

ABORD EPICARDIQUE & ABLATION DE TACHYCARDIE VENTRICULAIRE

28 septembre 2023

Journées de rythmologie SFC - Avignon

Dr TIXIER Romain

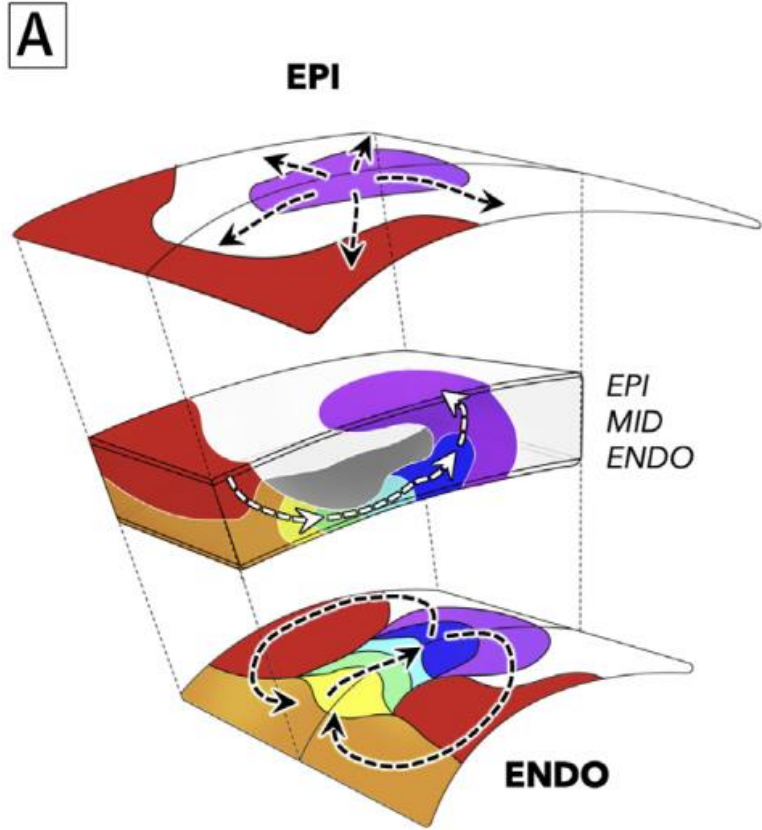
Service d'électrophysiologie et stimulation cardiaque – Pr HAISSAGUERRE

CHU BORDEAUX & IHU LIRYC

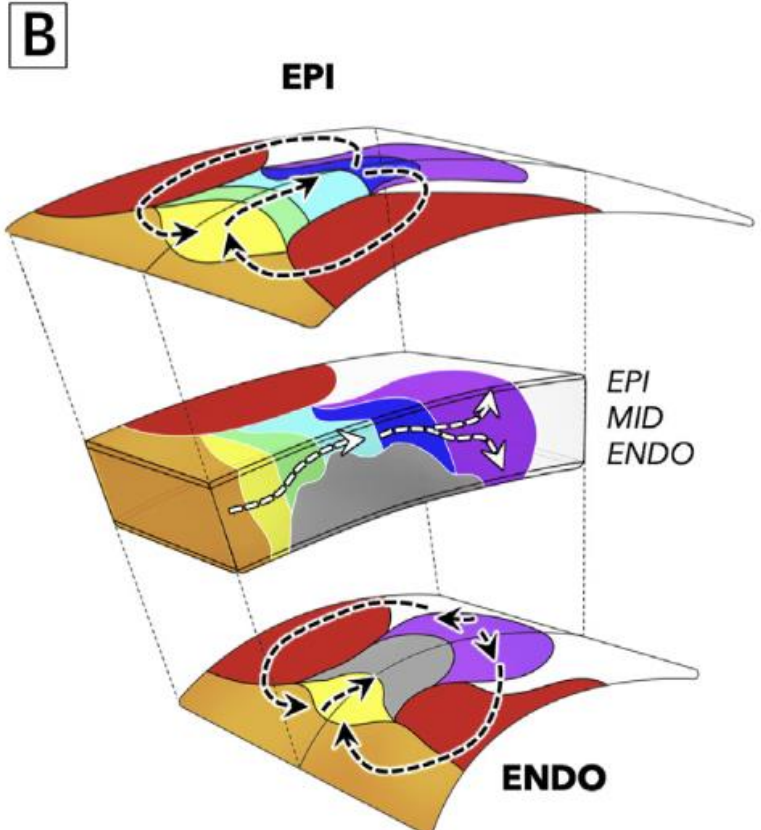
LIENS D'INTERETS

Prise en charge congrès/transports : BMS/Pfizer, Bayer, Microport CRM, Abbott

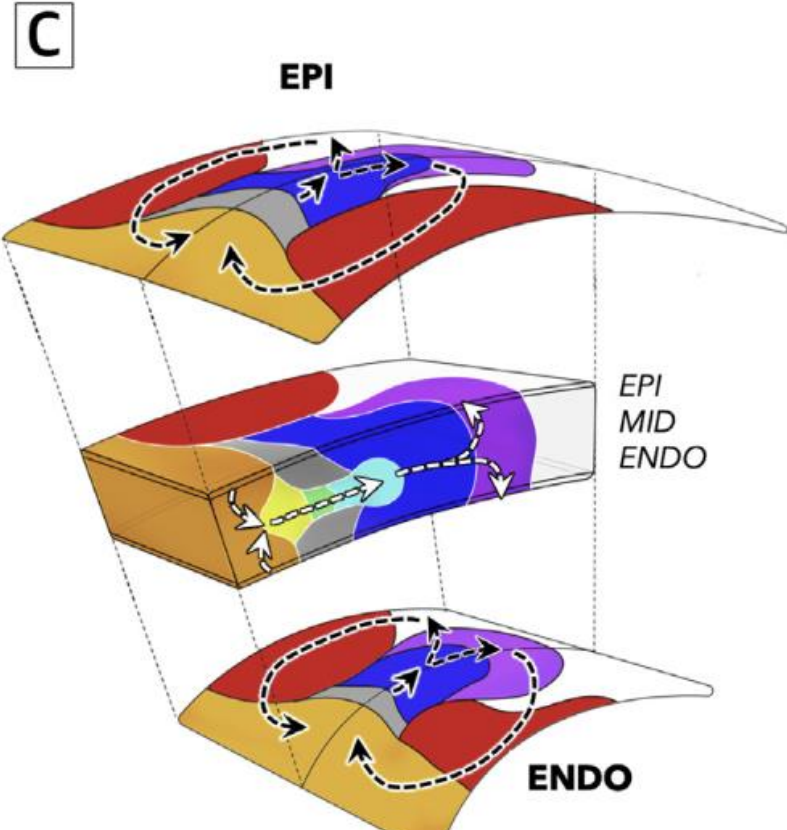
Honoraires : Bayer, Microport CRM, Abbott



2D
ENDOCARDIAL REENTRY
(Focal Epi)

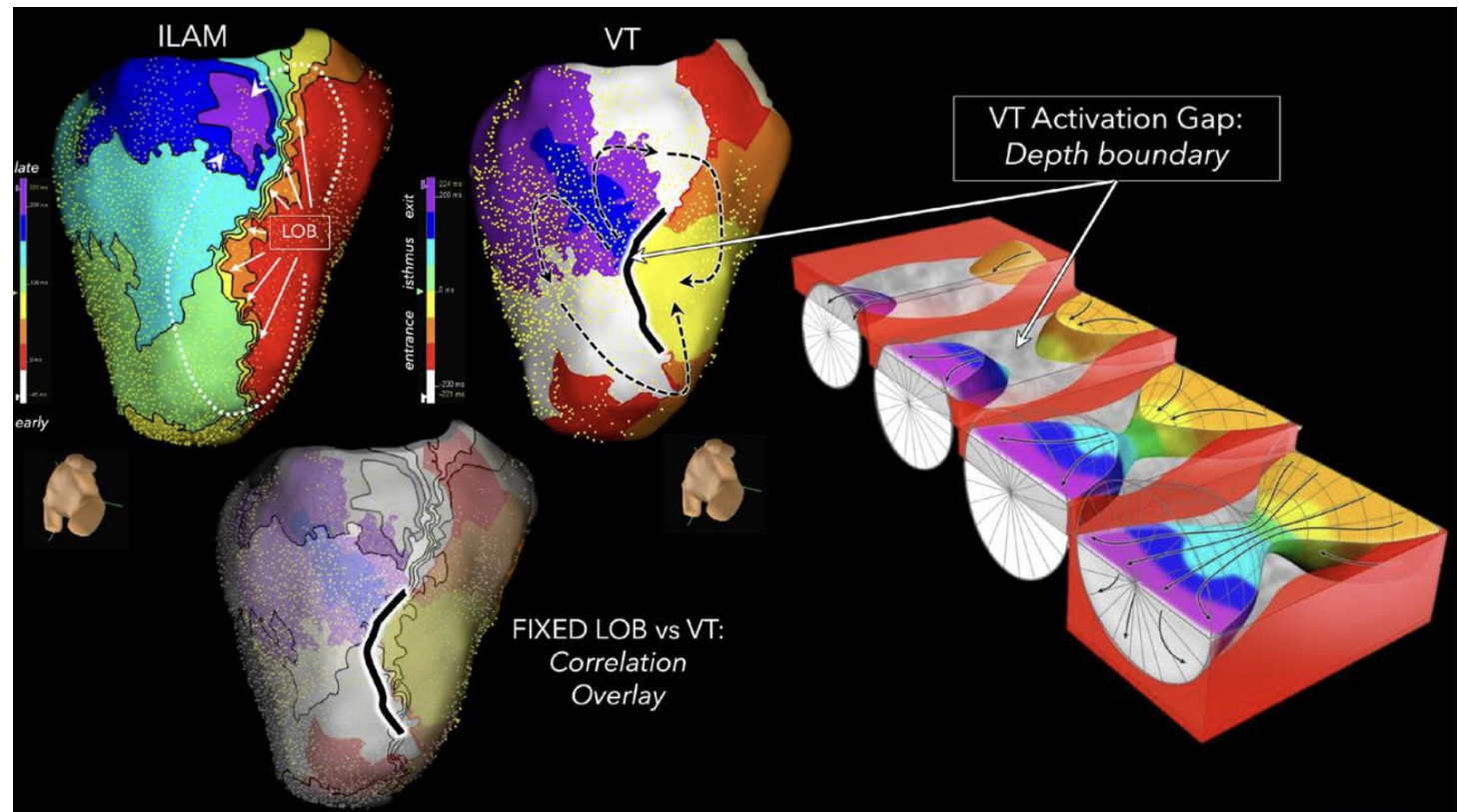
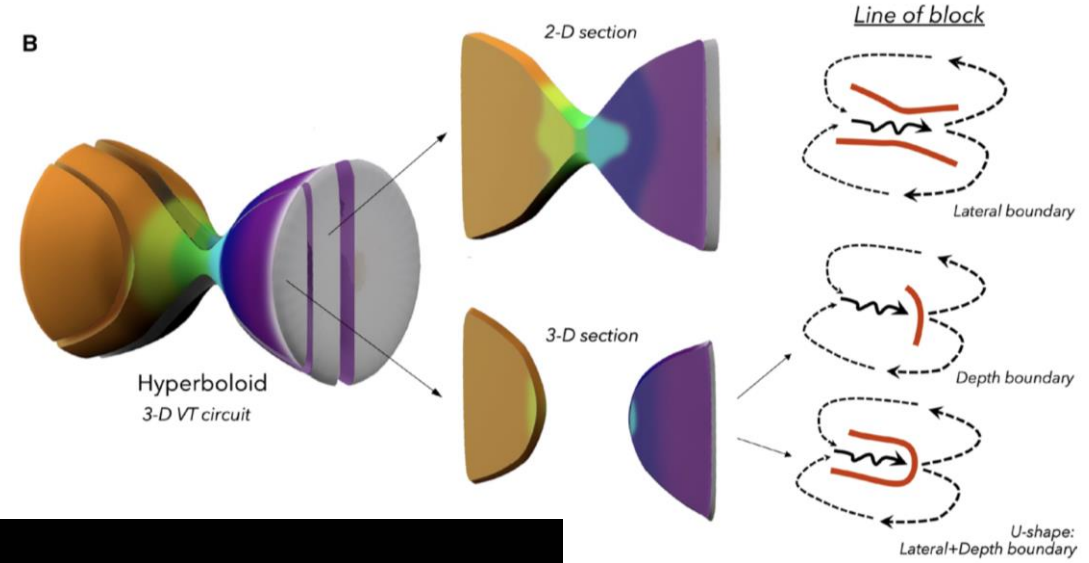
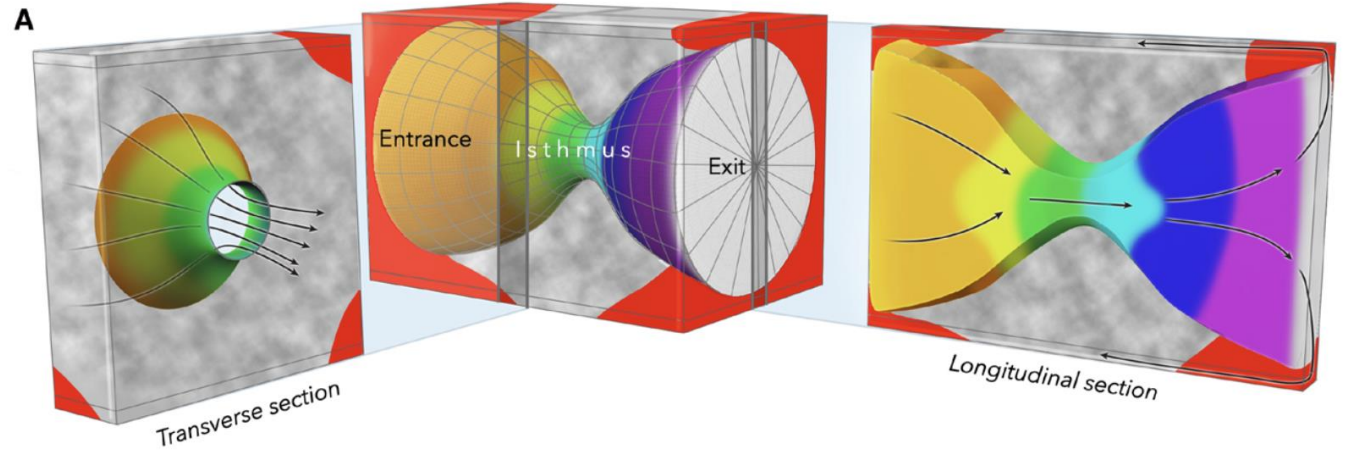


3D
EPICARDIAL REENTRY
(Incomplete Endo)



3D
MIDMYOCARDIAL REENTRY
(Incomplete Epi & Endo)

INTRODUCTION



ANATOMIE

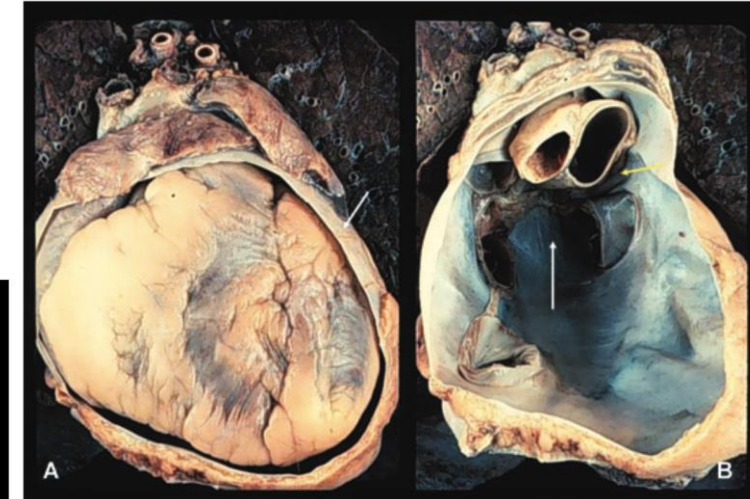
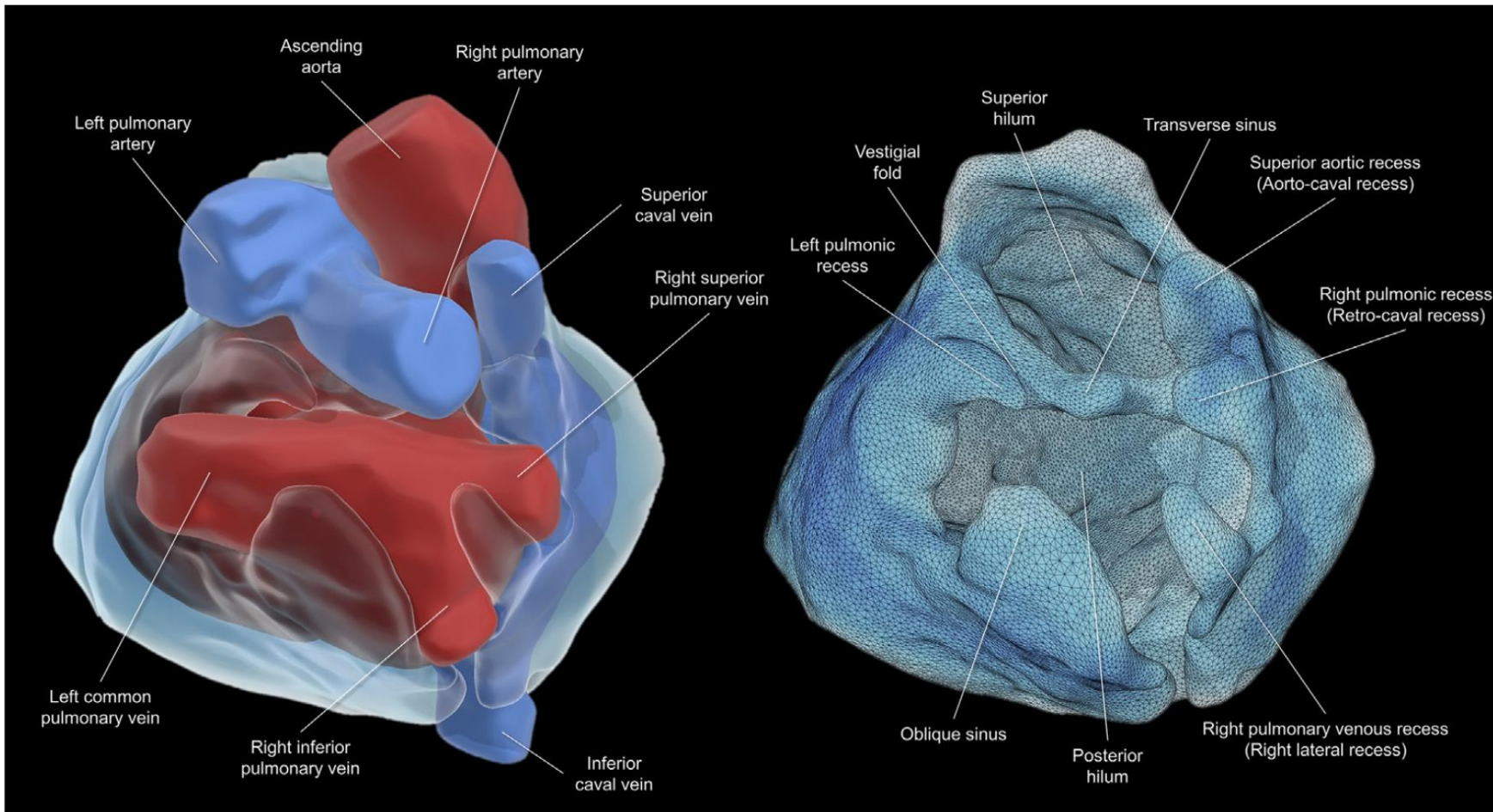
Sac péricardique = **espace virtuel** d'environ 20mL

Péricarde **fibreux** à la face externe

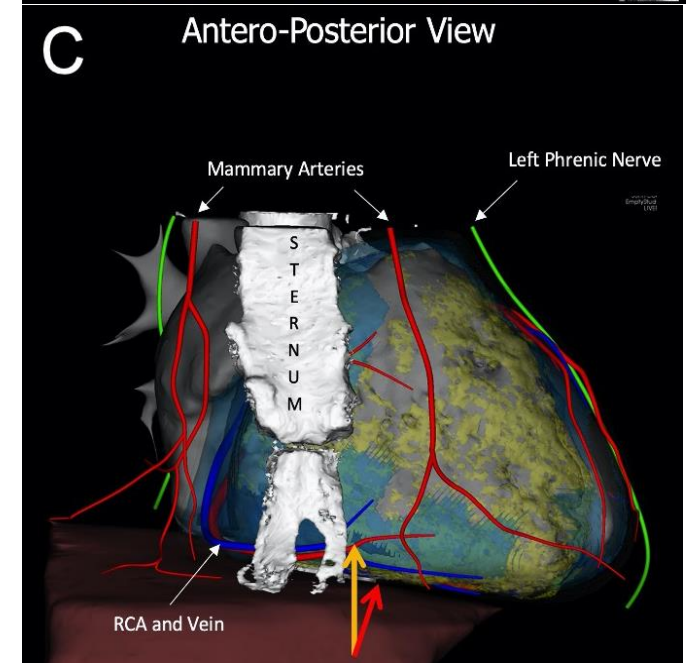
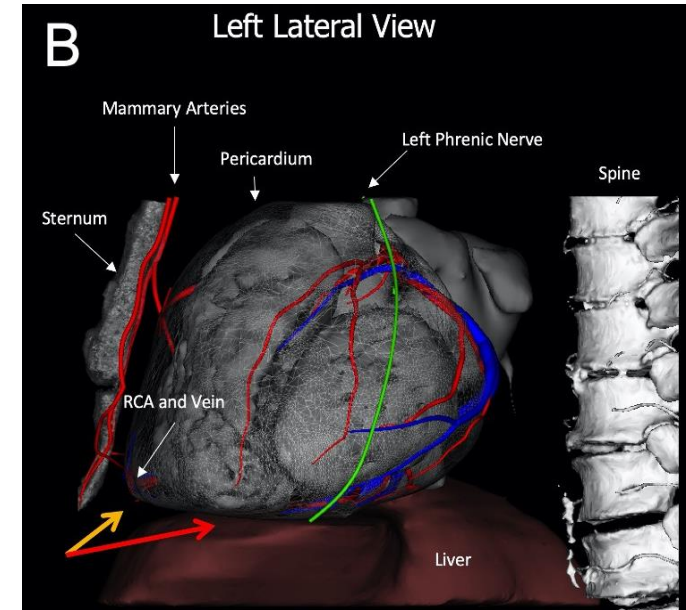
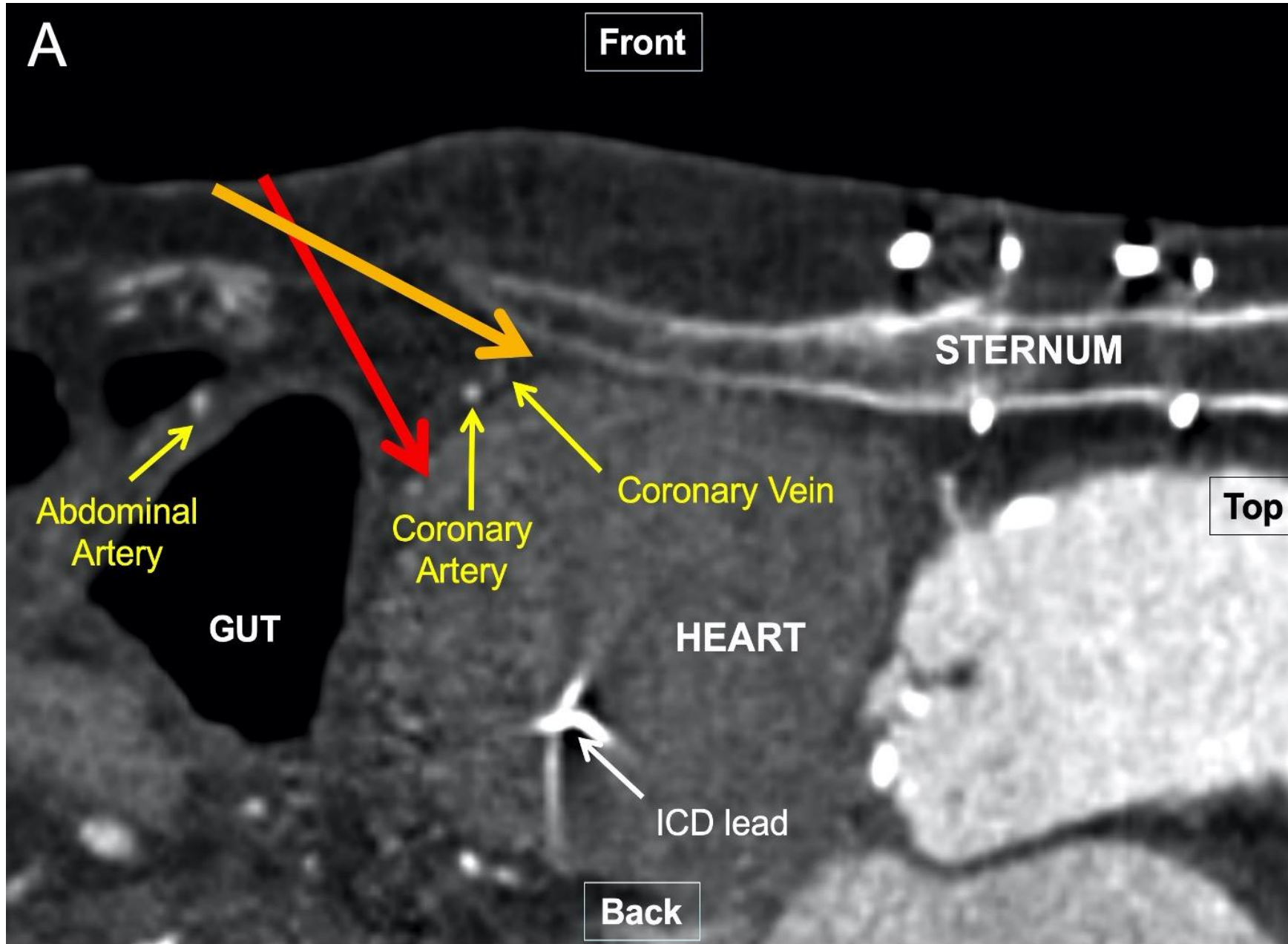
Péricarde **séreux** = pariétal + viscéral

Epaisseur péricardique : entre 0.8 et 2.5mm

Absent dans 1/10000

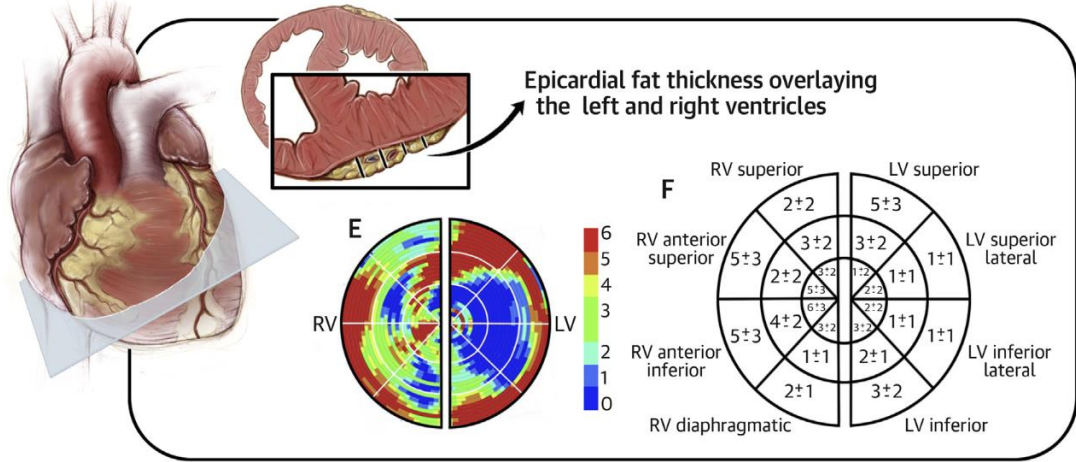
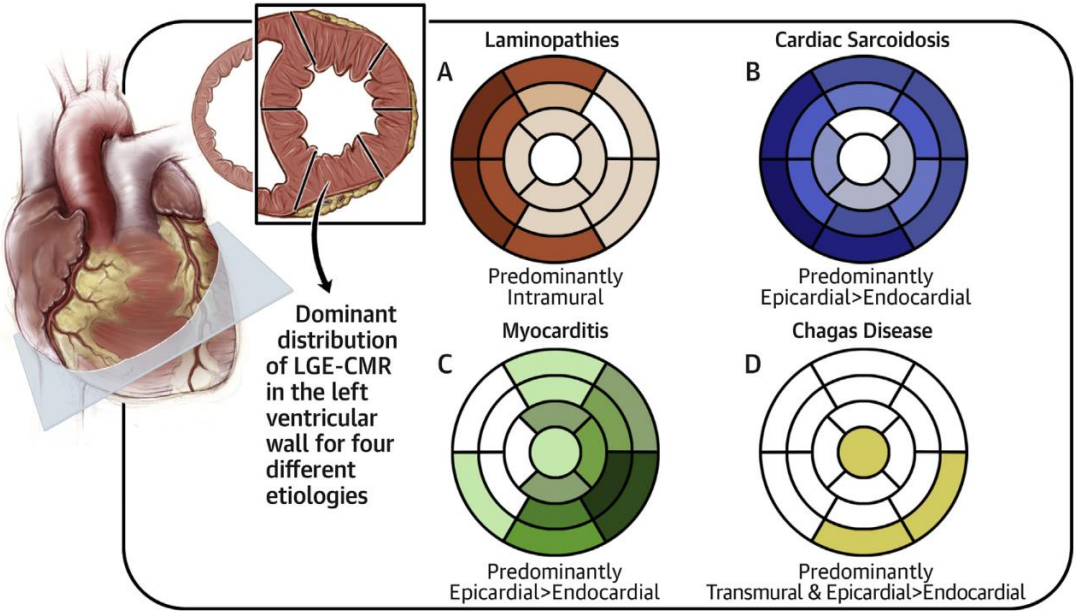


ANATOMIE



IMPORTANCE DE L'EVALUATION PREALABLE DU PATIENT

CARDIOPATHIE SOUS JACENTE



ETAT GENERAL

Contre-indication à l'ablation ?

CARACTERISTIQUES DE LA TV

ECG 12 dérivations
EGM dans les mémoires du DAI
Tolérance HD

IMAGERIE PRE-PROCEDURALE

Thrombus intra-cardiaque
Cible ?
Fonction cardiaque ? assistance / AG ?

DEGRE D'URGENCE

Orage rythmique ?
Facteur déclenchant traitable ?
TV stable = QUAND ?

Zeppenfeld et al. JACC EP (2018)

INDICATIONS ACTUELLES

Recommendations for catheter ablation of VAs in patients with IHD

COR	LOE	Recommendations	References
I	B-R	1. In patients with IHD who experience recurrent monomorphic VT despite chronic amiodarone therapy, catheter ablation is recommended in preference to escalating AAD therapy.	S4.4.1
I	B-NR	2. In patients with IHD and recurrent symptomatic monomorphic VT despite AAD therapy, or when AAD therapy is contraindicated or not tolerated, catheter ablation is recommended to reduce recurrent VT.	S4.4.2–S4.4.4
I	B-NR	3. In patients with IHD and VT storm refractory to AAD therapy, catheter ablation is recommended.	S4.4.5–S4.4.9
IIa	C-EO	4. In patients with IHD and recurrent monomorphic VT, in whom AADs are not desired, catheter ablation can be useful.	
IIb	A	5. In patients with IHD and an ICD who experience a first episode of monomorphic VT, catheter ablation may be considered to reduce the risk of recurrent VT or ICD therapies.	S4.4.10–S4.4.14
IIb	C-LD	6. In patients with prior myocardial infarction and recurrent episodes of symptomatic sustained VT for whom prior endocardial catheter ablation has not been successful and who have ECG, endocardial mapping, or imaging evidence of a subepicardial VT substrate, epicardial ablation may be considered.	S4.4.15–S4.4.19

Recommendations for catheter ablation of VT in nonischemic cardiomyopathy (NICM)

COR	LOE	Recommendations	References
I	B-NR	1. In patients with NICM and recurrent sustained monomorphic VT for whom antiarrhythmic medications are ineffective, contraindicated, or not tolerated, catheter ablation is useful for reducing recurrent VT and ICD shocks.	S4.5.1–S4.5.6
I	B-NR	2. In patients with NICM and electrical storm refractory to AAD therapy, catheter ablation is useful for reducing recurrent VT and ICD shocks.	S4.5.7–S4.5.9
IIa	B-NR	3. In patients with NICM, epicardial catheter ablation of VT can be useful after failure of endocardial ablation or as the initial ablation approach when there is a suspicion of an epicardial substrate or circuit.	S4.5.4, S4.5.10–S4.5.13
IIa	B-NR	4. In patients with cardiac sarcoidosis and recurrent VT despite medical therapy, catheter ablation can be useful to reduce the risk of VT recurrence and ICD shocks.	S4.5.14–S4.5.18
IIa	C-EO	5. In patients with NICM and recurrent sustained monomorphic VT for whom antiarrhythmic medications are not desired, catheter ablation can be useful for reducing recurrent VT and ICD shocks.	
IIb	B-NR	6. In patients with NICM related to lamin A/C (LMNA) mutations and recurrent VT, catheter ablation may be considered as a palliative strategy for short-term arrhythmia control.	S4.5.19

Recommendations for catheter ablation of VA in inherited primary arrhythmia disorders

COR	LOE	Recommendations	References
I	B-NR	1. In patients with arrhythmogenic right ventricular cardiomyopathy (ARVC) who experience recurrent sustained VT or frequent appropriate ICD interventions for VT in whom AAD therapy is ineffective or not tolerated, catheter ablation, at a center with specific expertise, is recommended.	S4.8.1–S4.8.11
I	B-NR	2. In patients with ARVC who have failed one or more attempts of endocardial VT catheter ablation, an epicardial approach for VT ablation is recommended.	S4.8.3–S4.8.7, S4.8.12, S4.8.13
IIa	B-NR	3. In patients with ARVC who experience recurrent sustained VT or frequent appropriate ICD interventions for VT in whom AAD therapy is not desired or preferred, catheter ablation, at a center with specific expertise, is reasonable.	S4.8.1, S4.8.3–S4.8.6, S4.8.8
IIa	B-NR	4. In patients with Brugada syndrome who experience recurrent sustained VAs or frequent appropriate ICD interventions, catheter ablation can be useful.	S4.8.14–S4.8.17
IIa	C-LD	5. In patients with ARVC, a first-line combined endocardial/epicardial approach for VT ablation is reasonable.	S4.8.1, S4.8.6, S4.8.12, S4.8.18

Recommendations for epicardial access for catheter ablation

COR	LOE	Recommendations
I	C-EO	1. In patients undergoing epicardial VT ablation, imaging of the epicardial coronary arteries by coronary arteriography or coronary CT angiogram prior to ablation is recommended to reduce the risk of arterial injury.
I	C-EO	2. In patients undergoing epicardial VT ablation via a percutaneous approach, provision for immediate echocardiography, blood transfusion, and onsite cardiothoracic surgical backup is recommended.
I	C-EO	3. In patients with prior cardiac surgery or pericardial adhesions for whom epicardial VT ablation via a percutaneous approach is considered, careful assessment of the risk/benefit ratio and alternative therapies such as surgical dissection are recommended.
I	C-EO	4. In patients undergoing epicardial VT ablation, pacing with high stimulus intensity from the ablation electrode to rule out diaphragmatic stimulation is recommended to avoid phrenic nerve injury.

Recommendations for intraprocedural anticoagulation

COR	LOE	Recommendations	References
I	B-NR	1. In patients undergoing endocardial LV catheter mapping and/or ablation, intraprocedural systemic anticoagulation with intravenous heparin is recommended.	S6.5.1–S6.5.6
I	C-EO	2. In patients undergoing RV endocardial mapping and/or ablation who are considered high risk for thromboembolism, intraprocedural systemic anticoagulation with intravenous heparin is recommended.	
IIa	C-LD	3. In patients undergoing epicardial access after systemic heparinization, reversal of heparin with protamine is reasonable.	S6.5.7, S6.5.8

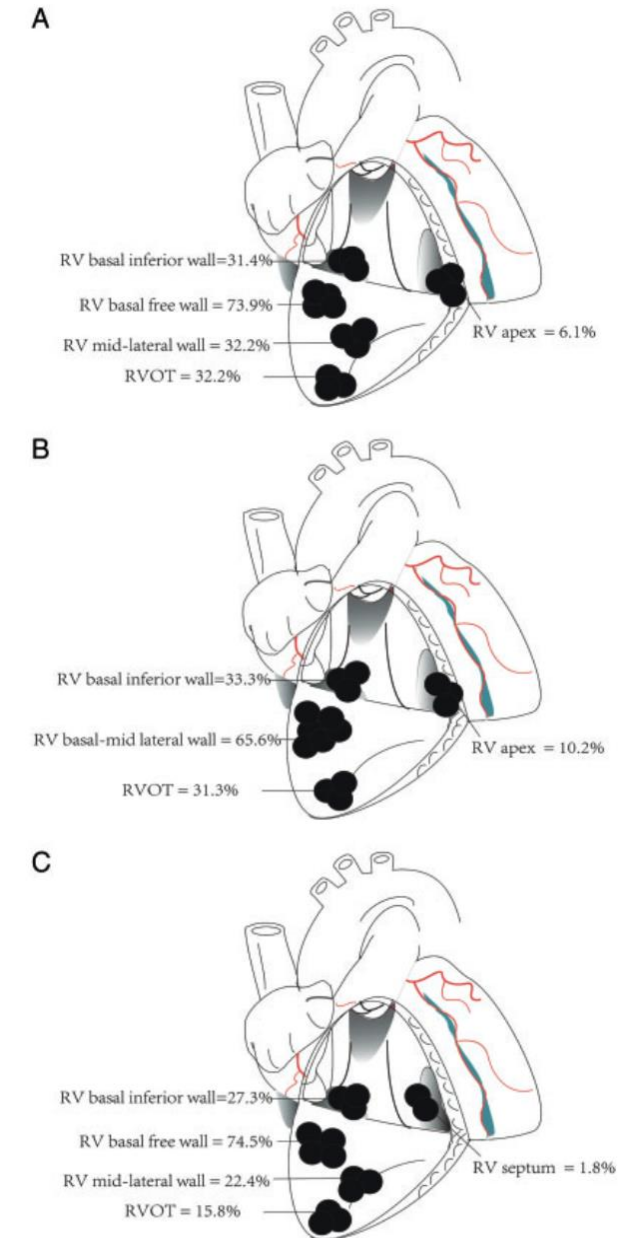
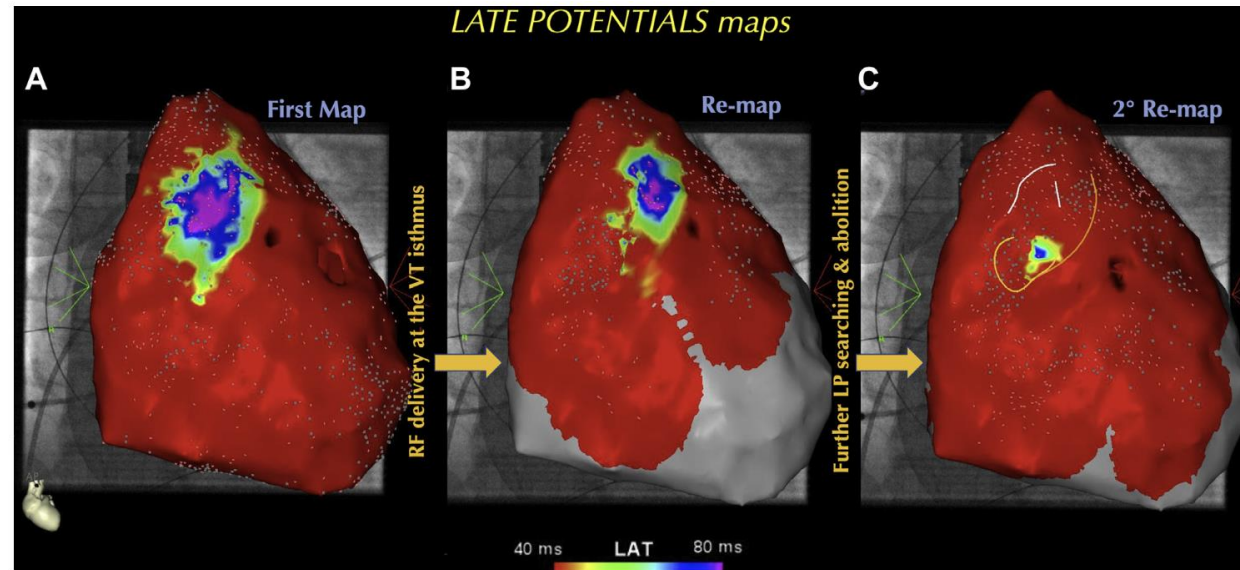
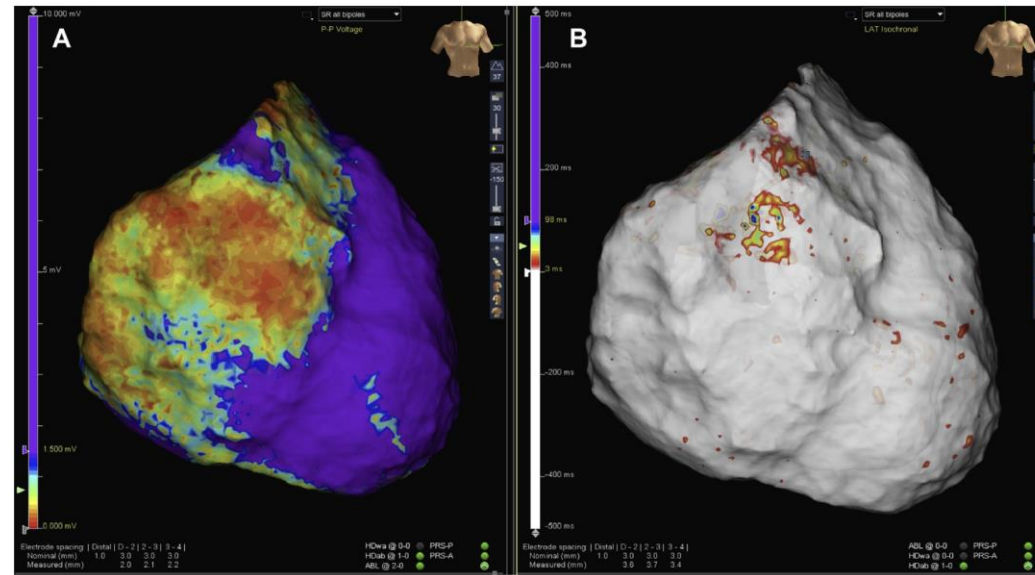
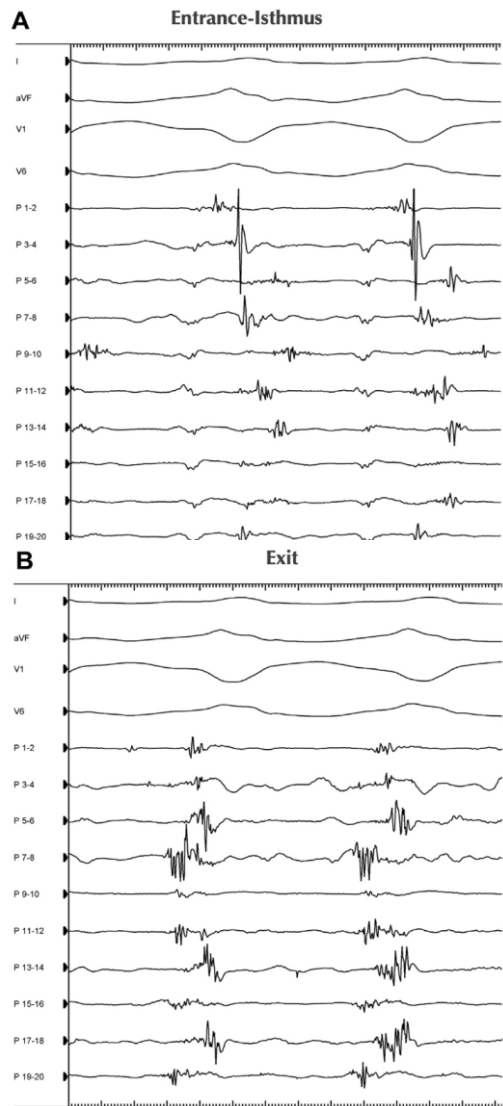
INDICATIONS PRINCIPALES

- DAVD
- Brugada
- Myocardites
- Cardiopathies ischémiques
- CMD à coronaires saines

AUTRES INDICATIONS ? (FA, VA etc.)

INDICATIONS ACTUELLES : DAVD

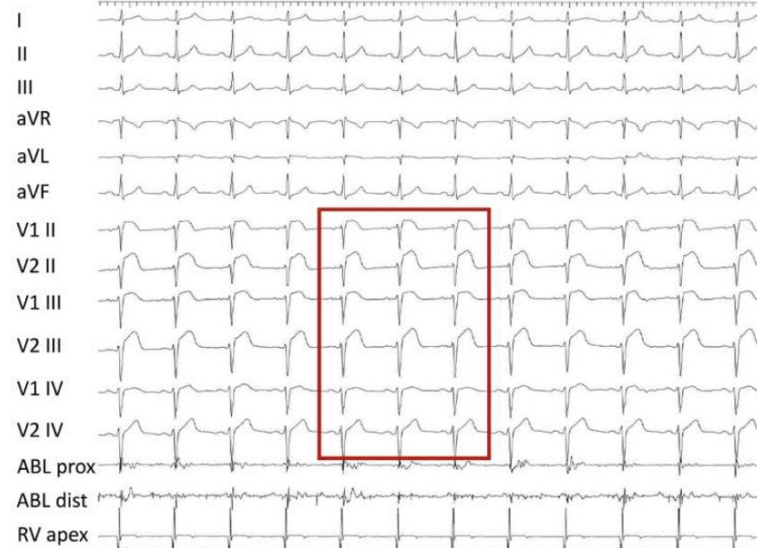
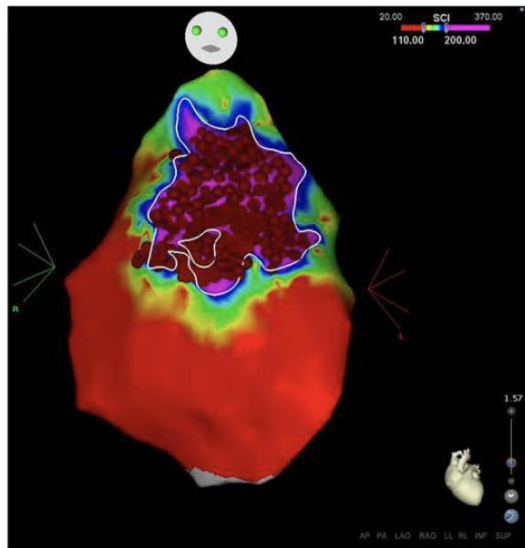
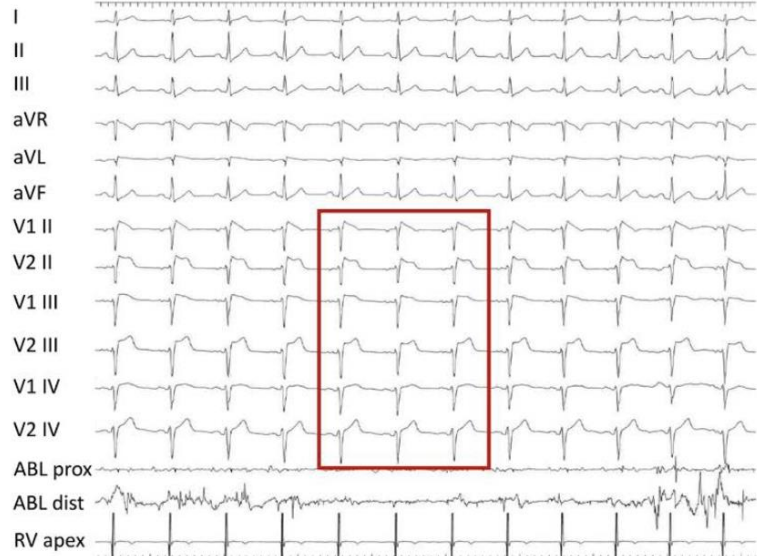
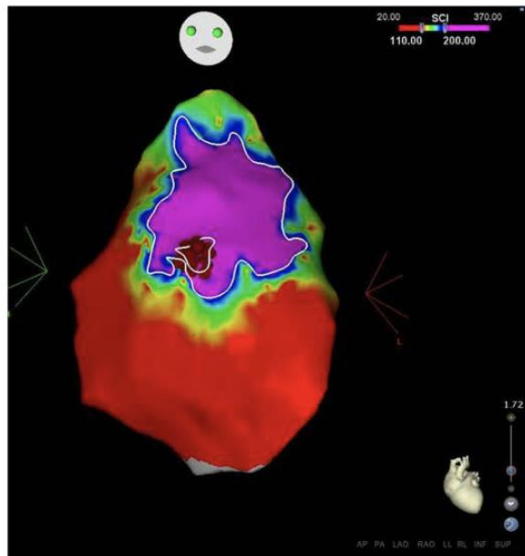
Liang et al. Europace (2020)
 Frontera et al. Heart Rhythm (2019)



INDICATIONS ACTUELLES : BRUGADA

Nademanee, Haissaguerre et al. Heart Rhythm (2019)

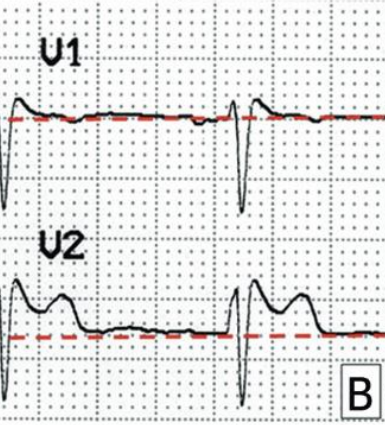
Brugada et al. JACC (2018)



Type 1 - "Coved" (diagnostic)



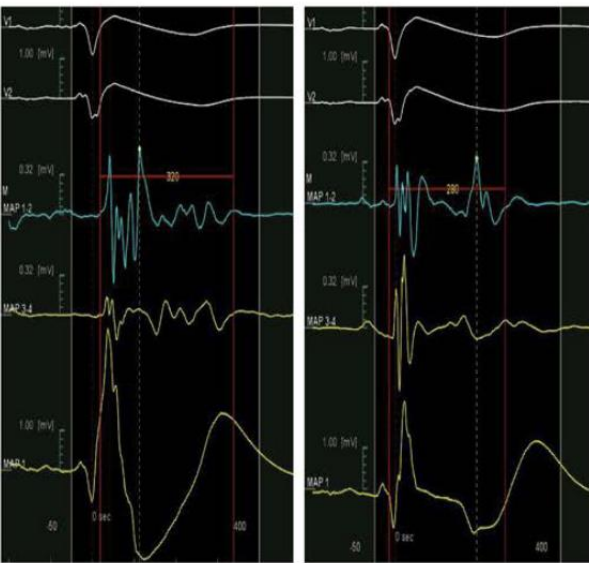
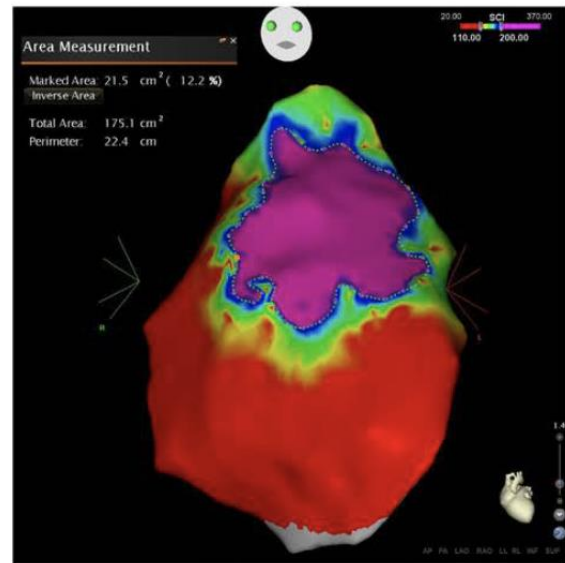
Type 2 "Saddle-back" (non-diagnostic)



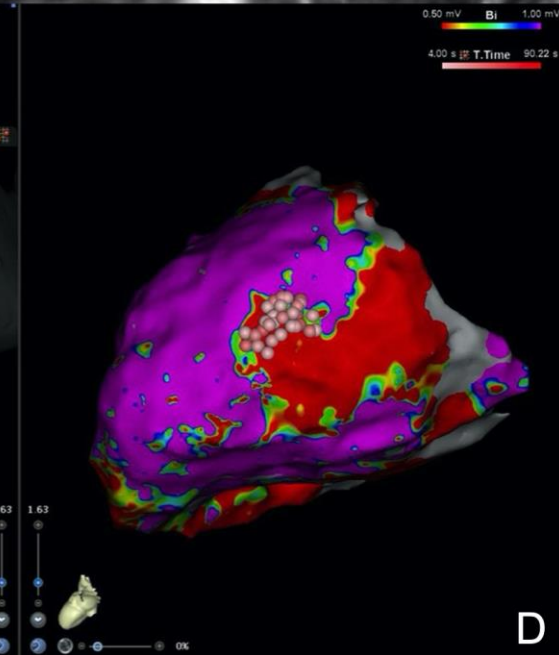
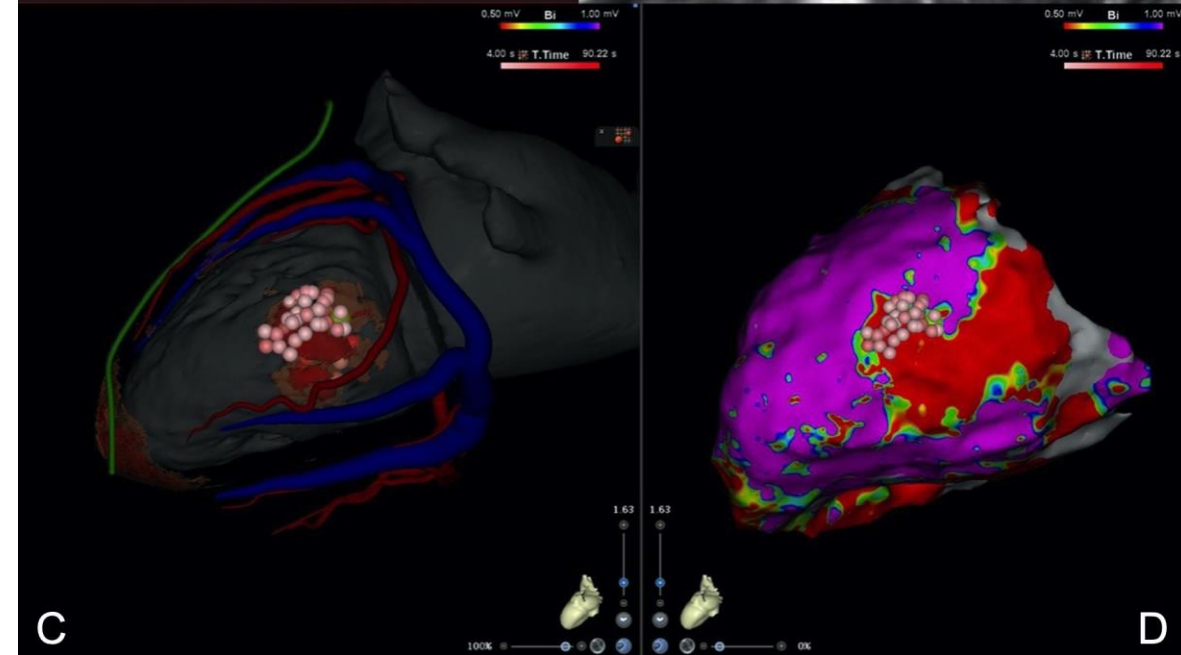
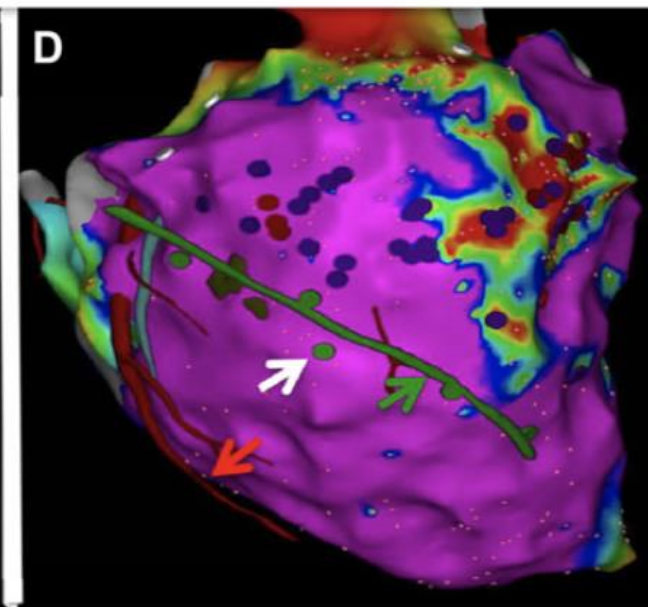
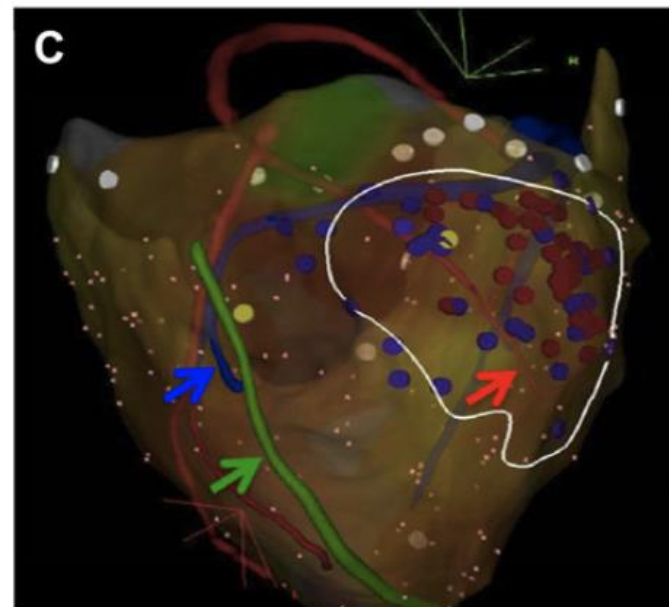
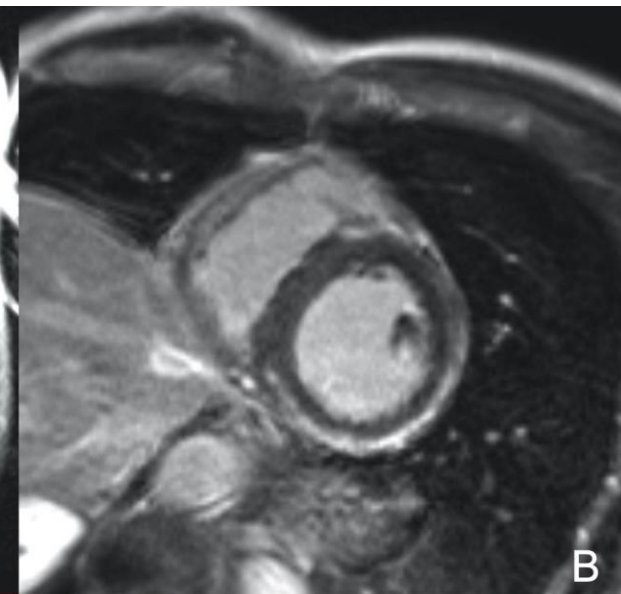
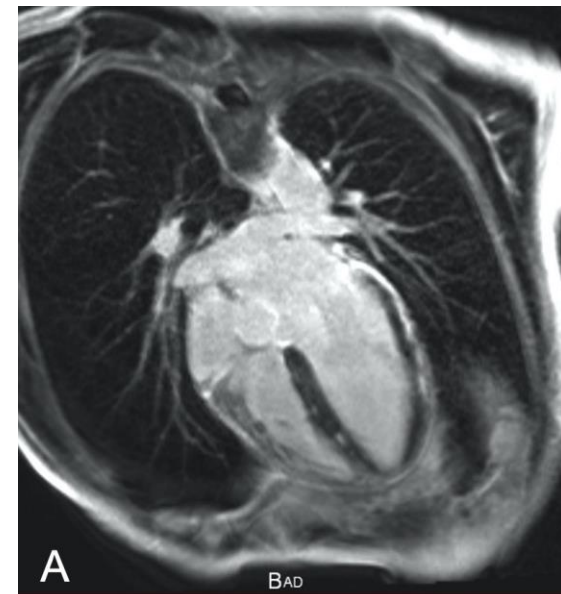
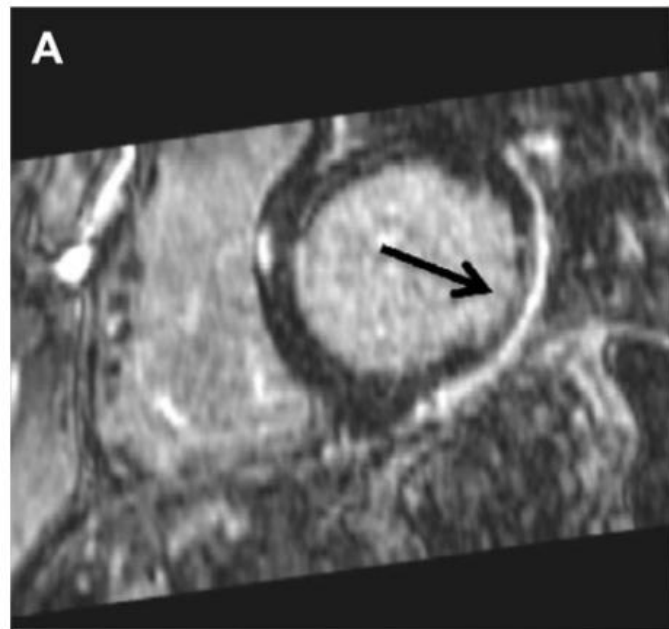
β angle $\geq 58^\circ$



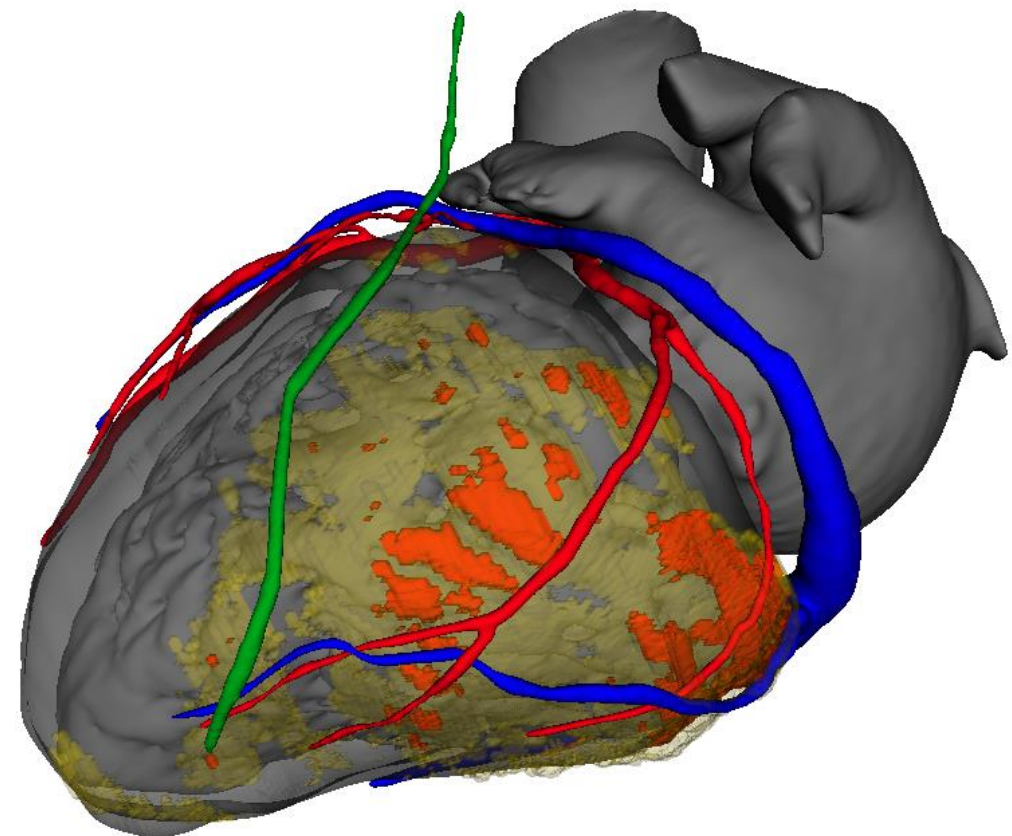
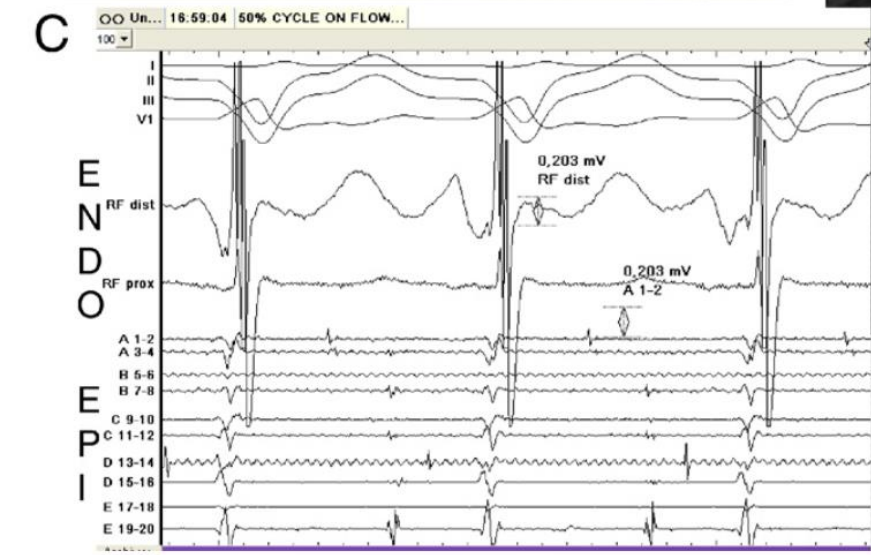
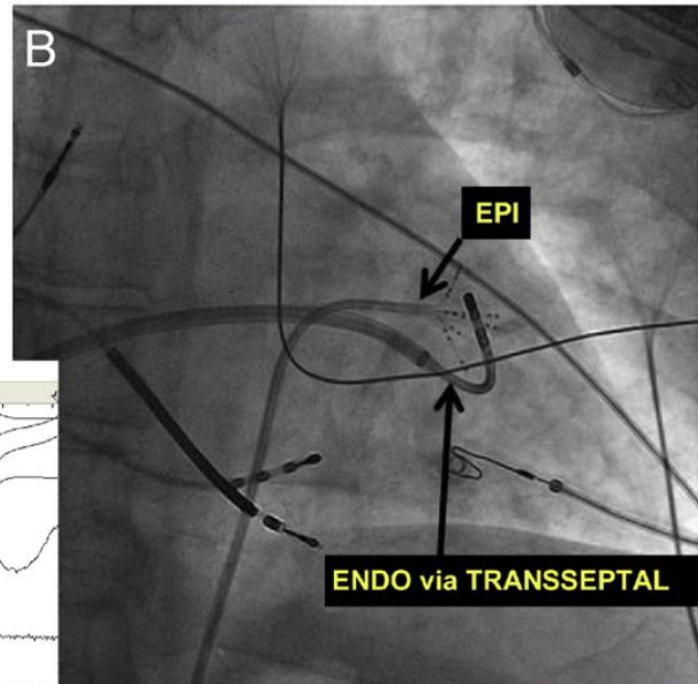
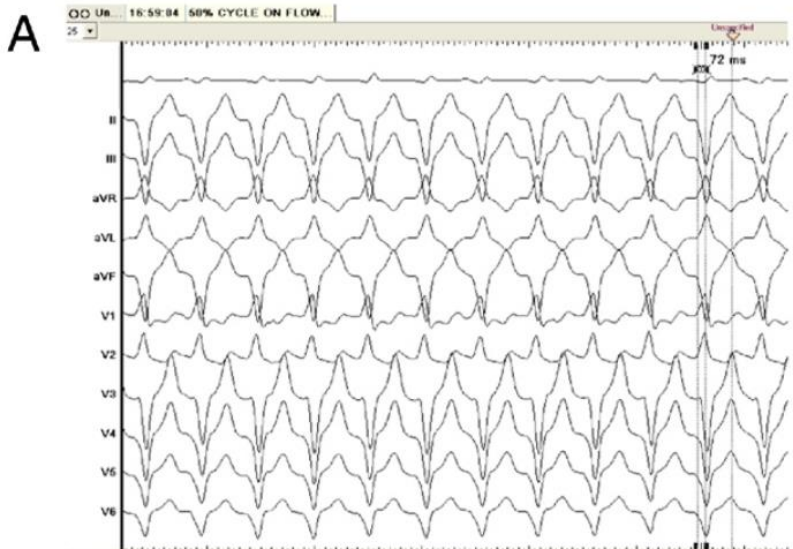
Base of triangle ≥ 4 mm



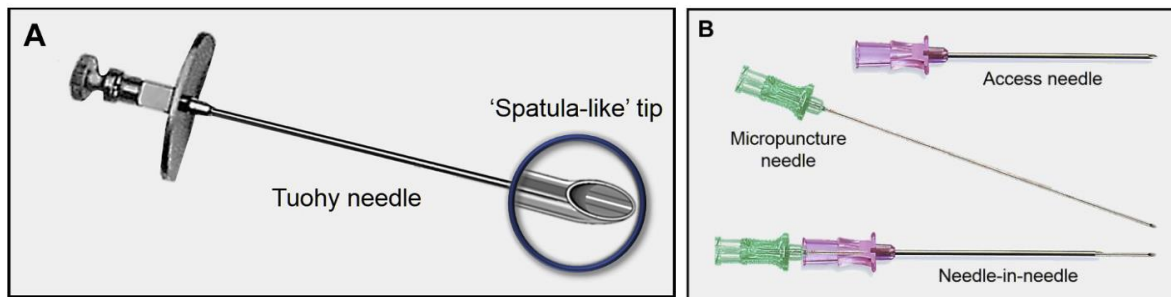
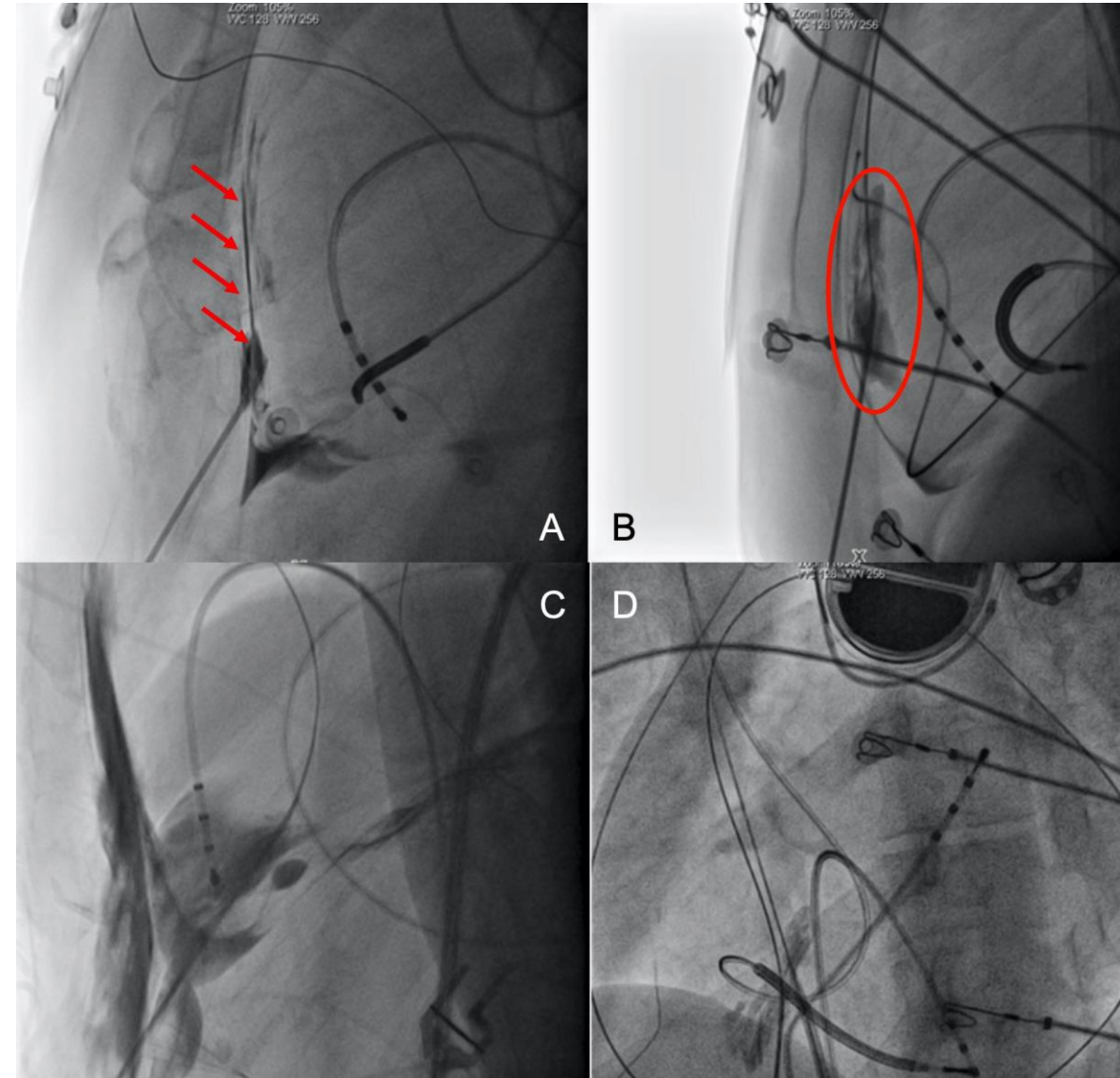
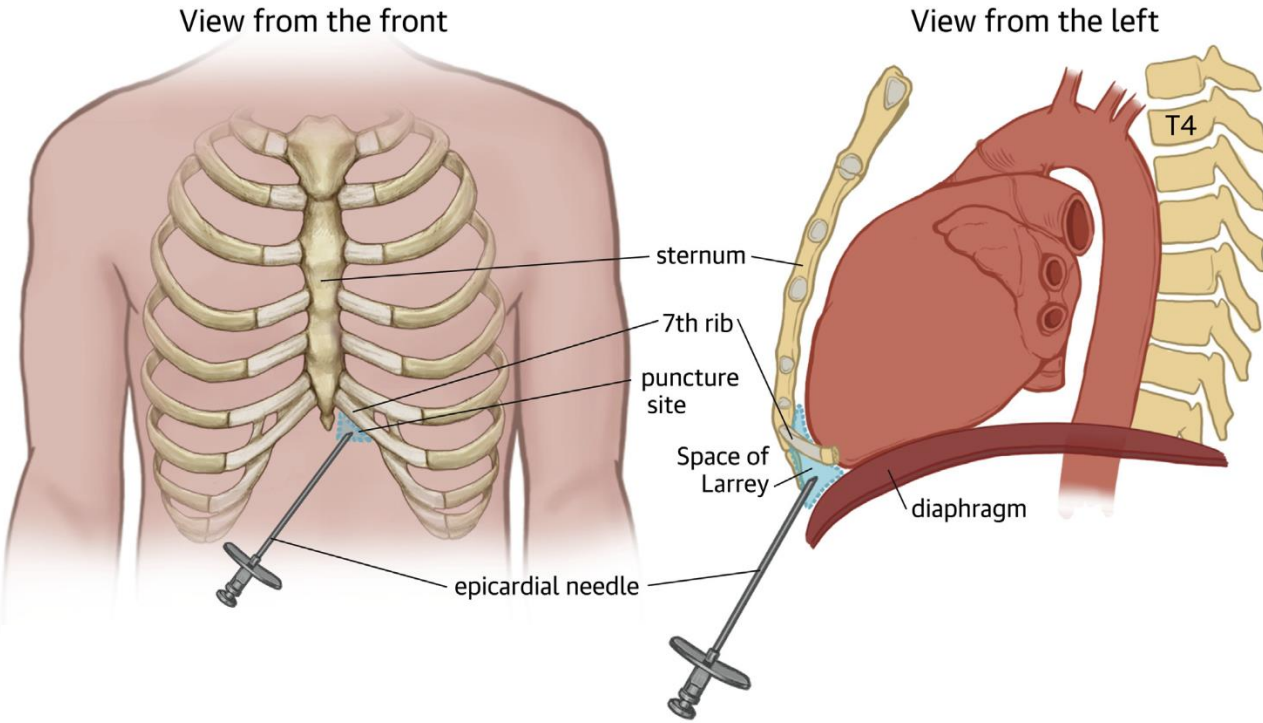
INDICATIONS ACTUELLES : MYOCARDITE



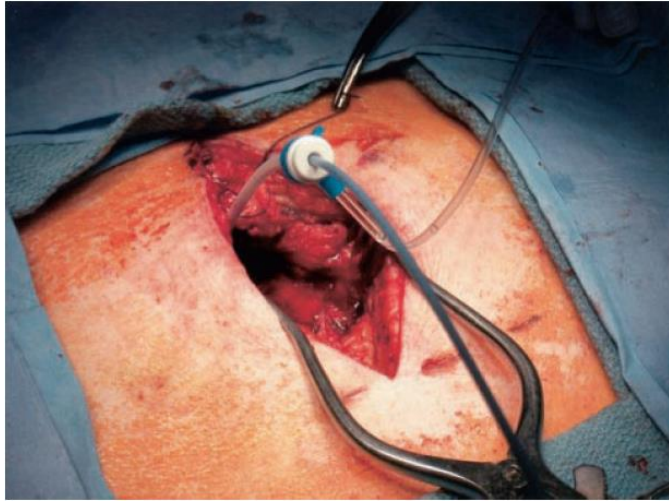
INDICATIONS ACTUELLES : CARDIOPATHIE ISCHEMIQUE



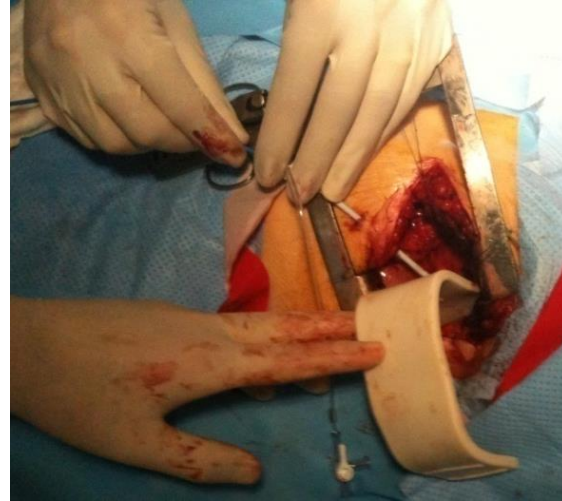
TECHNIQUES D'ABORD EPICARDIQUE : PONCTION SECHE



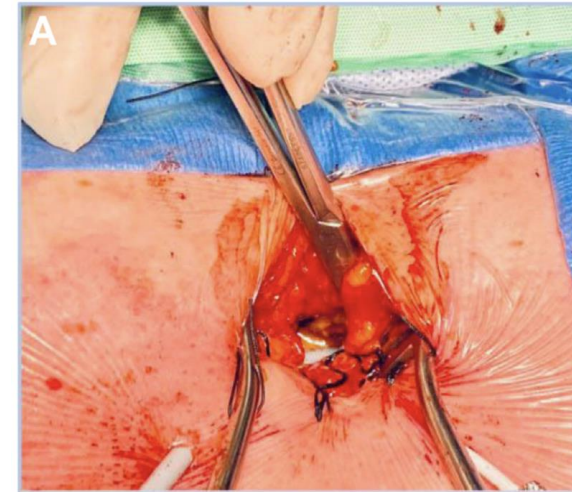
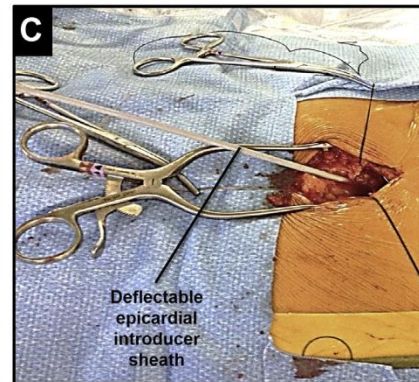
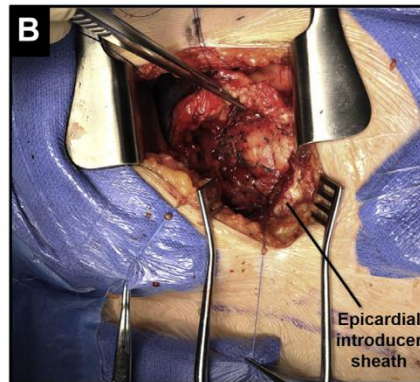
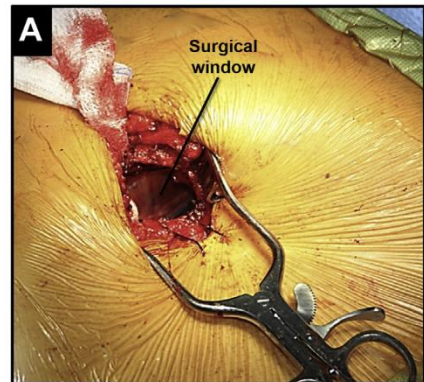
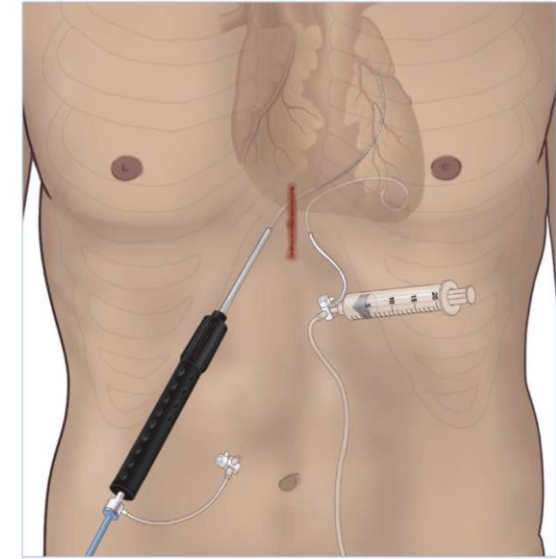
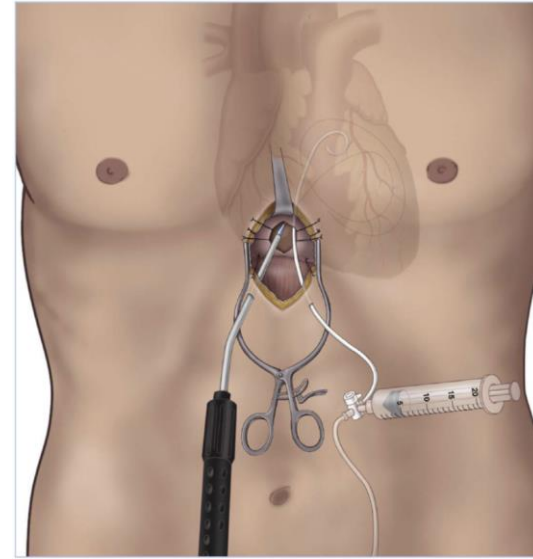
TECHNIQUES D'ABORD EPICARDIQUE : ABORD MINI-CHIRURGICAUX



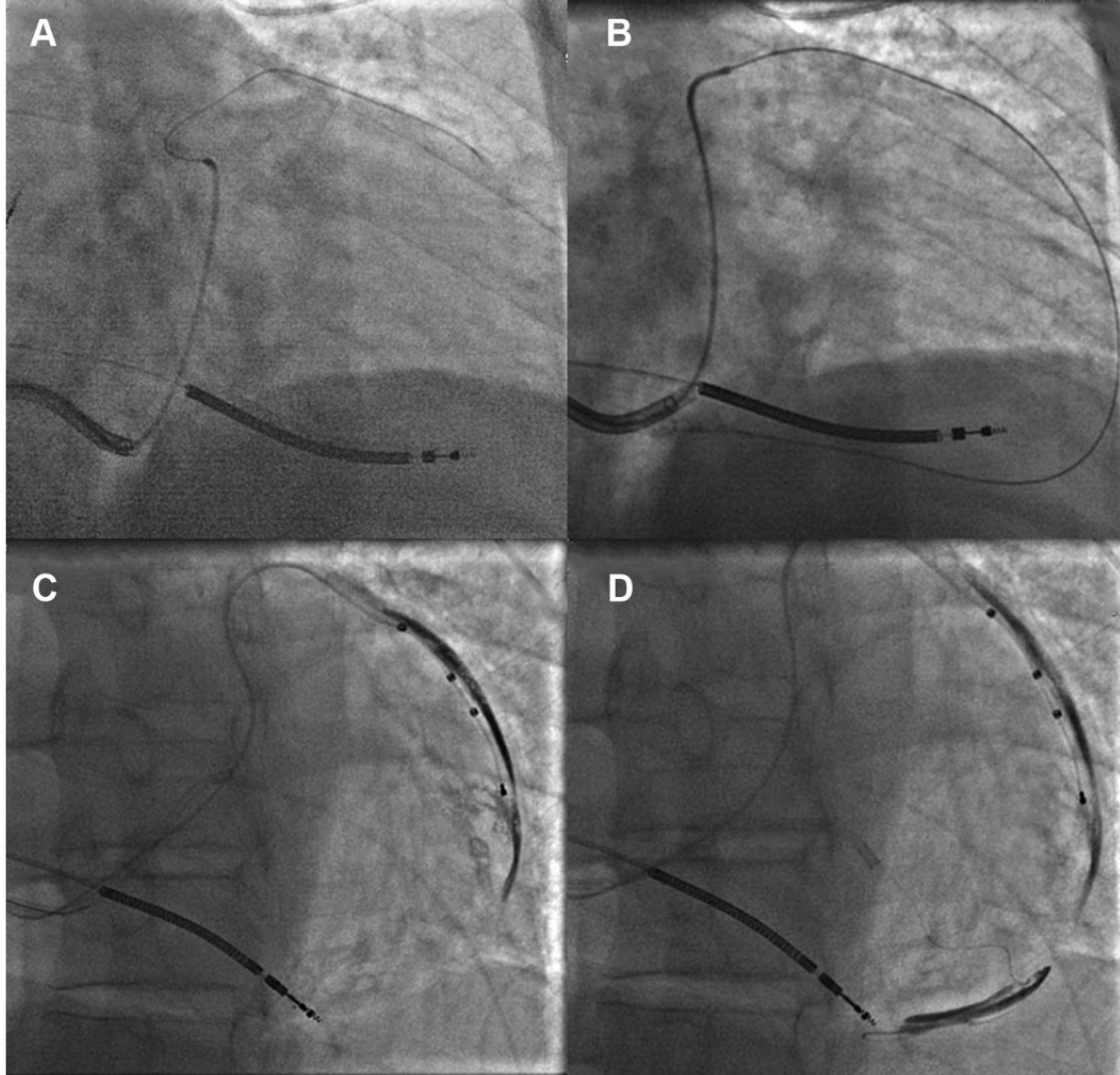
Subxyphoid Surgical Approach
Soejima et al. Circ. 2004



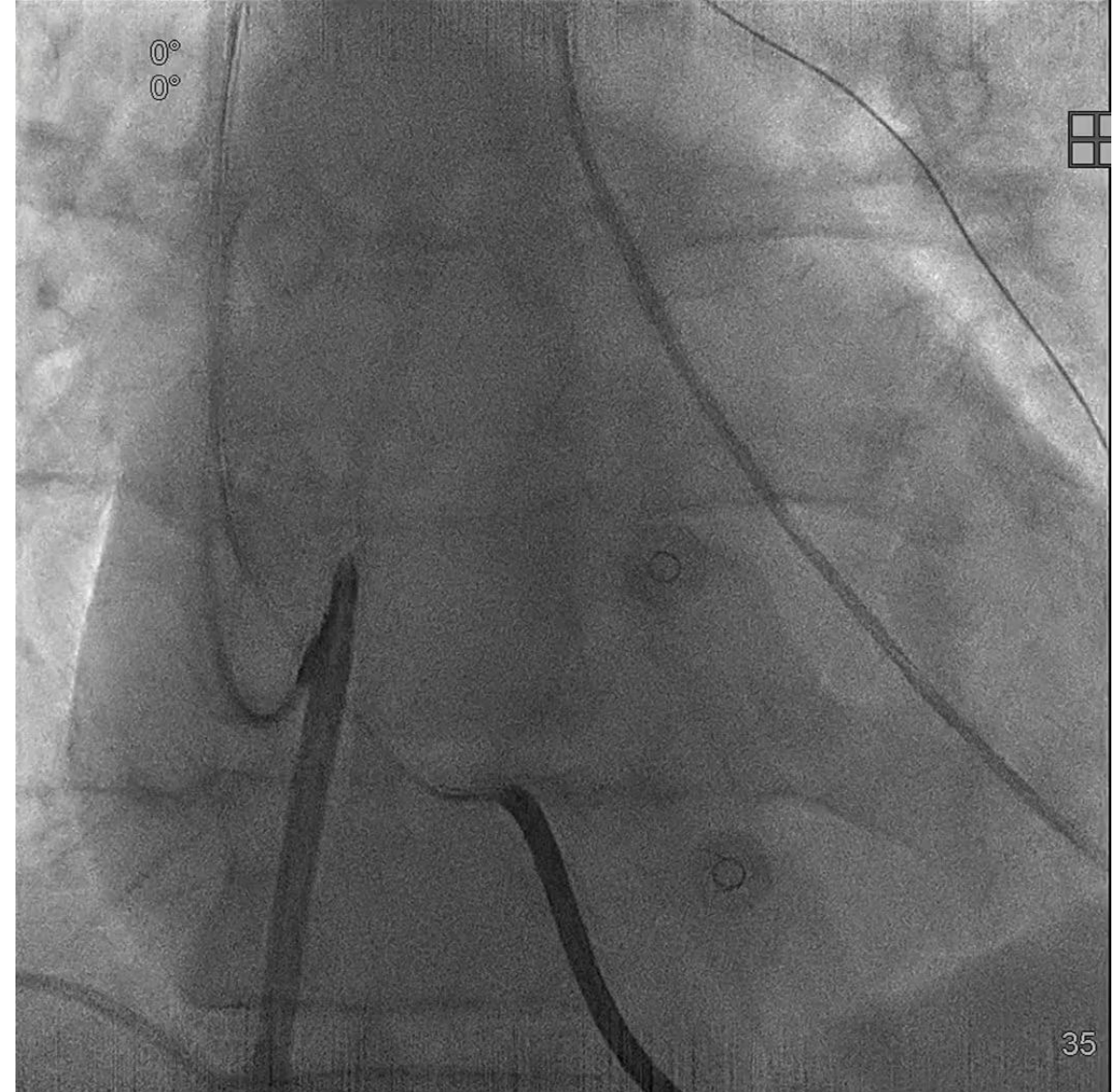
Latero-thoracic Intercostal
Surgical Approach



Par **veine coronaire distale** = sortie **postérieure**



Par **l'auricule droit** = sortie **antérieure**



TECHNIQUE : TIPS & TRICKS

PREPARATION

- Gestion des anticoagulants : anticoagulants suspendus et AAP autre que l'aspirine arrêtés dès que possible
- Imagerie cardiaque pré-procédurale : TDM ++ (anatomie, identification des situations à risque et prévention des complications)
- Préférer les procédures sous AG ... mais sans curares même si les procédures sous AL sont réalisables

ACCES EPICARDIQUE

- Préparation du matériel
- Ponction épicardique en début de procédure ... avant toute héparinisation ++

CARTOGRAPHIE & ABLATION

- Irrigation modérée pour manipulation des cathéters (50mL) et gaine en aspiration douce
- Cathéters irrigués exclusivement (5-7mL/min – 20-50W)
- Importante vecteur > contact
- Attention aux zones graisseuses (>5mm), artères coronaires (<5mm) et nerf phrénique
- Ne jamais laisser la gaine seule dans l'espace péricardique

POST-PROCEDURE

- Drainage et pigtail avant retrait de l'ensemble du matériel
- +/- injection corticostéroïdes
- Contrôle ETT systématique +++

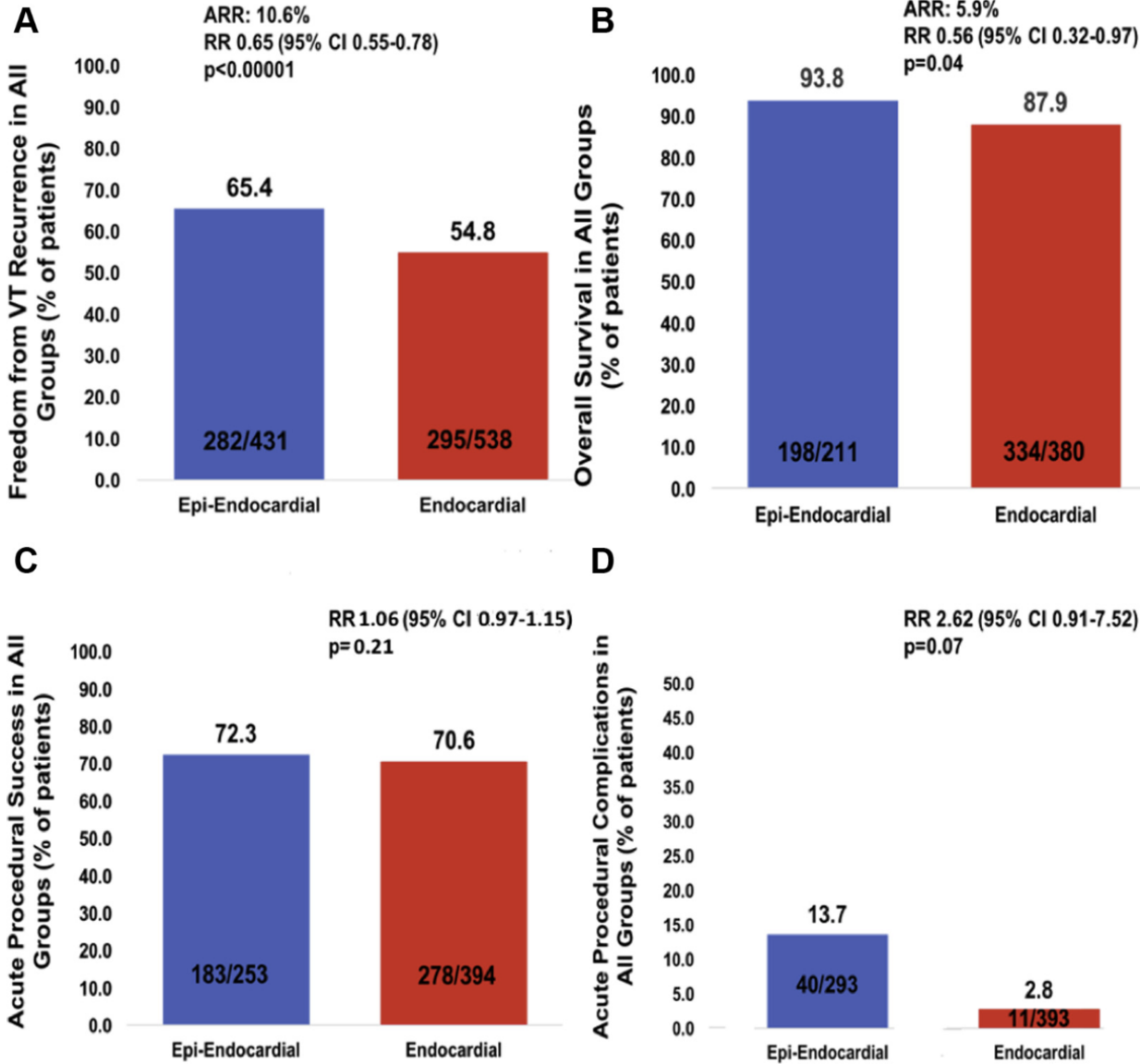
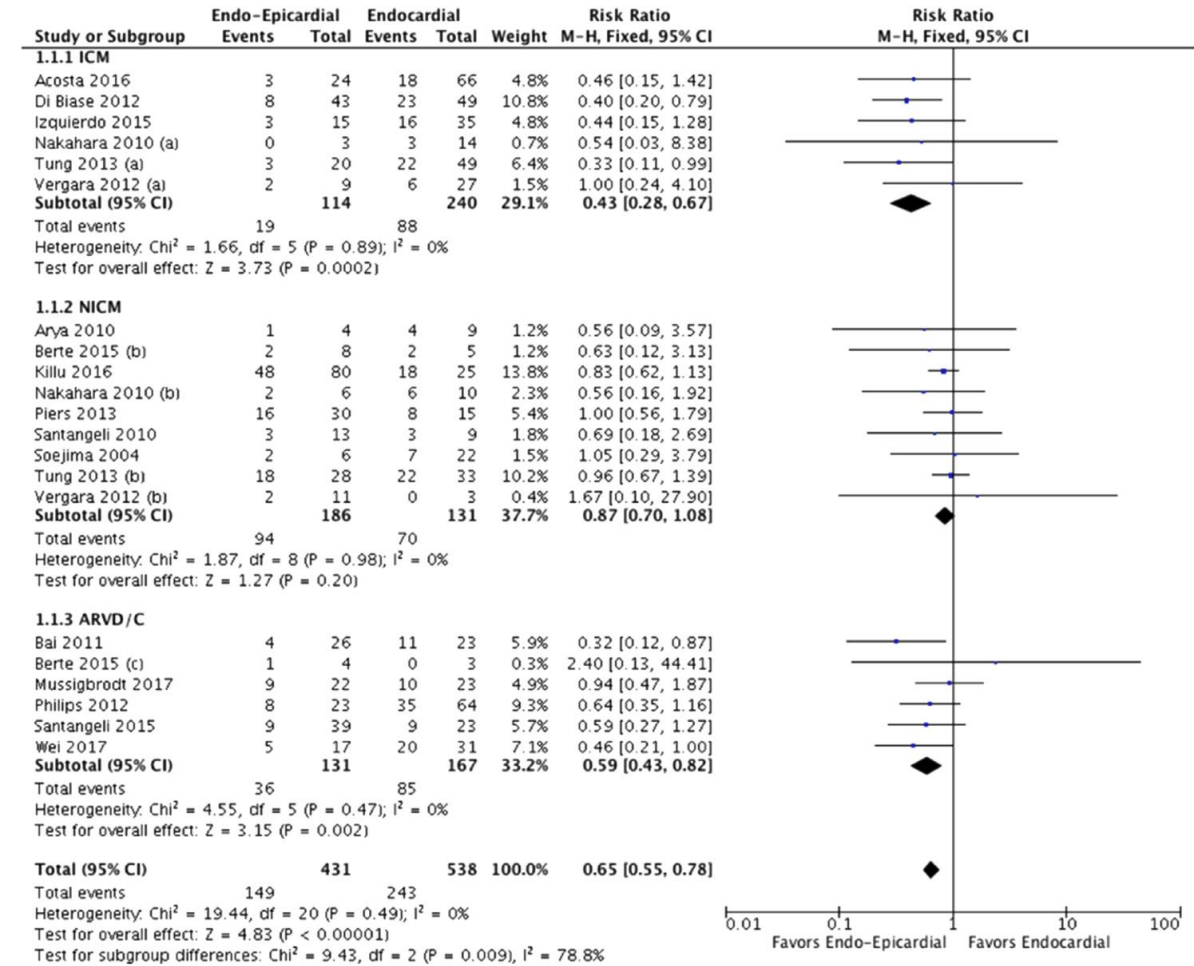


FIGURE 3 VT Recurrence by Subgroups



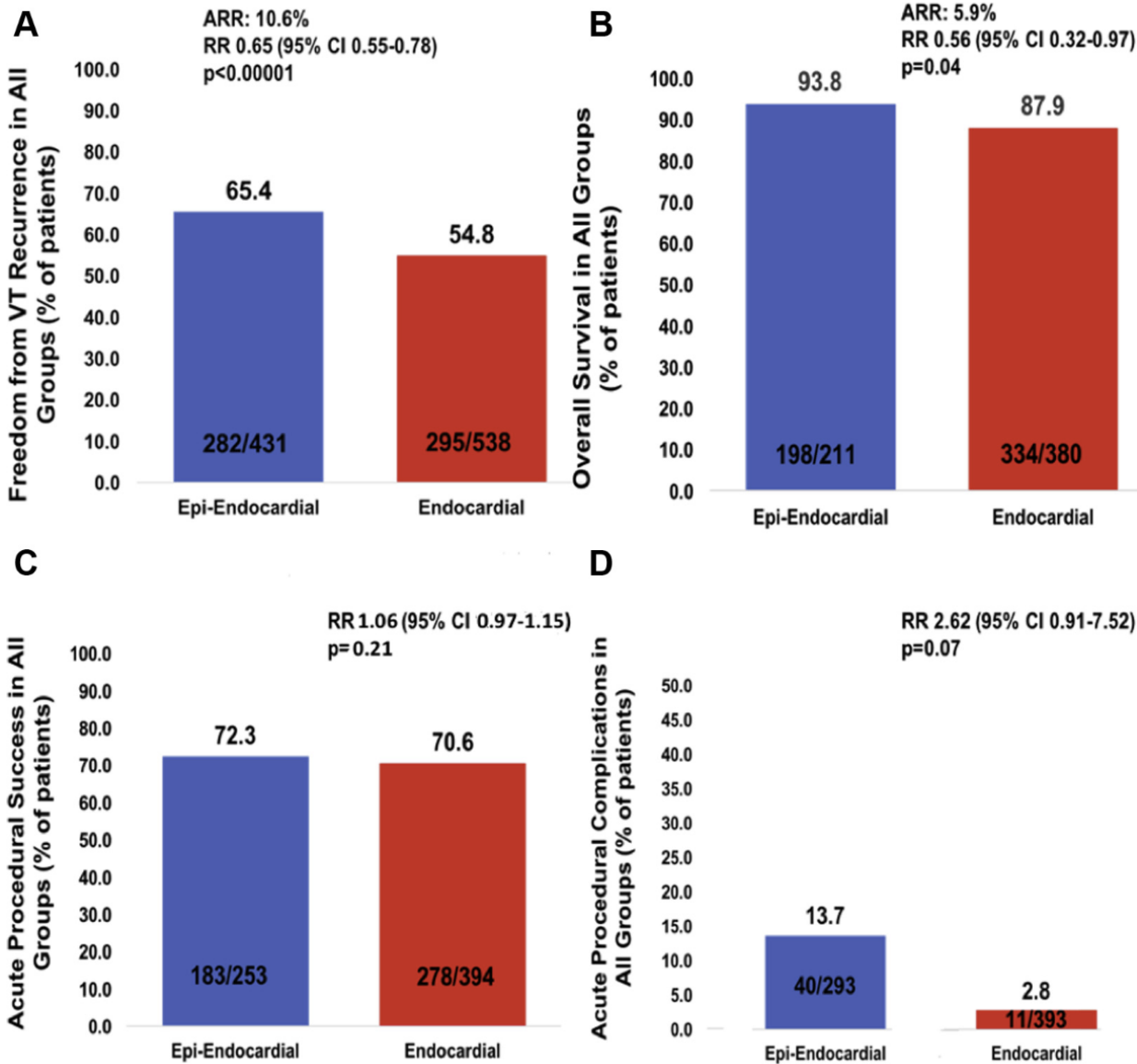
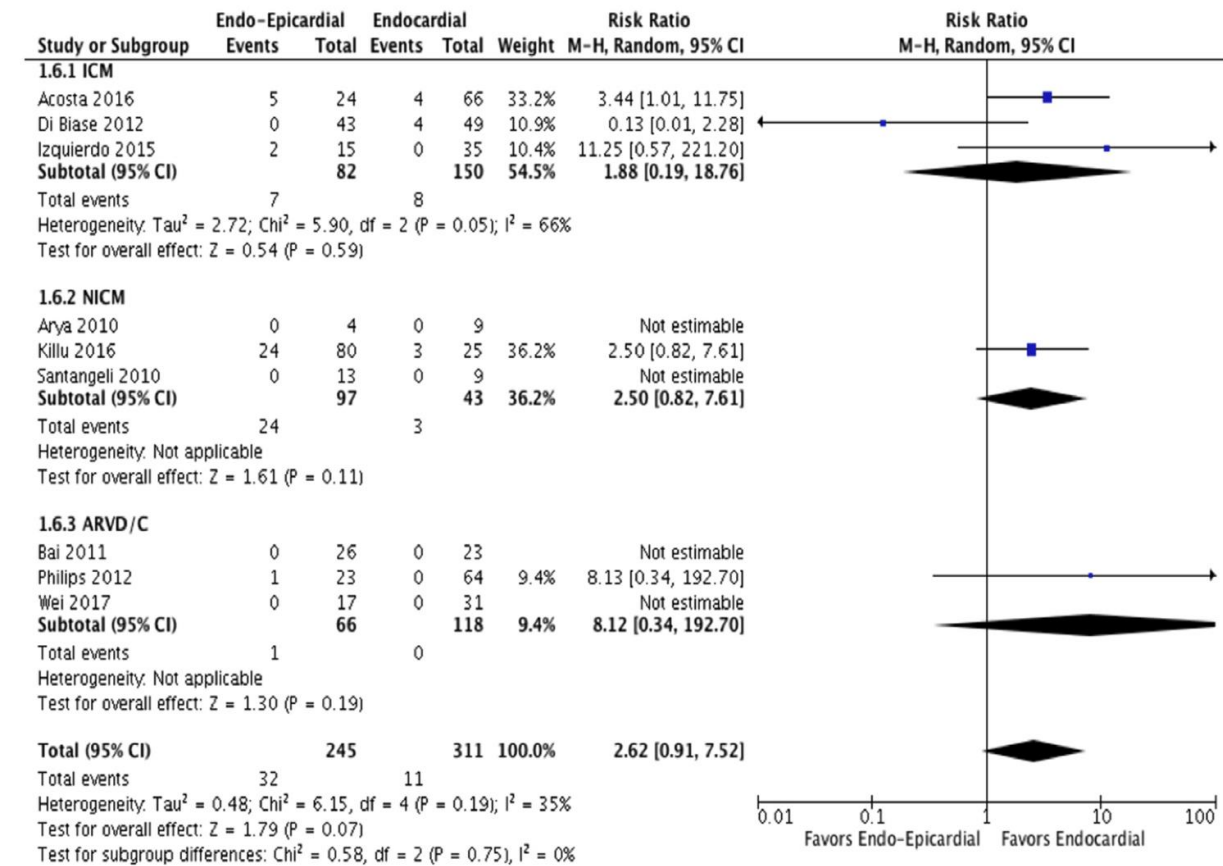


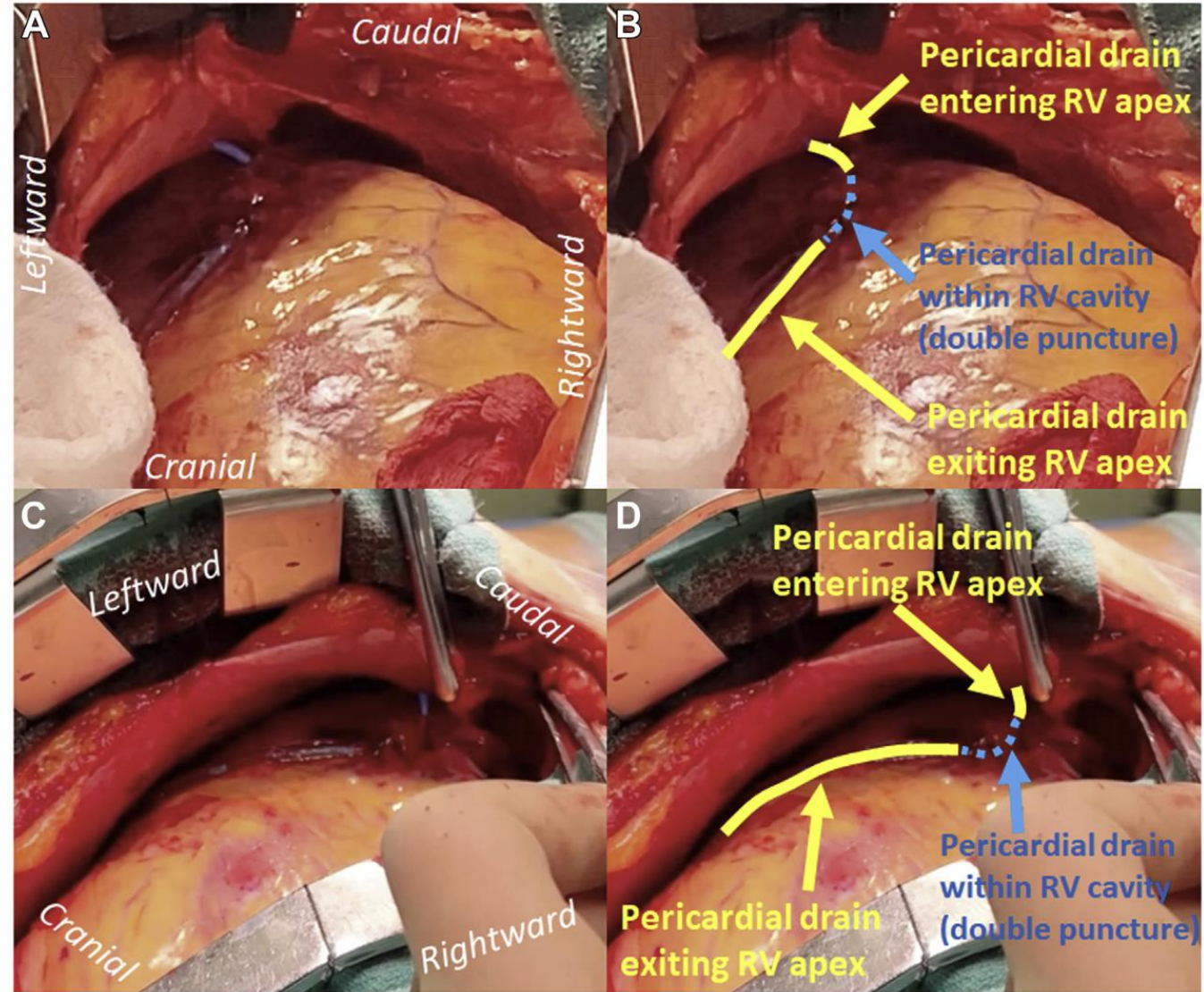
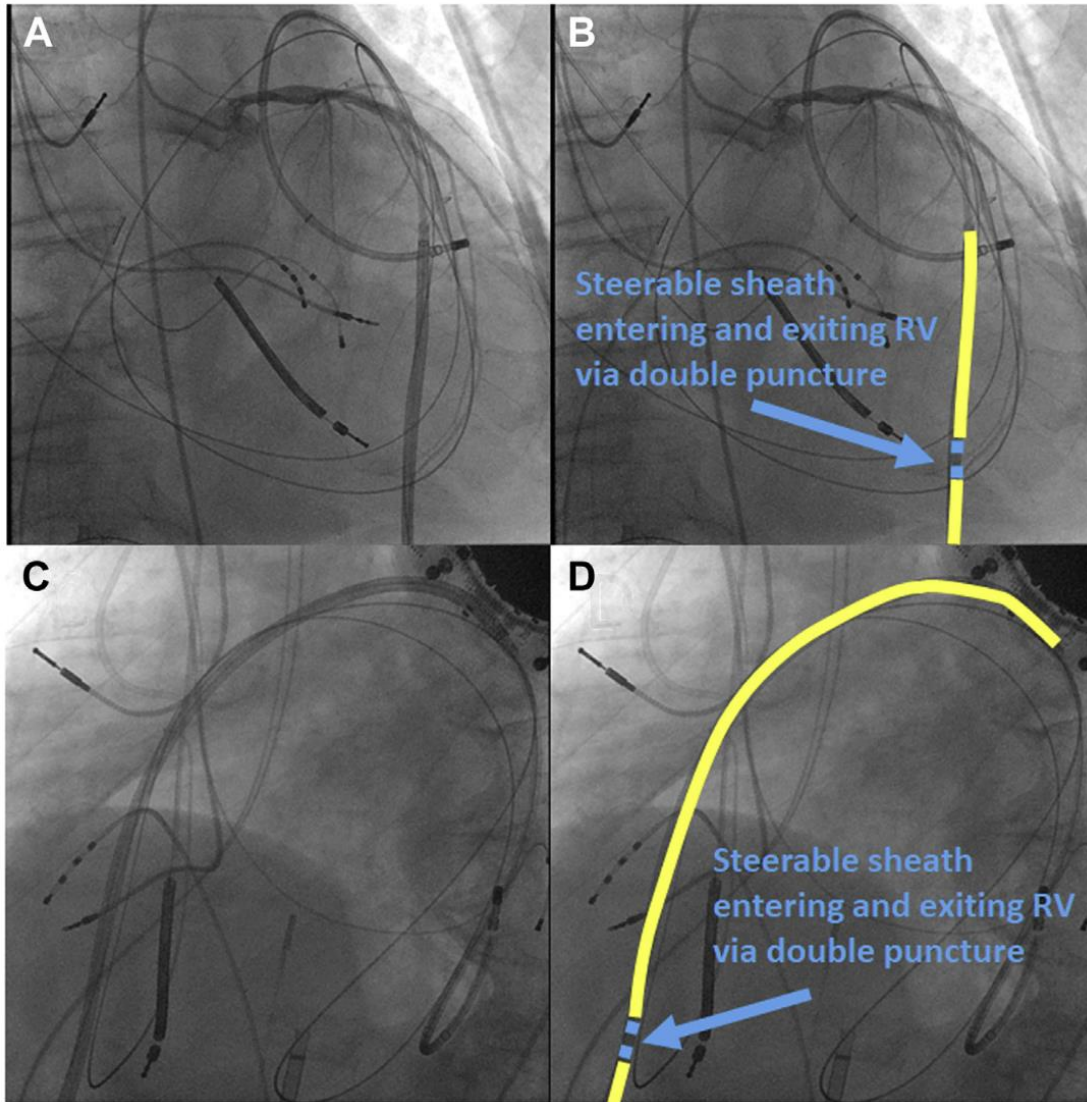
FIGURE 6 Acute Procedural Complications by Subgroup



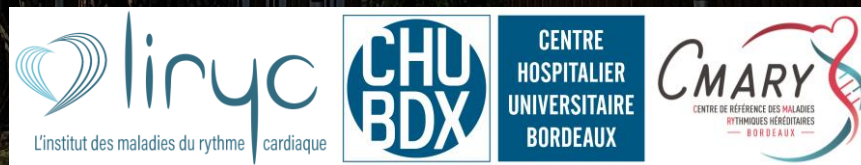
COMPLICATIONS

Tableau 2 : Résumé des principales complications aiguës et tardives dans les suites d'une procédure d'ablation avec abord péricardique percutané	
COMPLICATIONS AIGUES	
Épanchement péricardique	Ponction ventriculaire Pop épicardique Effraction d'une artère coronaire Lésion mécanique avec la gaine
Lésions abdominales	Lésion hépatique, splénique ou biliaire Lésion de vaisseaux sous diaphragmatiques Perforation de l'estomac ou des intestins
Lésions pulmonaires	Fistule pleuropéricardique Ponction parenchymateuse pulmonaire
Lésion nerveuse	Lésion d'un nerf phrénique avec paralysie diaphragmatique Lésion du nerf vague Lésion du nerf récurrent pharyngé
Spasme coronaire et fibrillation ventriculaire	
COMPLICATIONS TARDIVES	
	Péricardite récidivante Épanchement péricardique retardé Péricardite constrictive Sténose coronaire

COMPLICATIONS : double ponction VD



MERCI DE VOTRE ATTENTION



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