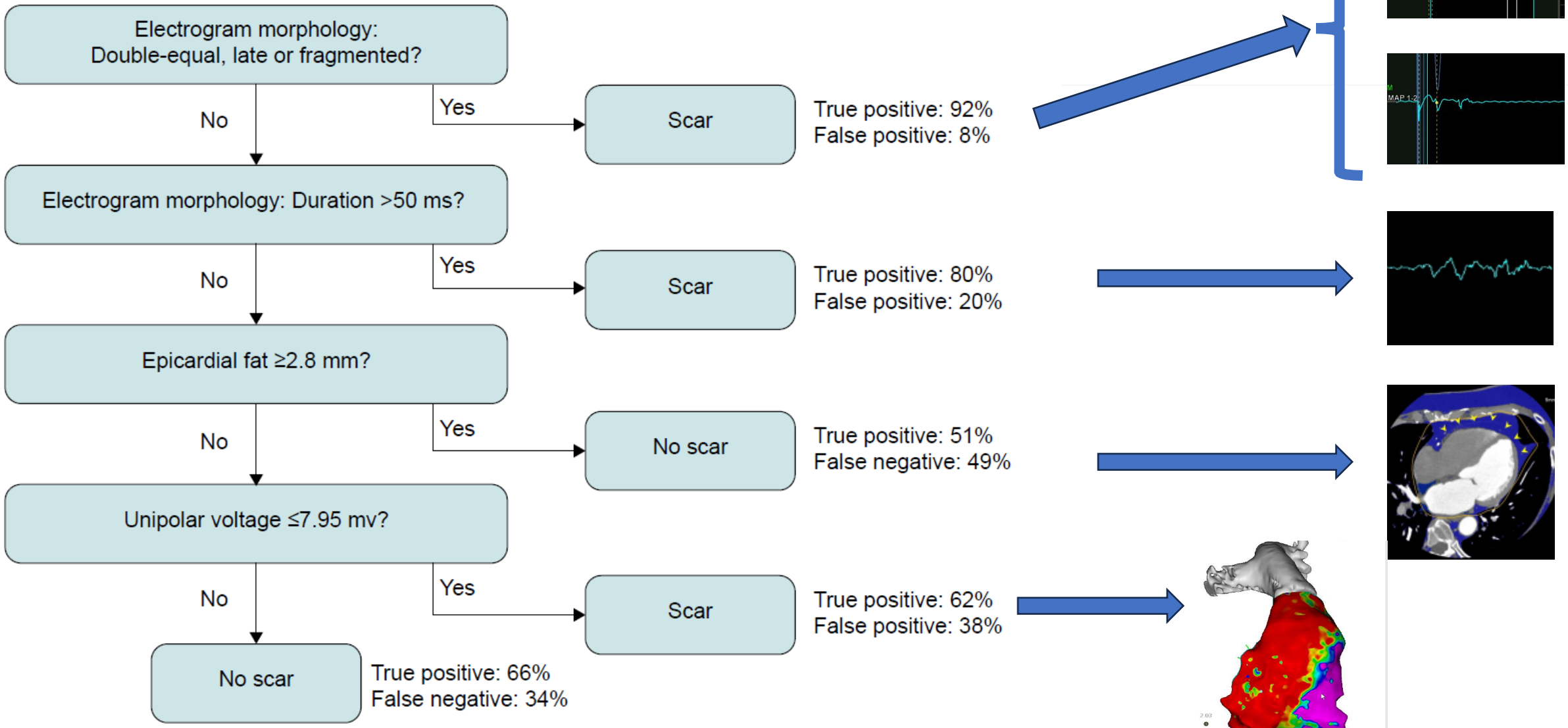
Cut off std 0,5/1,5 mV, modifiable en fct du pnt

Cathéter multipolaire



Analyse des potentiels et manœuvres identiques à la procédure endocardique

ANALYSE DES POTENTIELS LOCAUX



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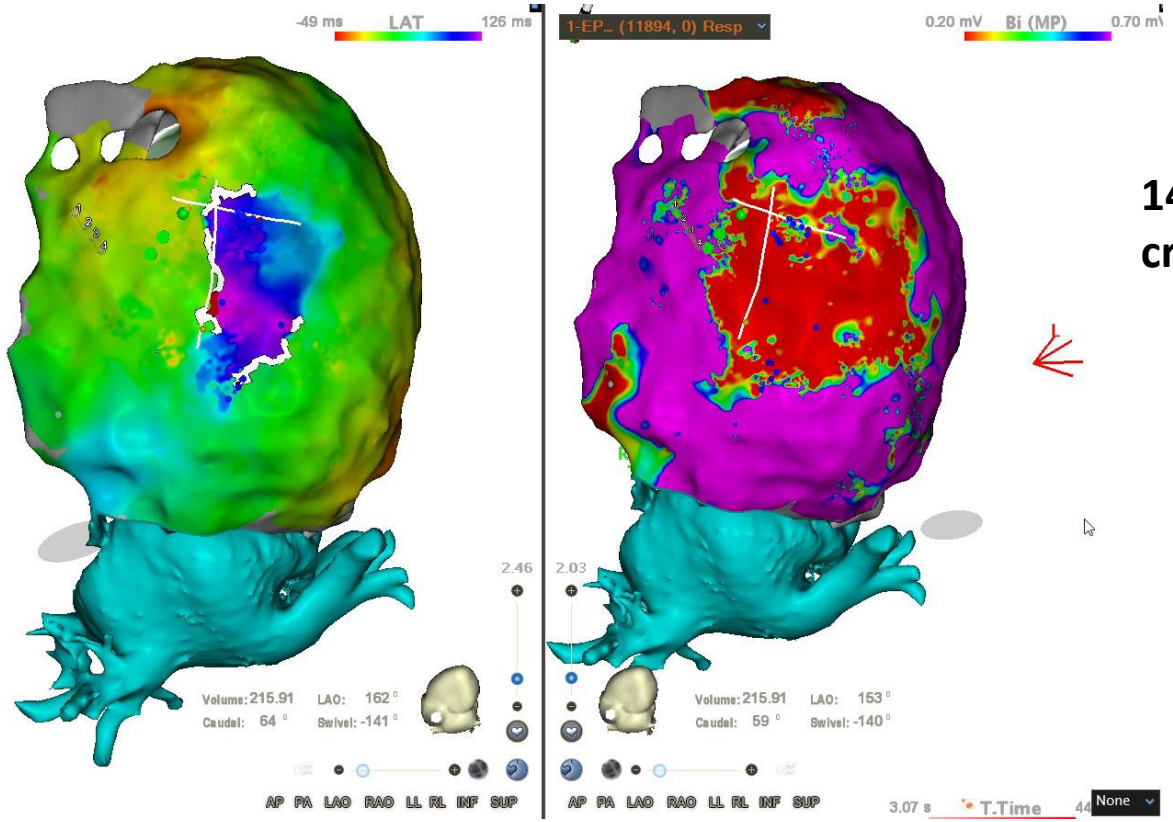
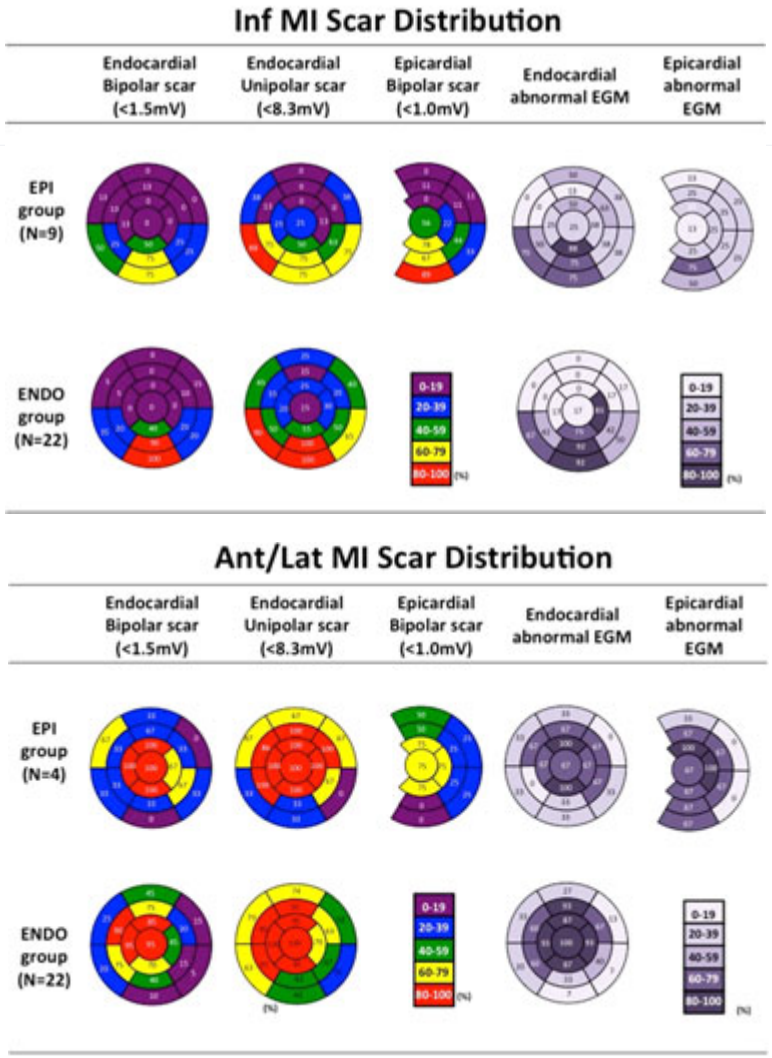
DANS LES CARDIOAPTHIES POST INFARCTUS

- Ablation épicardique raisonnable après échec de procédure endocardique (discutable)
- En cas de thrombus endocardique
- En cas de double valves mécaniques



14% de sites critiques épi

EPIC VT



Arya A et al Europace 2025; **27**, euaf055

Hayashi T et al J Cardiovasc Electrophysiol 2018: 1530-9

L'ABLATION EPICARDIQUE: PARAMETRES

Advice	Strength of evidence
Advice TO DO	
Achieving noninducibility and ablation of all late potentials are advised endpoints for epicardial VA ablation[121–124]	
Use of an irrigated-tip catheter is advised for epicardial ablation of VA[125–129]	
Setting 40–50 W as the upper power limit is advised when performing RF epicardial VA catheter ablation[130–132]	 >90% agree

- Ablation en irrigué, max 40/50 W
- Cibler une impédance < 120 Ω (-10/15 Ω ou -10%)
- 60 sec (jusqu'à 3 min, pas au-delà de 5 min)
- SSI demi-dose possible
- Au dessus de 10/20 g avec orientation du vecteur vers l'épicarde +++
- Garder en tête que la graisse épicardique limite la taille des lésions. (pas de lésion musculaire si épaisseur > 6,1 mm)
- Electroporation possible, mais attention au spasme coronaire!!!

Arya A et al Europace 2025; **27**, euaf055

L'ABLATION EPICARDIQUE: COMPLICATIONS

Advice	Strength of evidence
Advice TO DO	
Availability of immediate in-house cardiac surgical backup is advised at all centres performing epicardial ventricular arrhythmia (VA) ablations[7,8,164,165]	 >90% agree
It is advised to perform routine echo-guided exclusion of pericardial effusion before the patient leaves the EP-lab in patients undergoing epicardial VA catheter ablation[166,167]	 >90% agree
Performing a phrenic nerve capture test and marking its course before epicardial VA ablation is advised[168]	
Measures to protect phrenic nerve including use of balloon, air, or fluid instillation in case of phrenic capture at a provisional ablation site are advised[169–172]	

Advice	Strength of evidence
Visualization of coronary arteries using selective coronary angiography is advised before performing epicardial VA ablation in areas with possible proximity to coronary arteries[145,173]	 >90% agree
In case of a high probability of coronary artery damage, performing 12-lead ECG for monitoring of ST-segment during the procedure is advised	 >90% agree
Selective coronary angiography after epicardial ablation of VAs in the presence of new and/or dynamic ST-segment changes is advised	

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L'ABLATION EPICARDIQUE: COMPLICATIONS

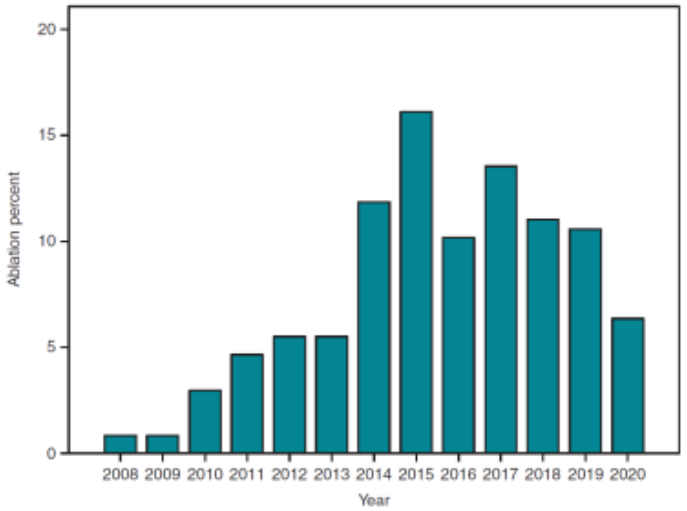

Table 7 Factors associated with increased rate of complications during epicardial access and ablation of ventricular arrhythmias

Patient-specific factors
• History of previous cardiac surgery or pericarditis
• Obesity
• Underlying coagulopathy
• Renal insufficiency
Anatomical variations
• Presence of pectus excavatum
• Proximity of the ablation site to the phrenic nerve and major coronary arteries
Procedure-related factors
• Prolonged procedure duration
• Extensive, long, and high-energy ablation
High PAINESD score[176]

Procedure-associated complications	
Major	12
RV perforation during puncture with need for operation	3
Acute tamponade during ablation	3
Late tamponade (within the first week post-ablation)	3
Pericarditis with relevant pericardial effusion	2
Peri-interventional stroke (6th day post-ablation)	1
Minor	6
Liver injury during subxiphoid puncture	1
Pseudoaneurysm A. fem.	4
AV fistula	1
Hospitalization-associated complications	11
Prolonged cardiorenal decompensation with need for dialysis	4
Nosocomial pneumonia	5
Pulmonary embolism	1
Deep vein thrombosis with compartment syndrome	1

+ 5% de complications spécifiques % procédure endocardique avec 5/6% de complications

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Darma A et al Europace 2021;23:1980-8

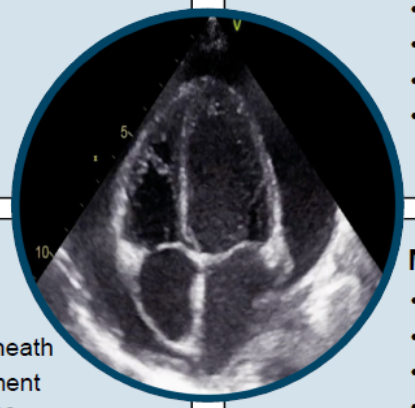
Tamponade and hemopericardium

Definition: compression of the heart due to the pericardial accumulation of fluid, blood, pus, clot, or gas.

Incidence (HP): 5–10%
Incidence (T): 1.5–5%

Clinical presentation

- Dyspnea
- Chest pain
- Lethargy
- Decreased blood pressure
- Palpitation (tachycardia)



Investigation

- Echocardiography
- Pulsus Paradoxus
- Elevated jugular venous pressure
- Electrical alternans in ECG

How to prevent

- Always place a guidewire or a small catheter into the epicardial sheath
- Gentle catheter and sheath movement especially in patients with adhesions
- Micropuncture and CO_2 techniques
- Always place a guidewire before the sheath's removal

Management

- Prompt diagnosis
- Continuous pericardial drainage
- Reversal of anticoagulation if needed
- Cardiac surgery, if necessary

Pericarditis

Definition: inflammation of the pericardium

Incidence: 20–40%

Clinical presentation

- Post-procedural pleuritic chest pain
- Pericarditic ECG changes (50%)

Investigation

- 12-lead-ECG
- Transthoracic echocardiography

How to prevent

- Intrapericardial corticosteroids
- Oral colchicine therapy

Management

- Oral NSAIDs
- Oral colchicine
- Intraprocedural liposomal bupivacaine

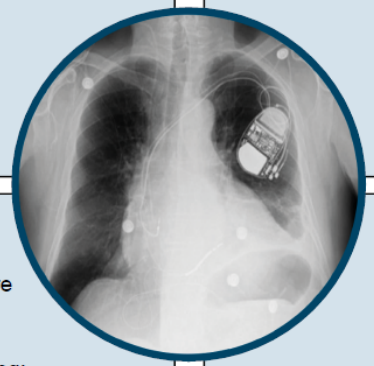
Phrenic nerve injury

Definition: Thermal damage to the phrenic nerve during ablation

Incidence: <1%

Clinical presentation

- Mostly asymptomatic
- Shortness of breath



Investigation

- Chest X-ray
- Electromyography

How to prevent

- Localization of phrenic nerve before catheter ablation:
  - with high output pacing
- Displacement of phrenic nerve using:
  - PTA balloon
  - steerable sheath/catheter

Management

- Pulmonary rehabilitation
- CPAP/BiPAP or invasive respiratory support
- Diaphragmatic pacing
- Surgical options:
  - Phrenic nerve grafting
  - Plication of the diaphragm

- Lésion AMI par ponction antérieure
- Lésion coronaire (< 5 mm +++)
- Saignements intra-abdominaux (foie ou vx diaph)
- Lésion oesophagienne???
- Plaies pleurales ou pulmonaires
- Pneumopéricarde (Attention défibrillation!!)
- FA (20%)

FIN DE PROCEDURE

- ETT en fin de procédure
- Acétate de triamcinolone 2 mg/kg intrapéricardique
- Drain 6 à 12h à ôter si < 30cc/h
- +/- reprise des AC 3 à 5h en post procédure

SITUATIONS SPECIFIQUES

- BMI > 40 = CI relative
- Adhésions péricardiques (accès limité et risque de sgt) = CI relative
- Procédures redux possibles (23% d'adhésions péricardiques)
- Antcd de sternotomie = CI relative

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CONCLUSIONS

- Procédure difficile et de recours
- Technique de ponction standardisée
- Analyse cartographique identique en endo et en épi
- Equipe entraînée (min 10/ centre/an) et unité de chirurgie cardiaque in situ
- Taux de complication substantiel

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Table 1 Classification and definition of different categories of advice

Definition	Categories of Advice
Evidence or general agreement that a given measure is clinically useful and appropriate	Advice TO DO
Evidence or general agreement that a given measure may be clinically useful and appropriate	May be appropriate TO DO
Evidence or general agreement that a given measure is not appropriate or harmful	Advice NOT TO DO
No advice can be given because of lack of data or inconsistency of data. The topic is important to be addressed	Areas of uncertainty

Table 2 Type and strength of supporting evidence

Type of supporting evidence	Strength of evidence	Icons
Published data	>1 high quality RCT Meta-analysis or high quality RCT	
	High quality RCT > 1 moderate quality RCT Meta-analysis or moderate quality RCT	
	High quality, large observational studies	
Expert opinion	Strong consensus > 90% of writing group supports advice	
	Consensus > 70% of writing group supports advice	

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