

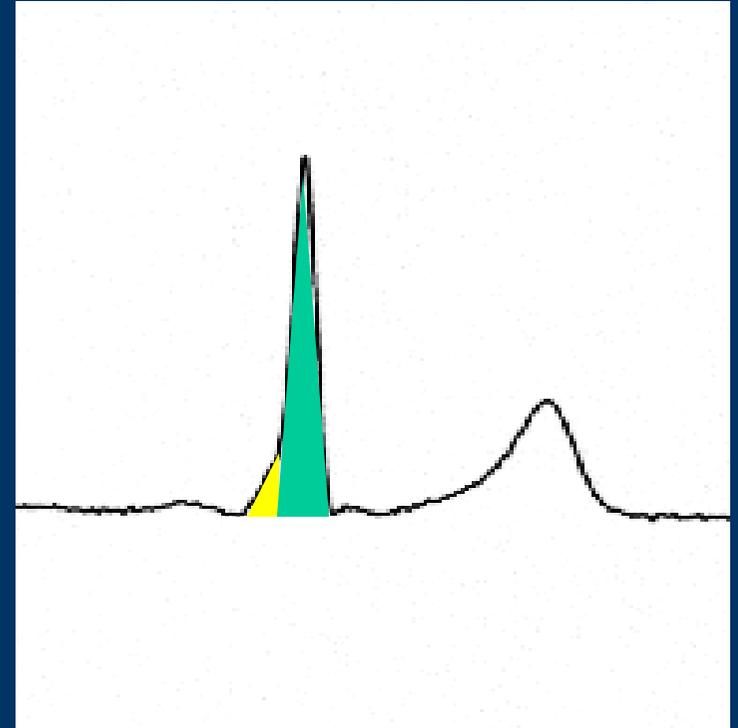
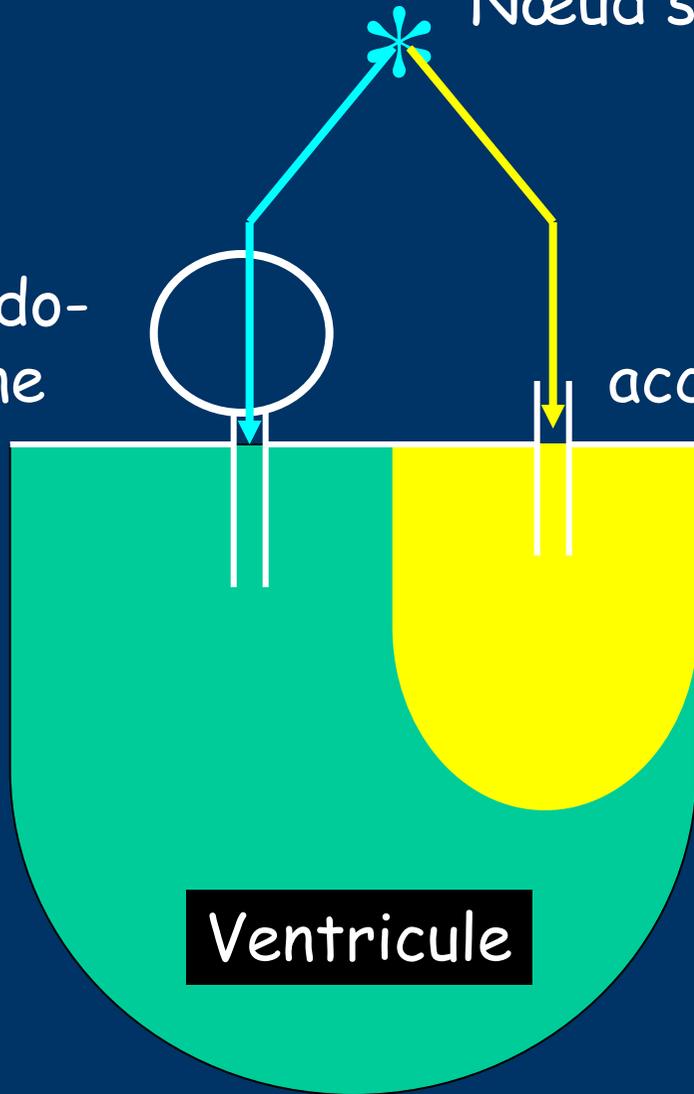
Oreillette

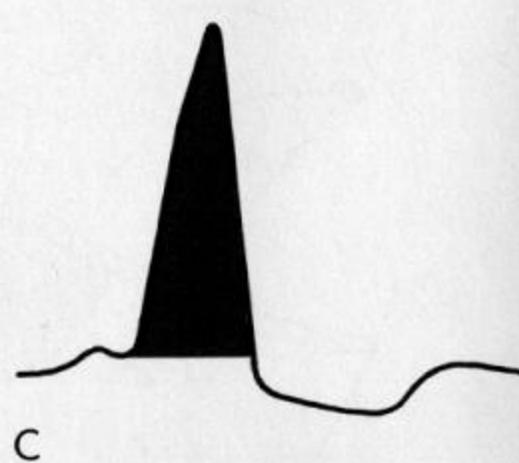
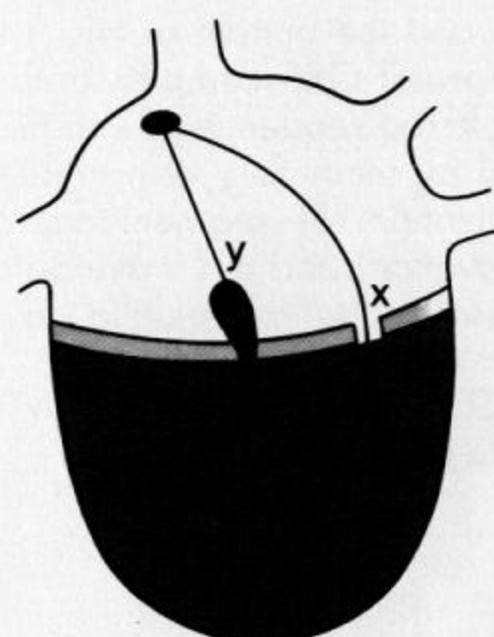
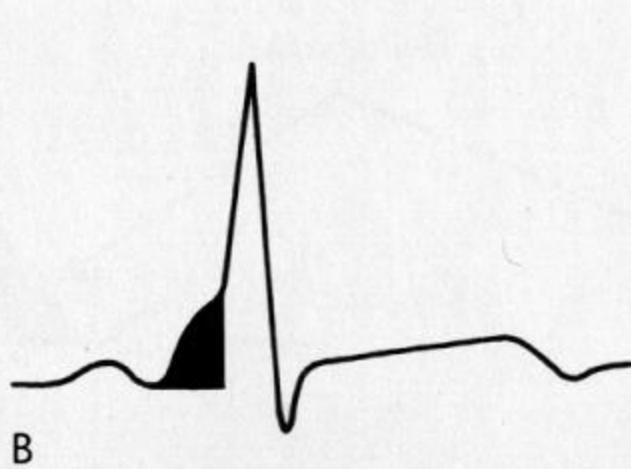
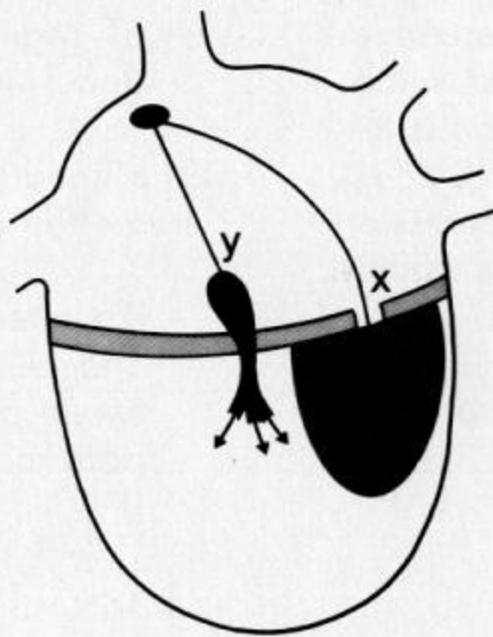
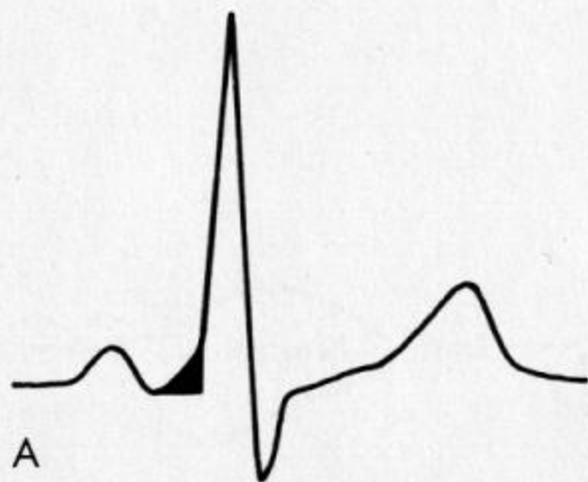
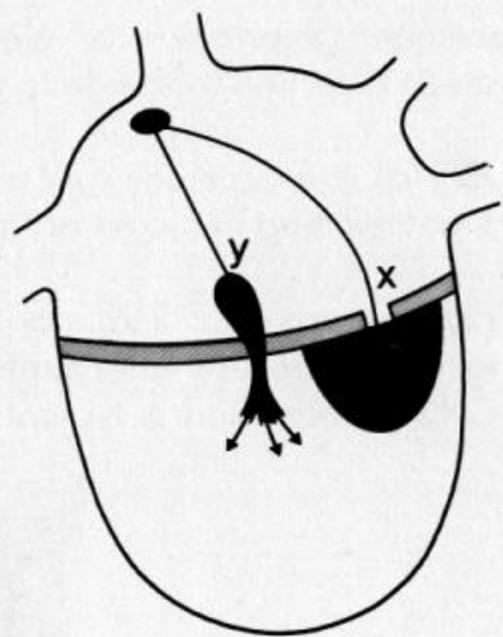
Nœud sinusal

Voie nodo-
hisienne

Voie
accessoire

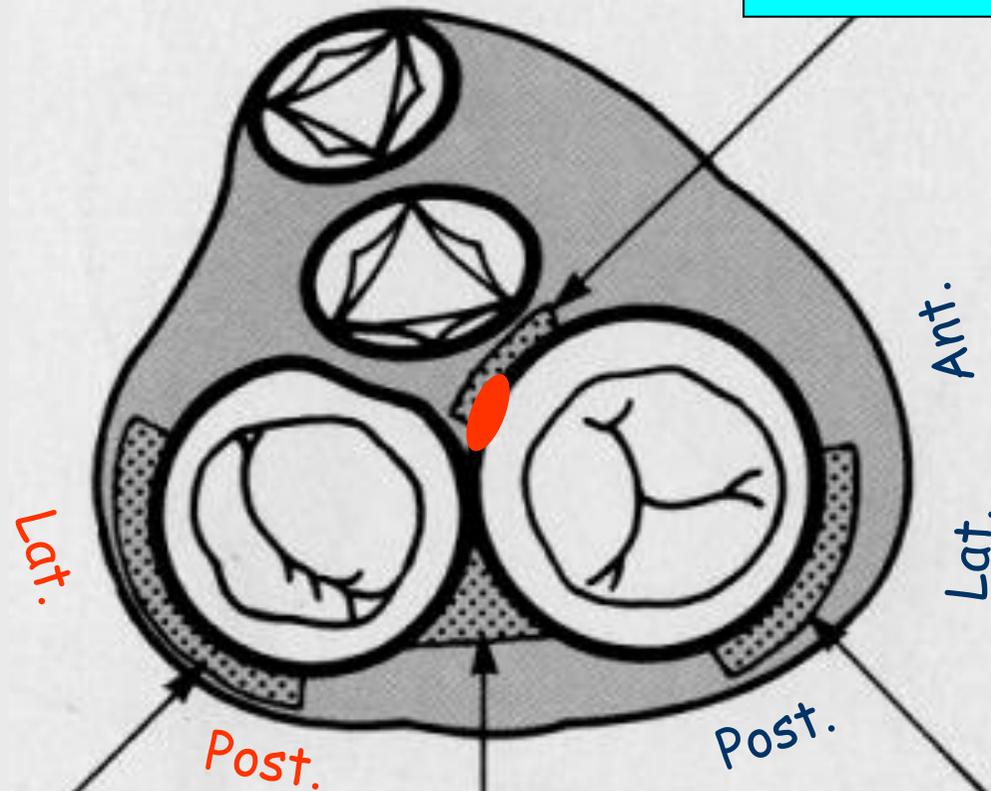
Ventricule





Faisceaux de Kent : répartition selon la localisation

Antéro-septal
5%

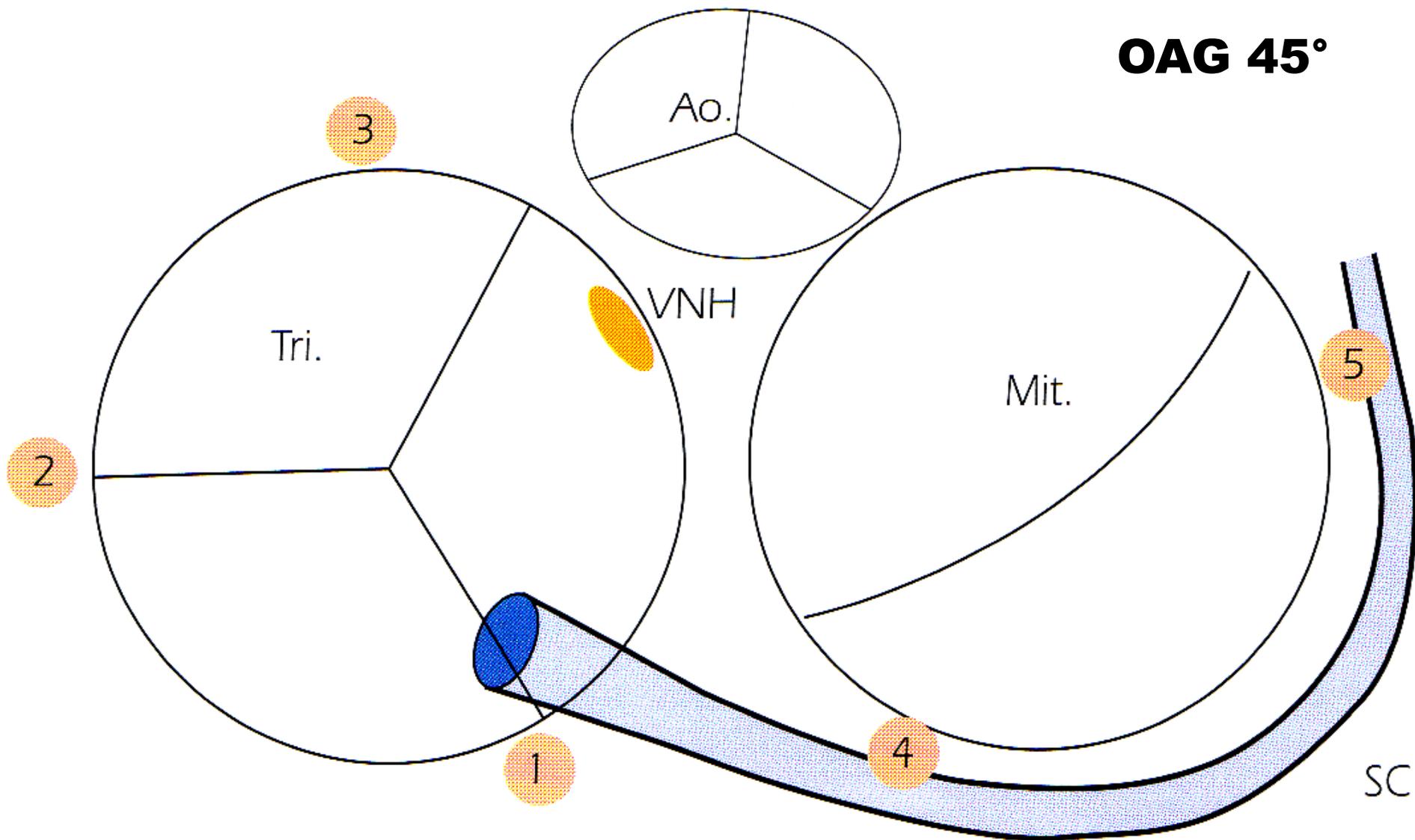


Gauche
45%

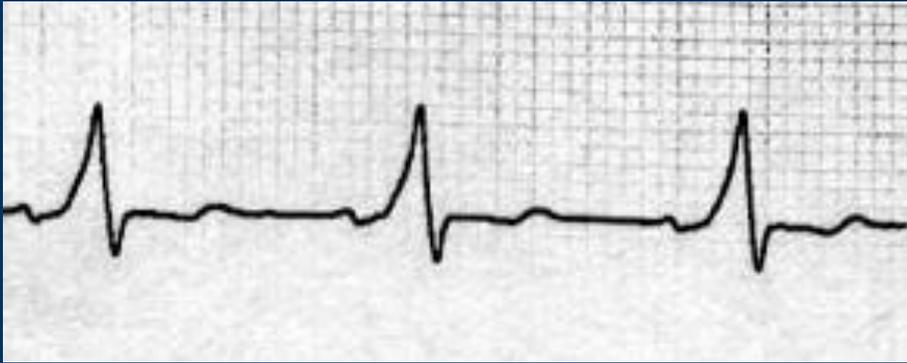
Postéro-septal
30%

Droit
20%

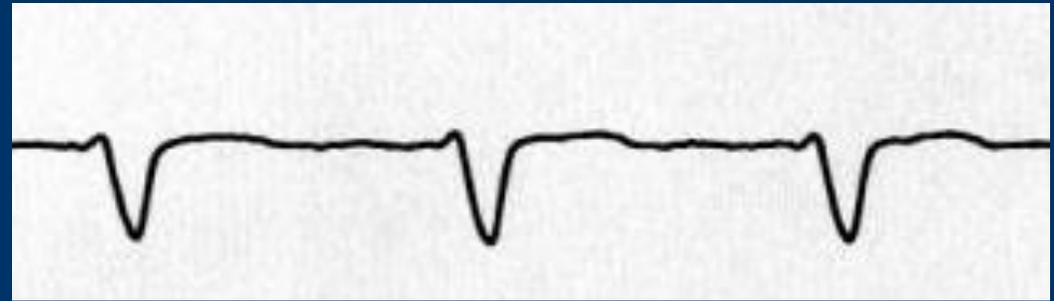
OAG 45°



Aspect en V1

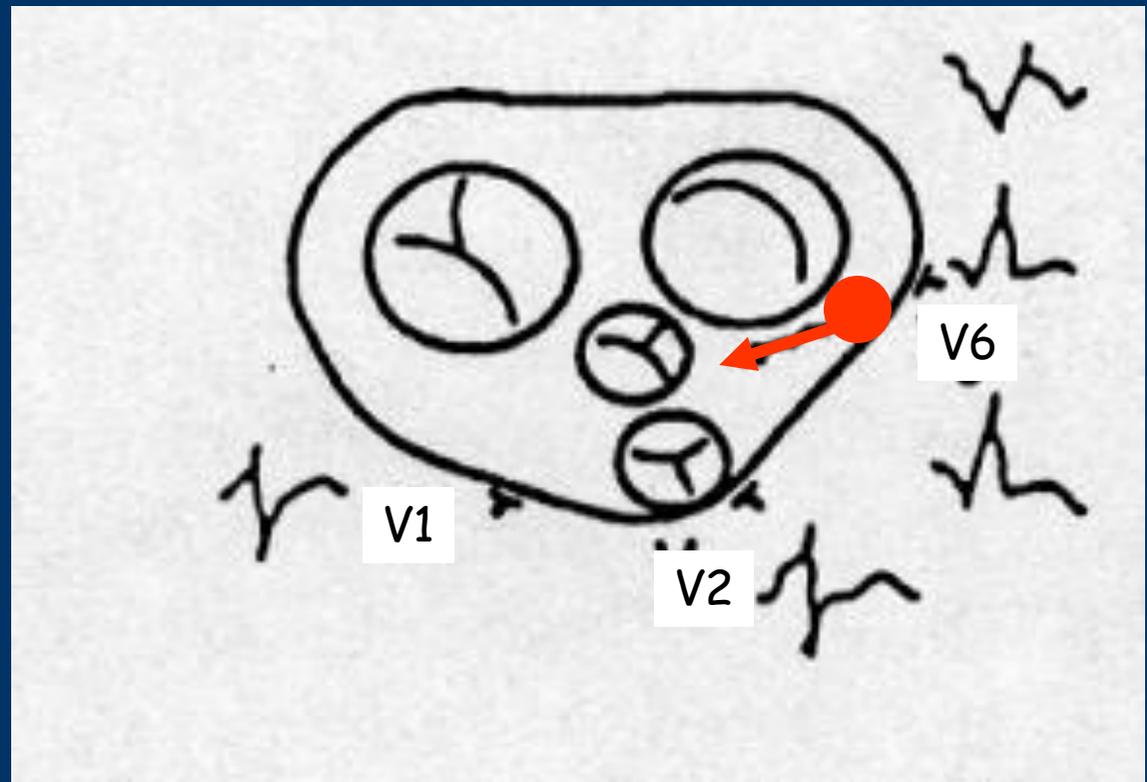
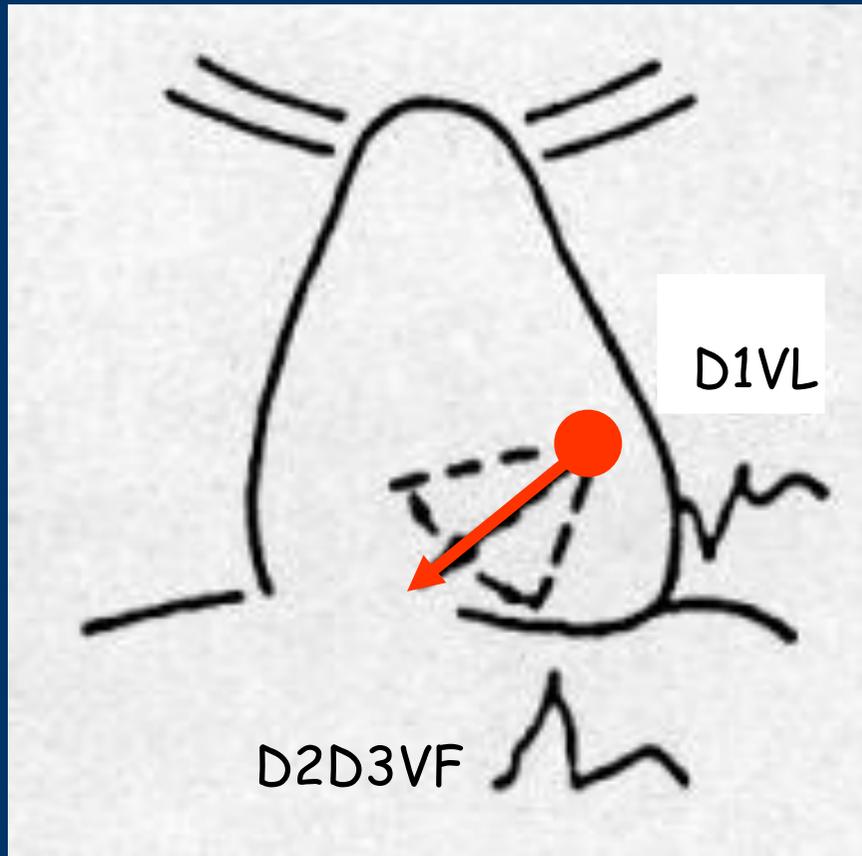


« Type A »

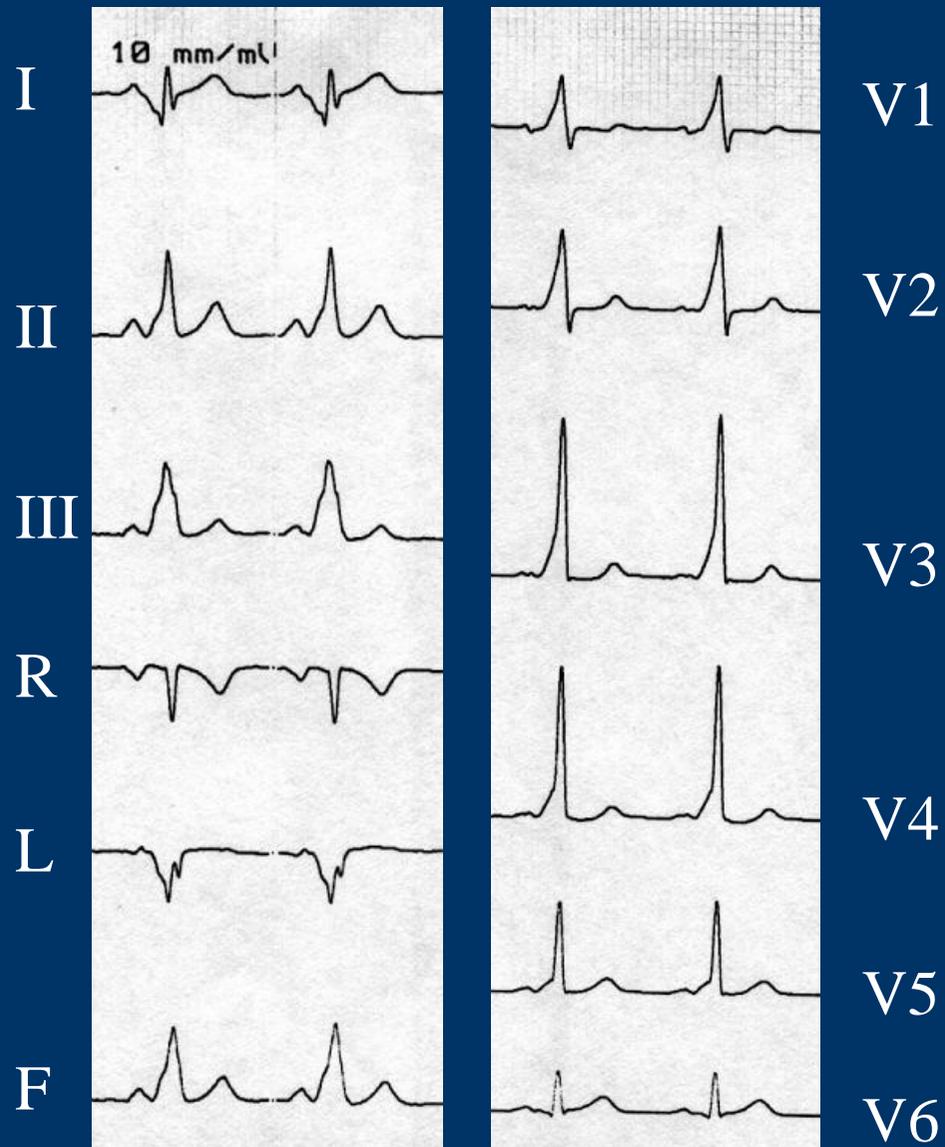


« Type B »

Voie accessoire latérale gauche



Dérivation V1



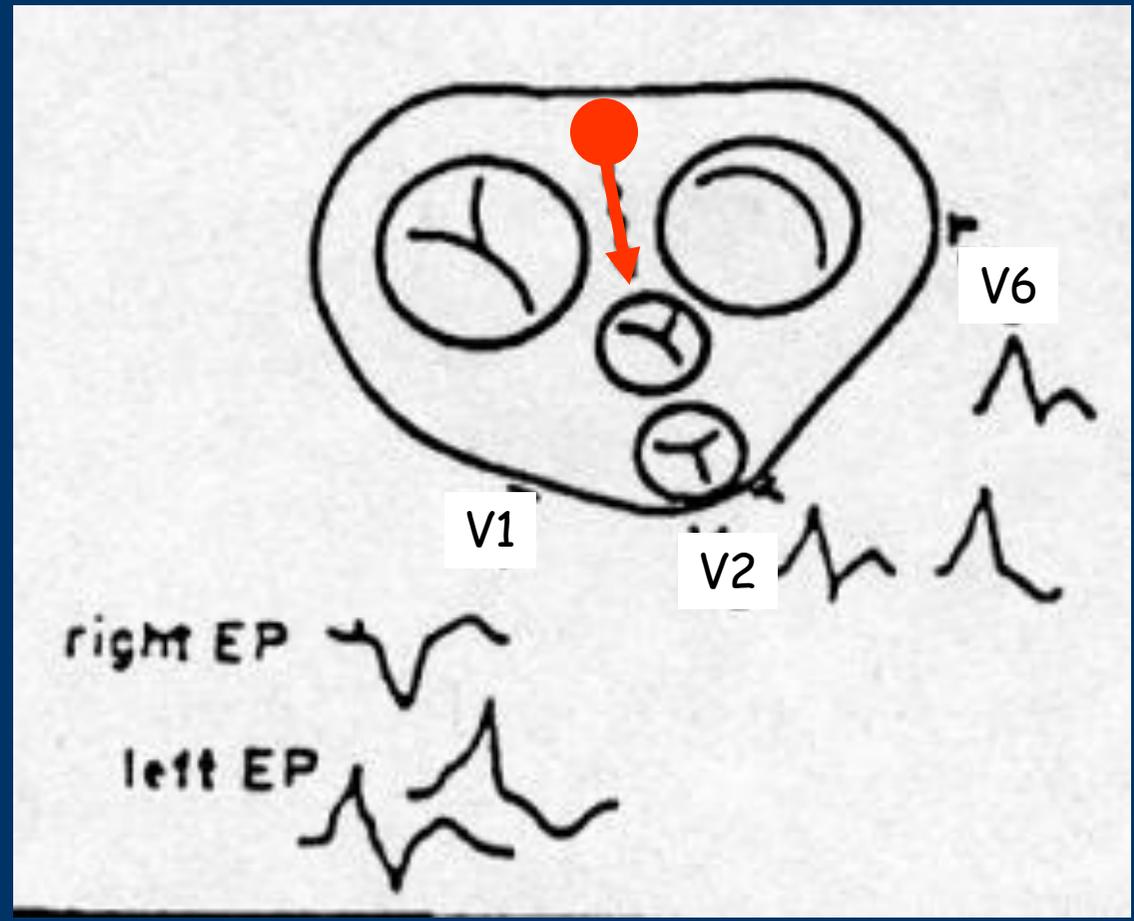
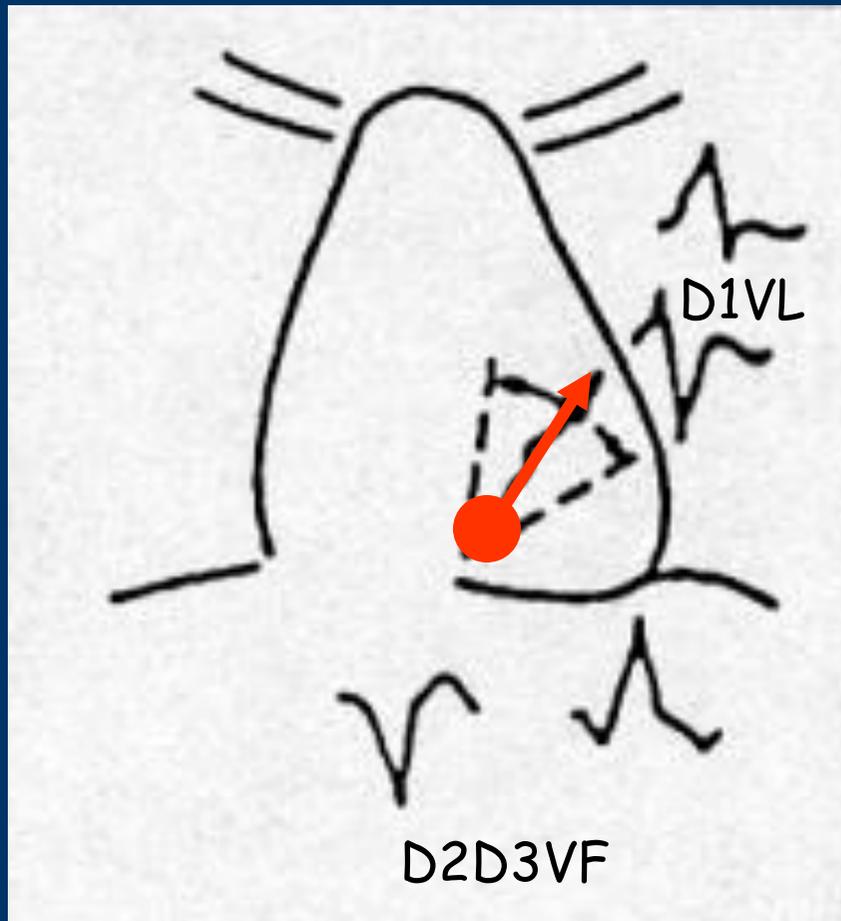
QRS et Δ positifs

Fx de Kent Gauche

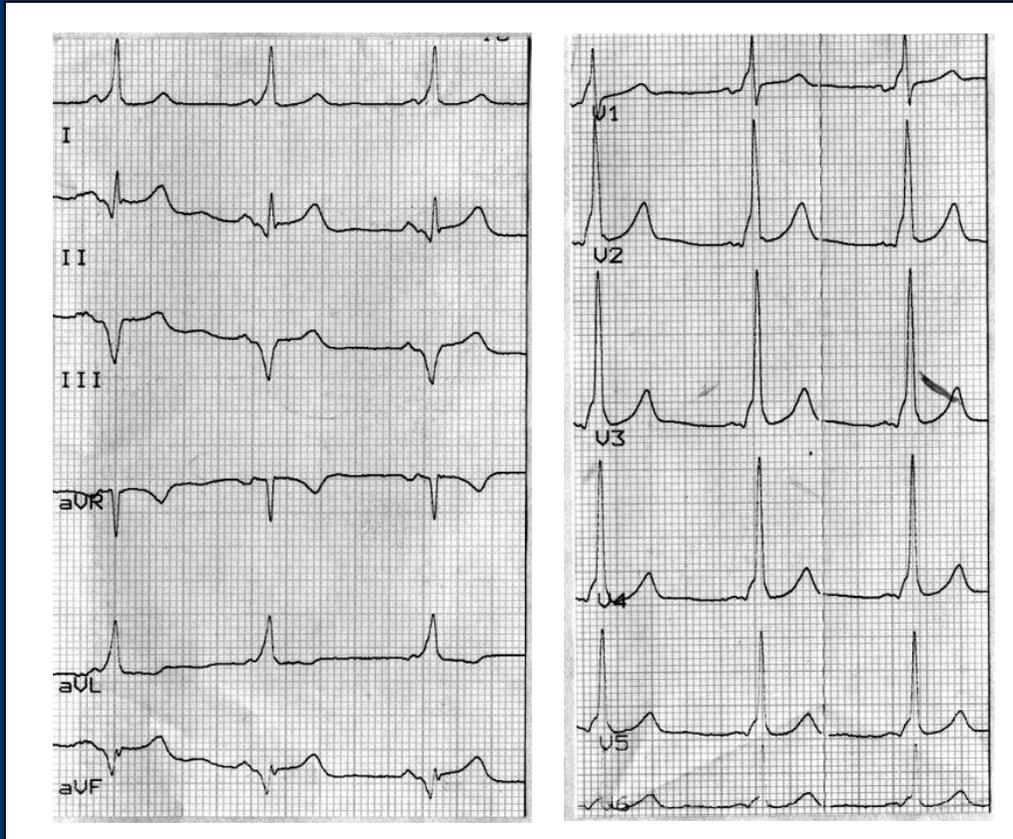
Onde Δ iso. ou négative I, L, V₅, V₆

Latéral

Voie accessoire postéro-septale



Dérivation V1



QRS et Δ
positifs

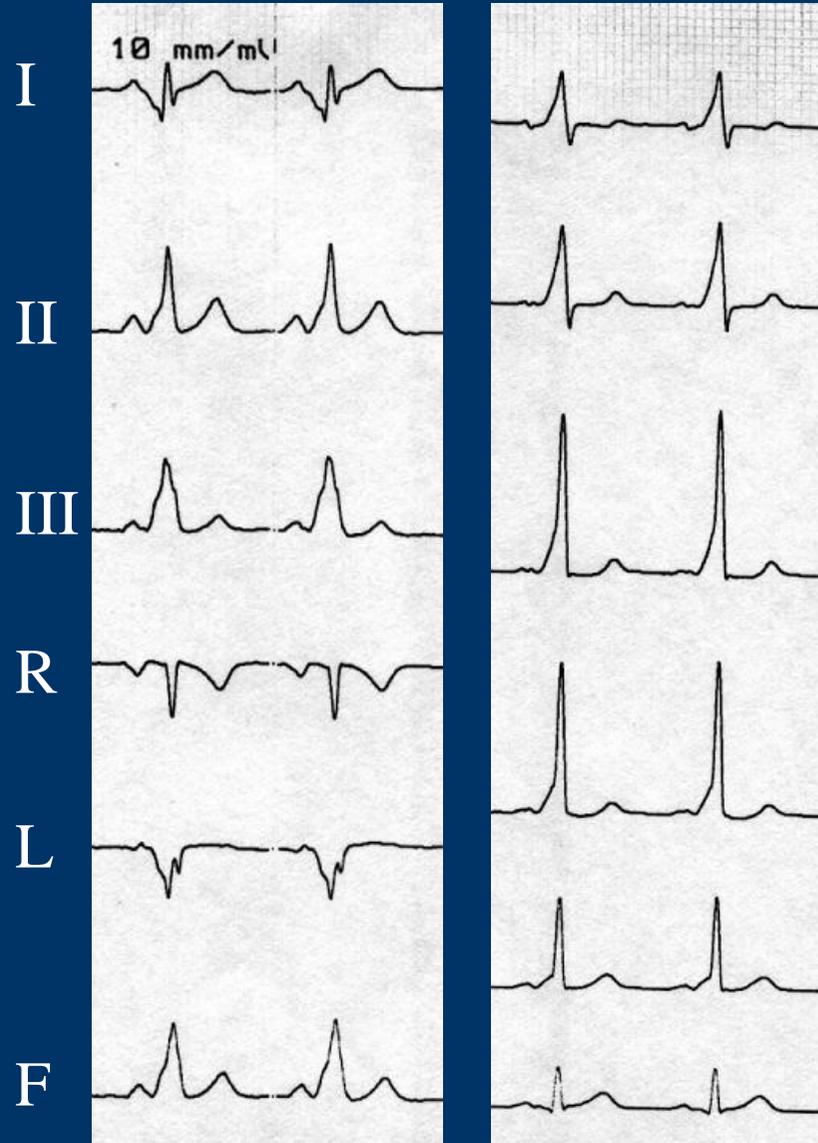
Fx de Kent Gauche

QRS et Δ
négatifs
II, III VF

Postérieur ou
postéro-septal

Gauche

Latéral



Postérieur

V1

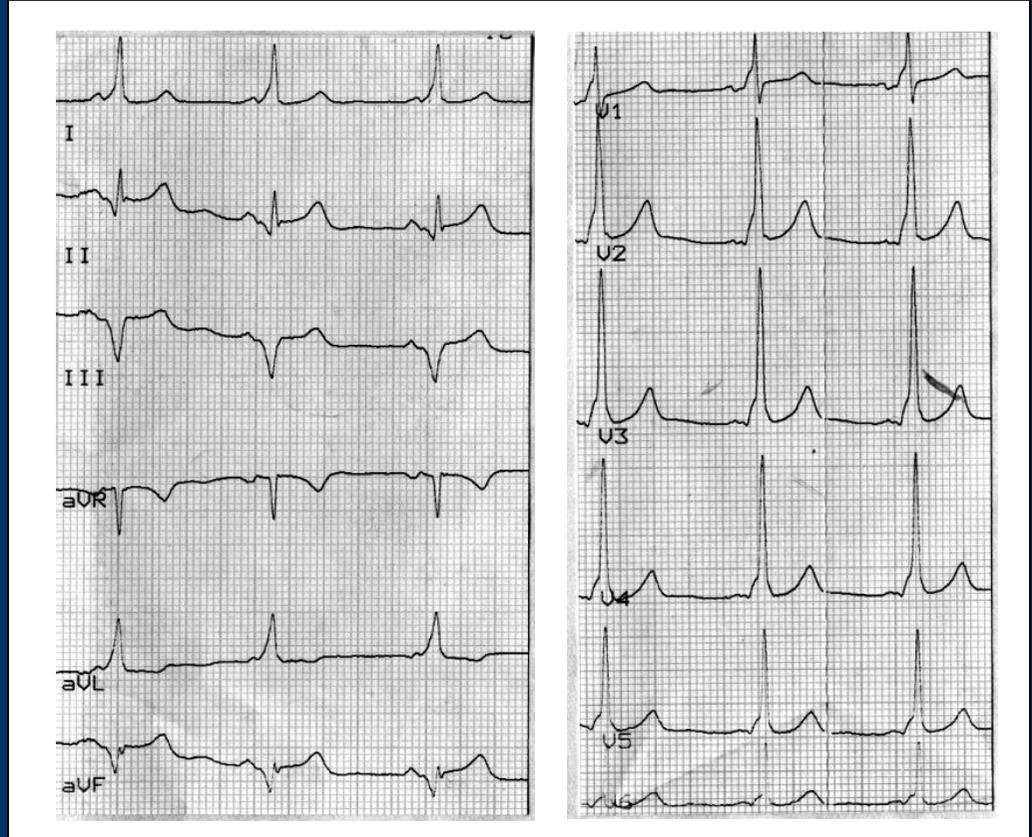
V2

V3

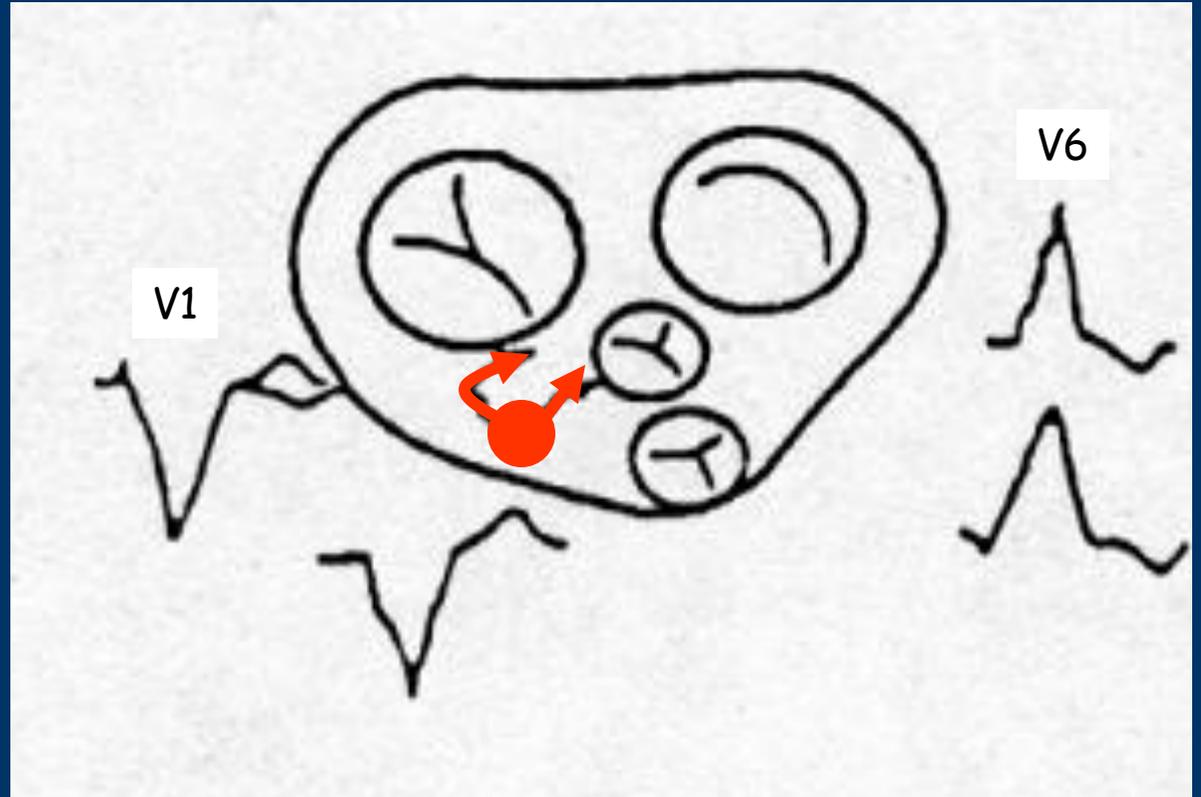
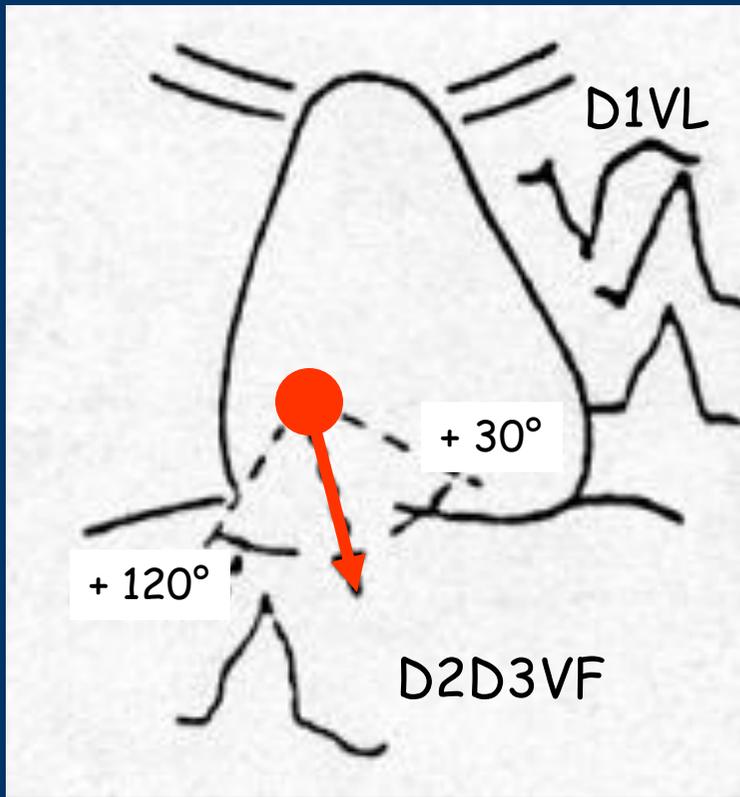
V4

V5

V6



Voie accessoire antéro-septale droite



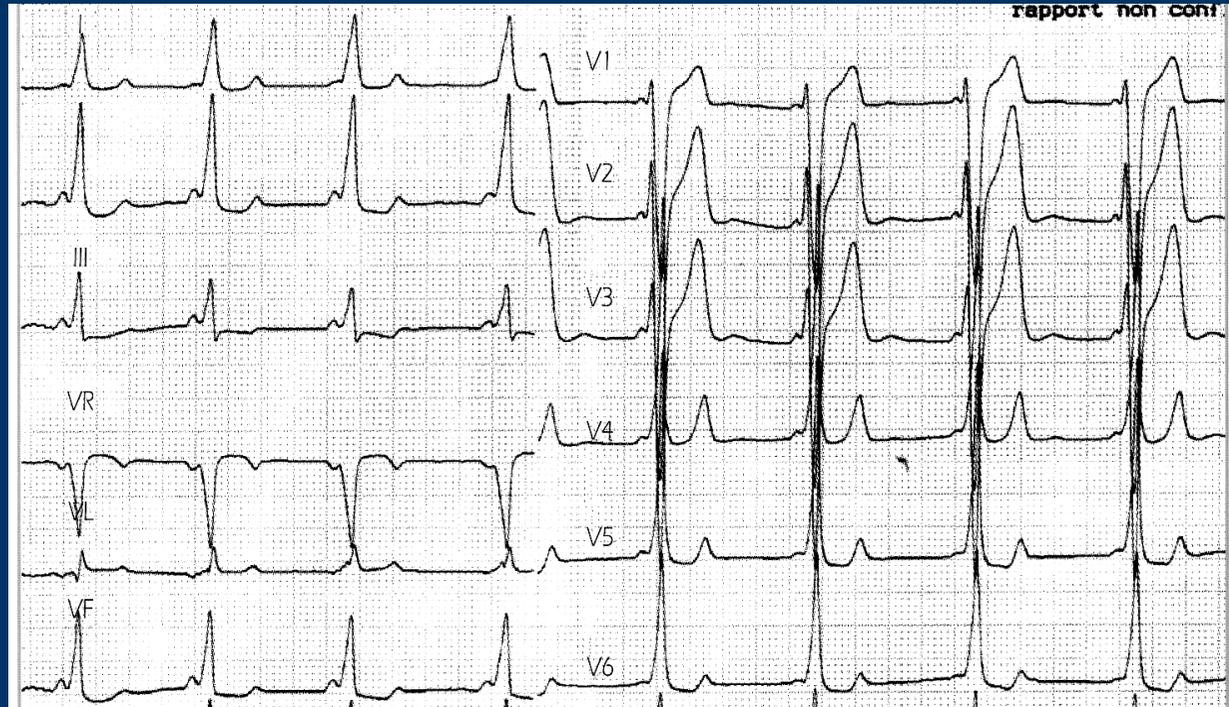
Dérivation V1

QRS et Δ
négatifs

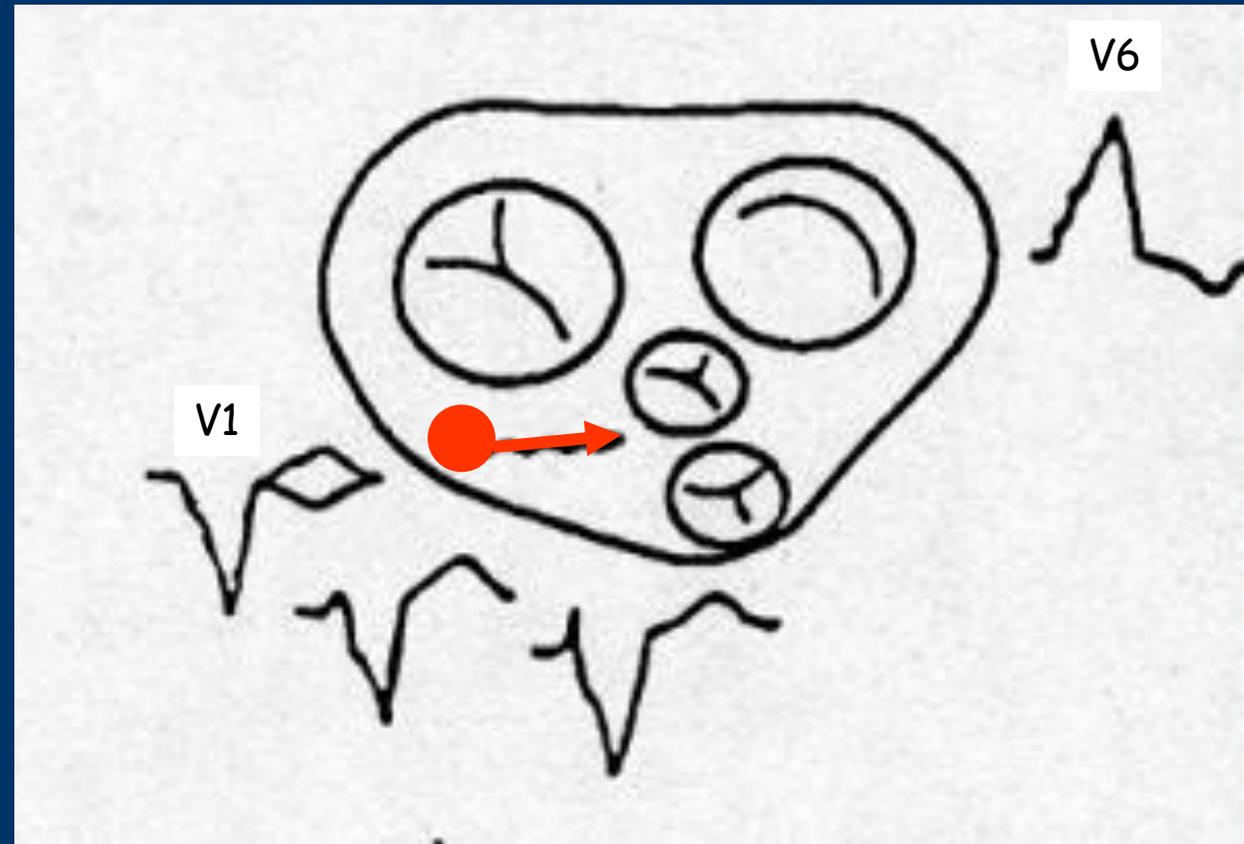
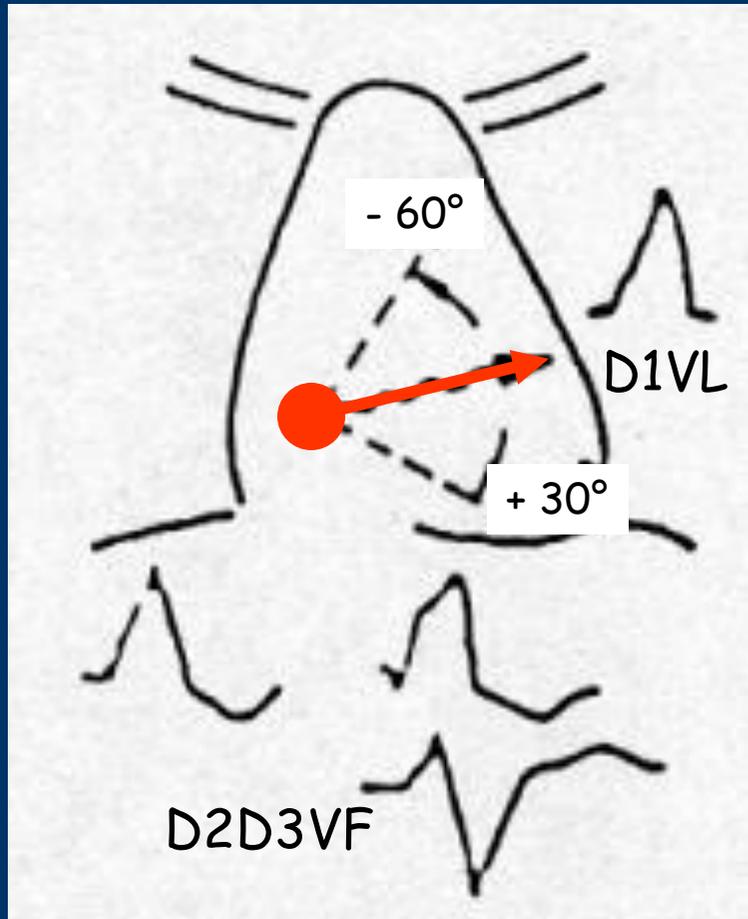
Fx de Kent Droit

Axe
inférieur

Antéro-septal



Voie accessoire droite latérale



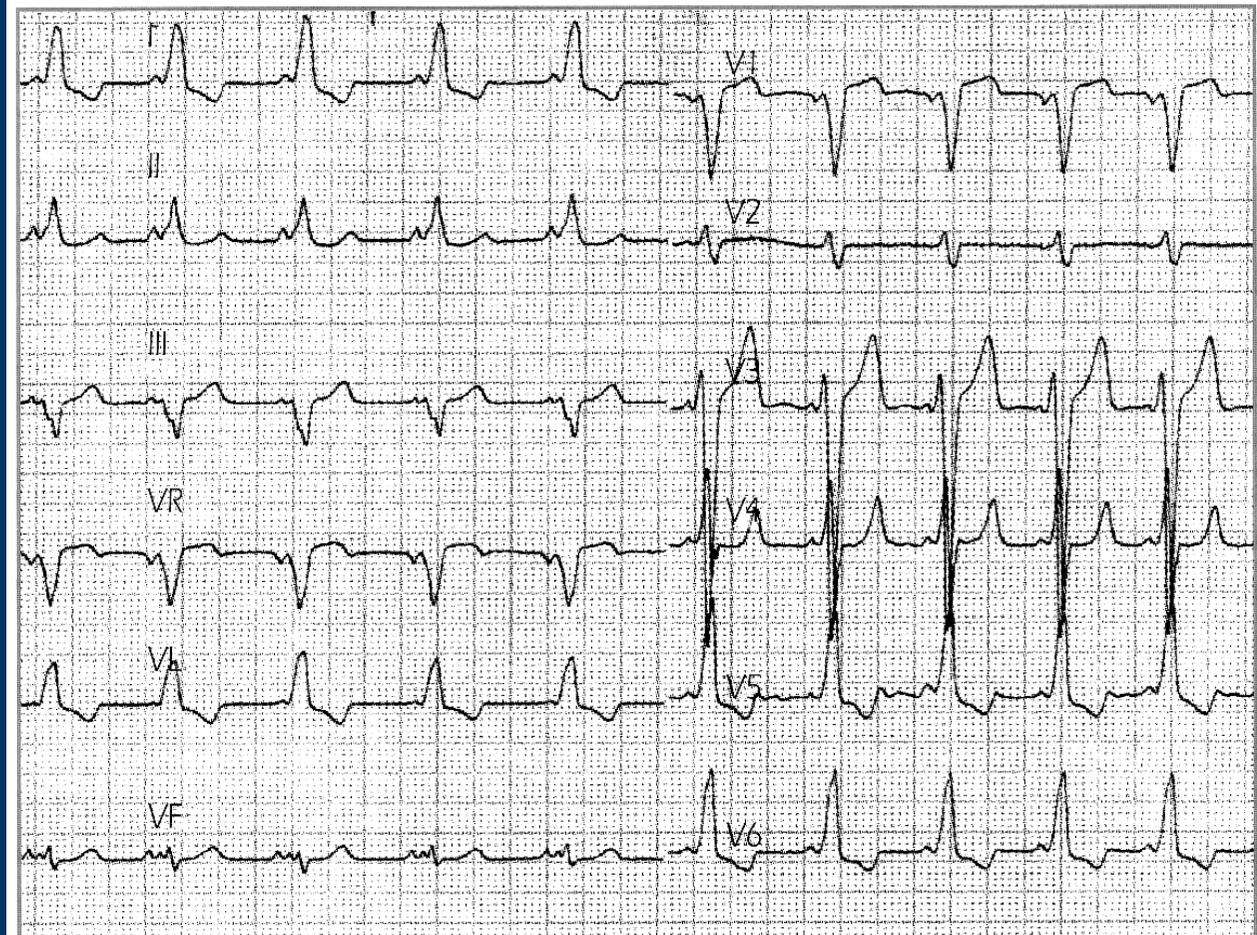
Dérivation V1

QRS et Δ
négatifs

Fx de Kent Droit

Axe
gauche

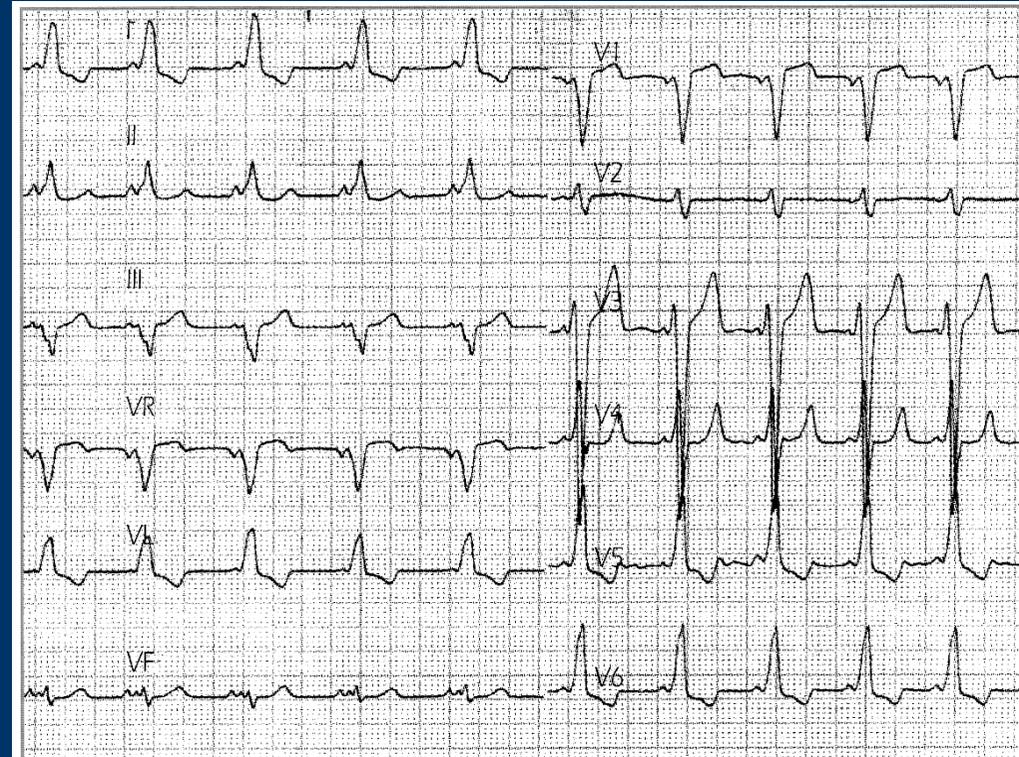
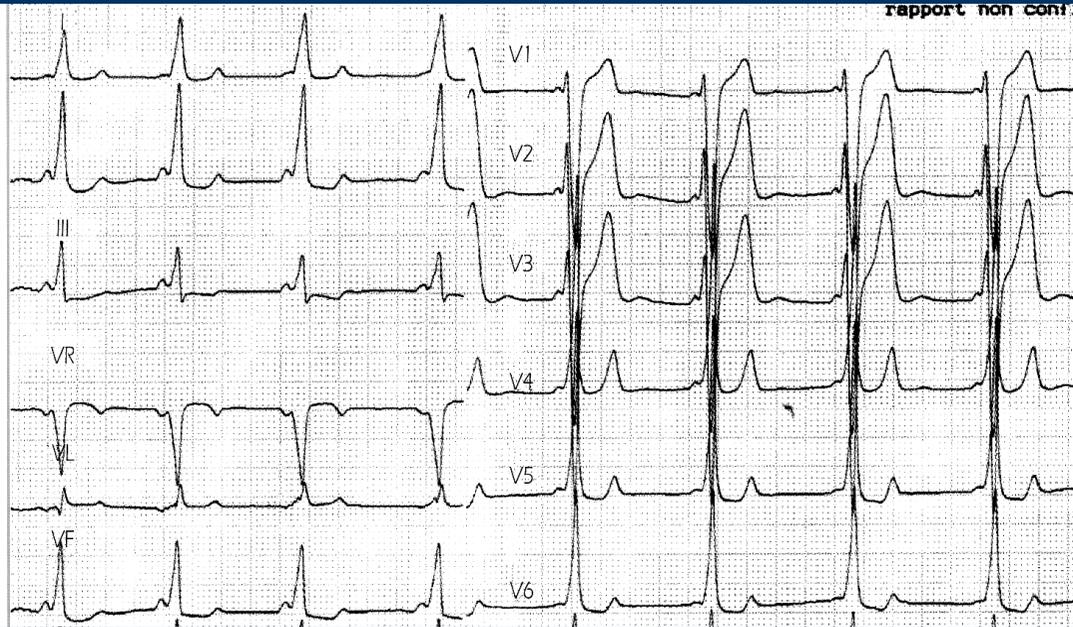
Paroi libre VD



Droite

Antéro-septal

Paroi libre



Dérivation V1

QRS et Δ
négatifs

QRS et Δ
positifs

Fx de Kent Droit

Fx de Kent Gauche

QRS et Δ
négatifs
II, III VF

Axe
inférieur

QRS et Δ
négatifs
II, III VF

Onde Δ iso.
ou négative
I, L, V₅, V₆

Postéro-septal
ou postérieur

Antéro-septal

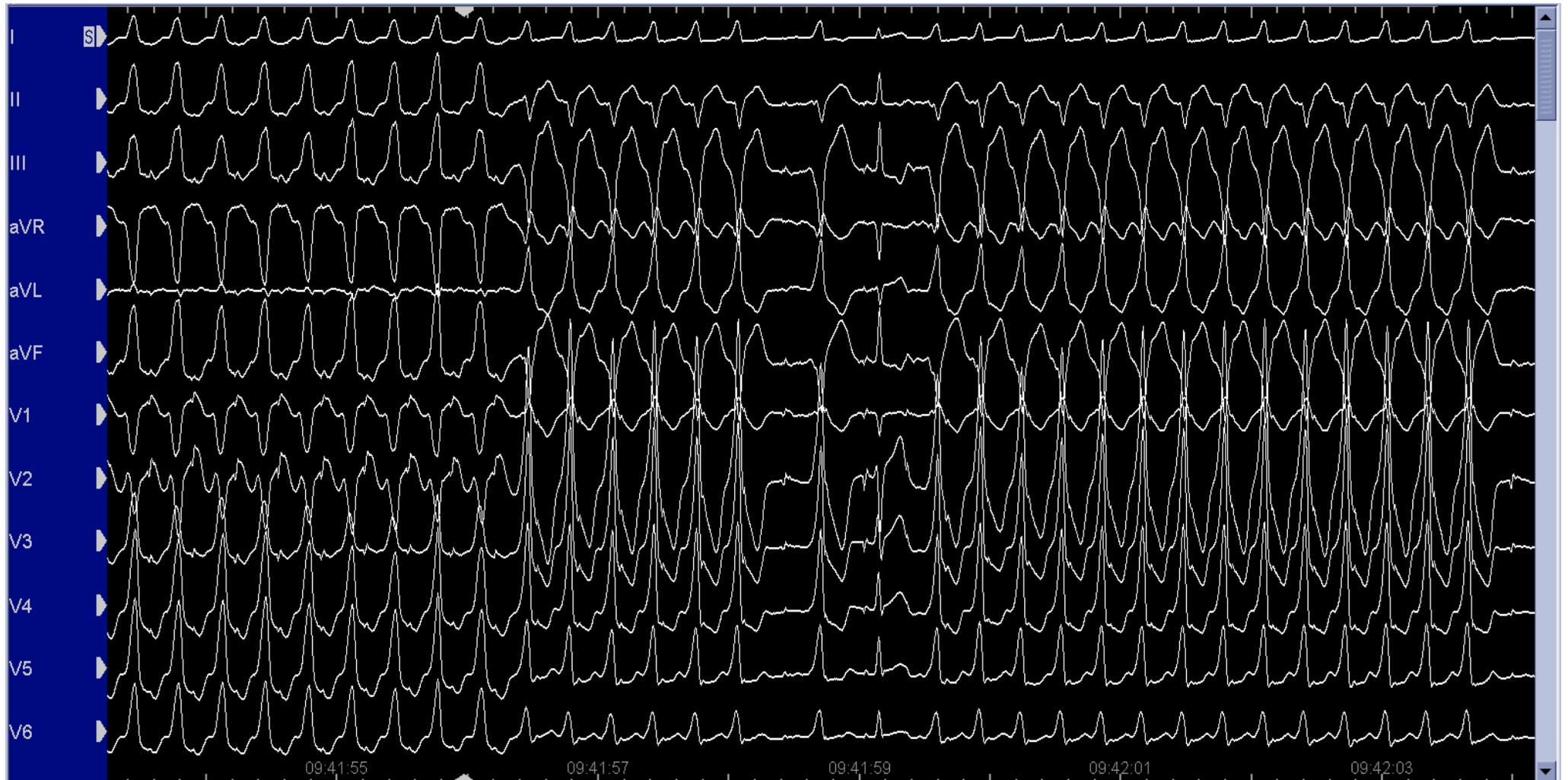
Postérieur ou
postéro-septal

Latéral

Axe
gauche

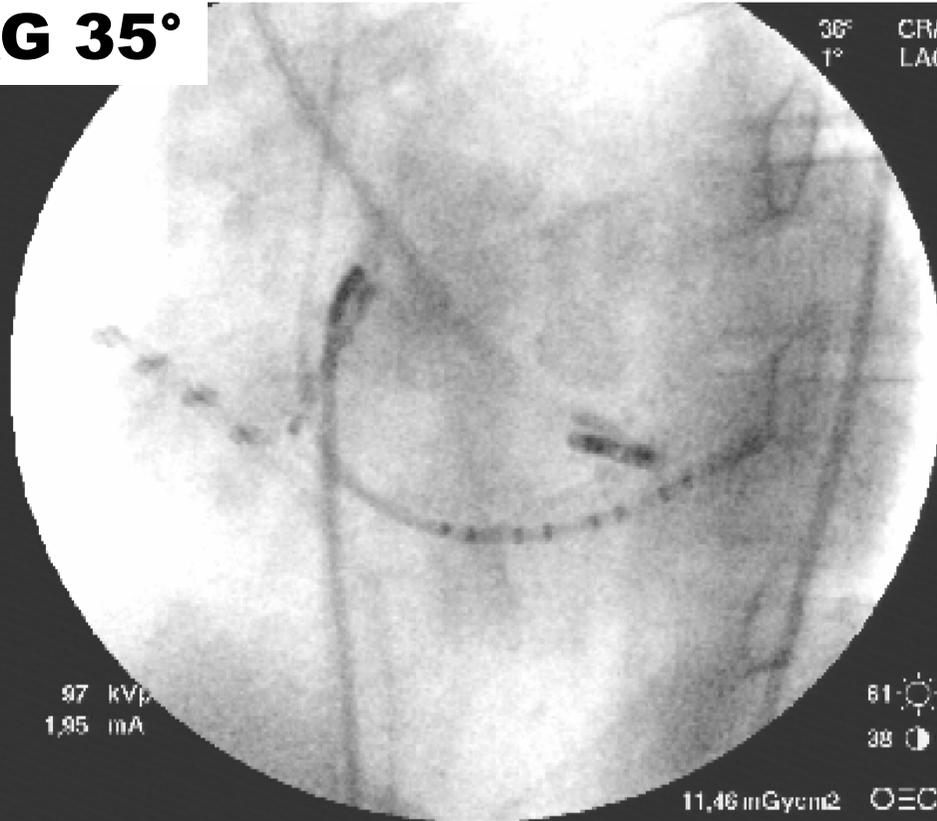
Paroi libre VD





OAG 35°

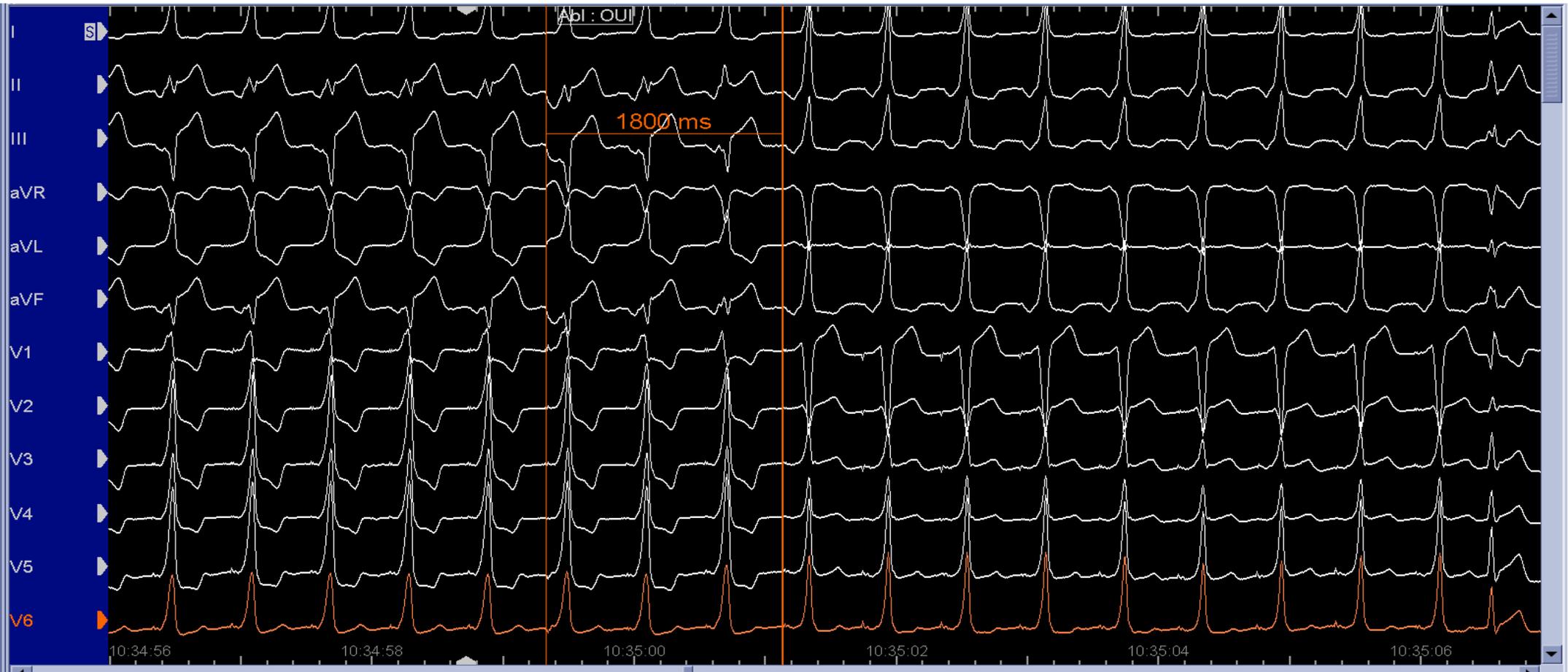
36° CRA
1° LAO



97 kVp
1.95 mA

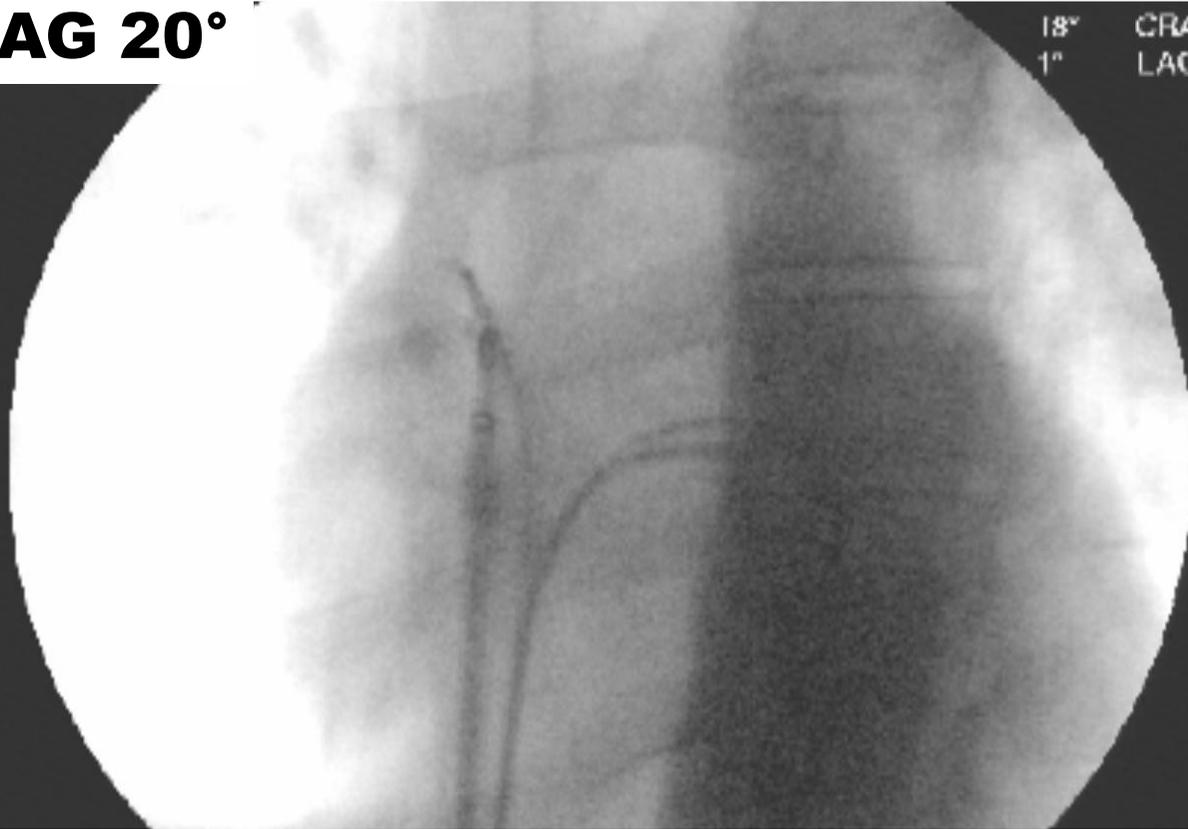
61
38

11.46 mGy/cm2 OEC



OAG 20°

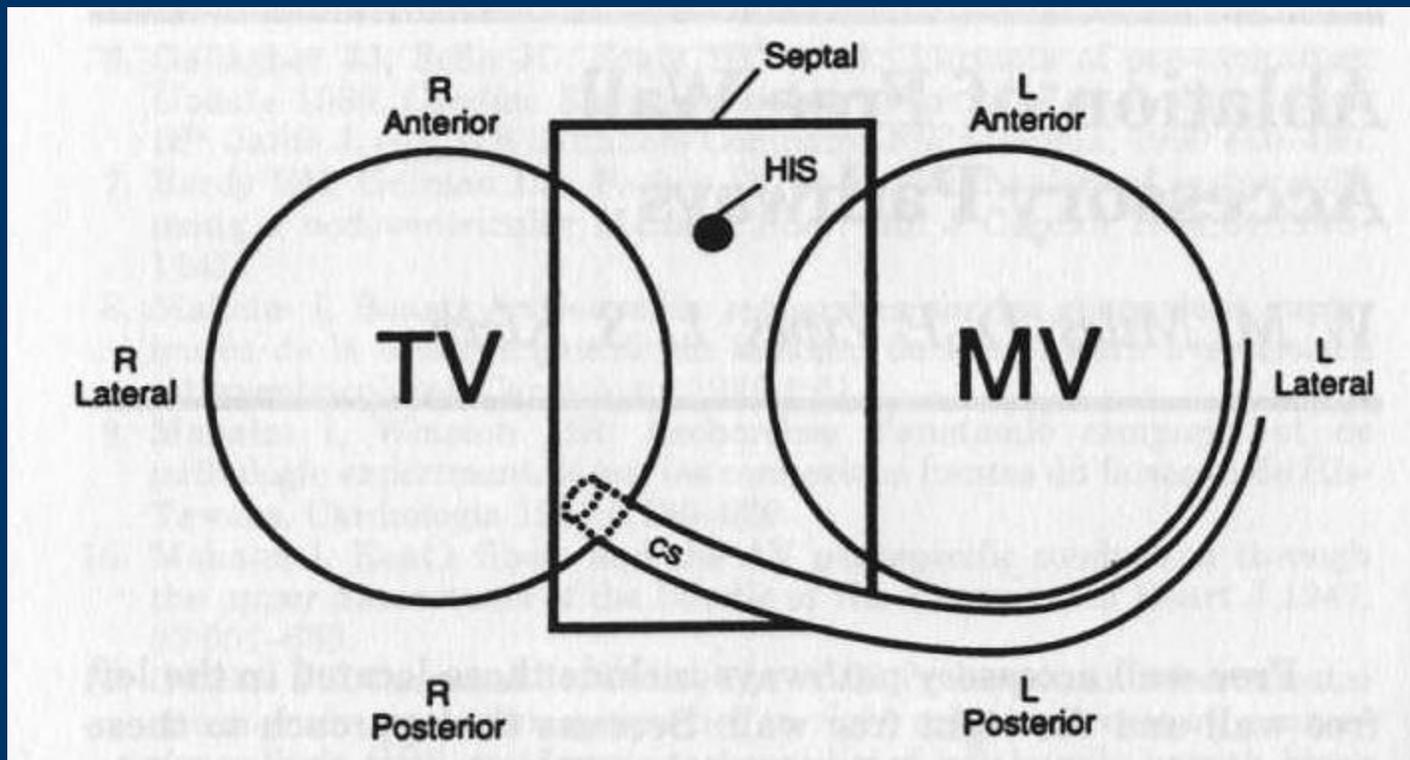
18° CRA
1° LAO



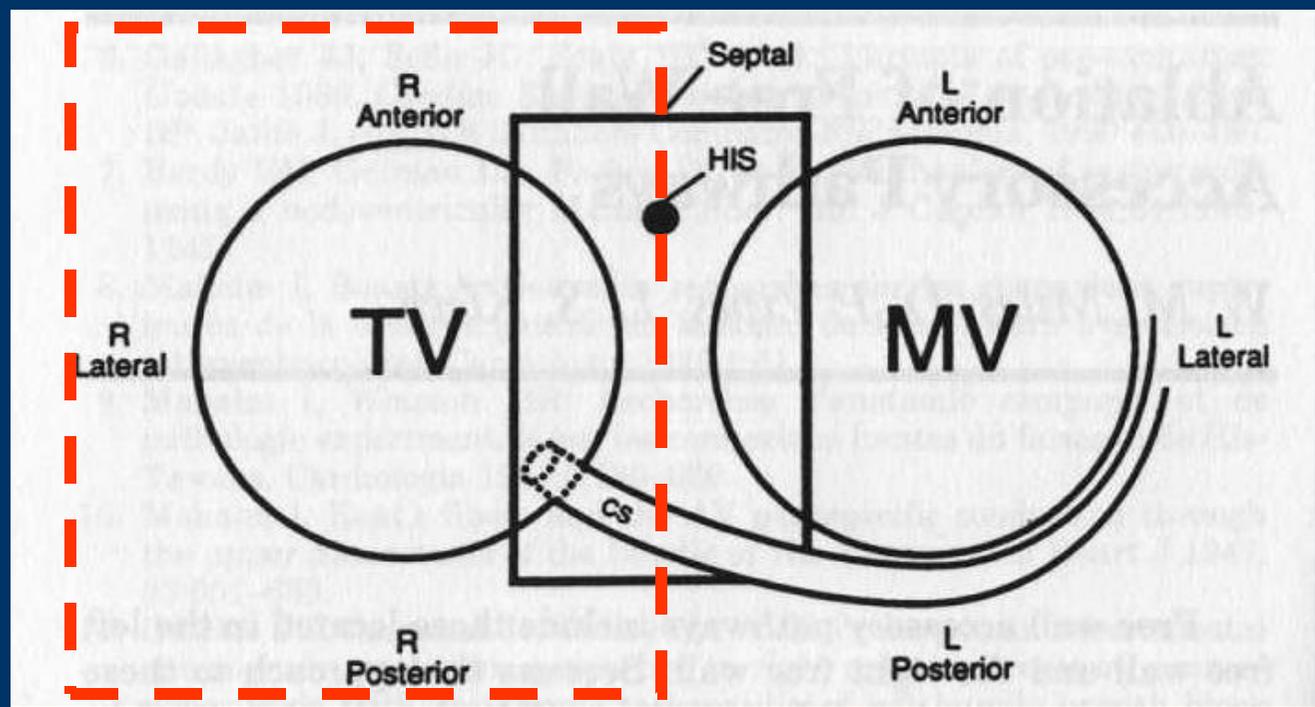
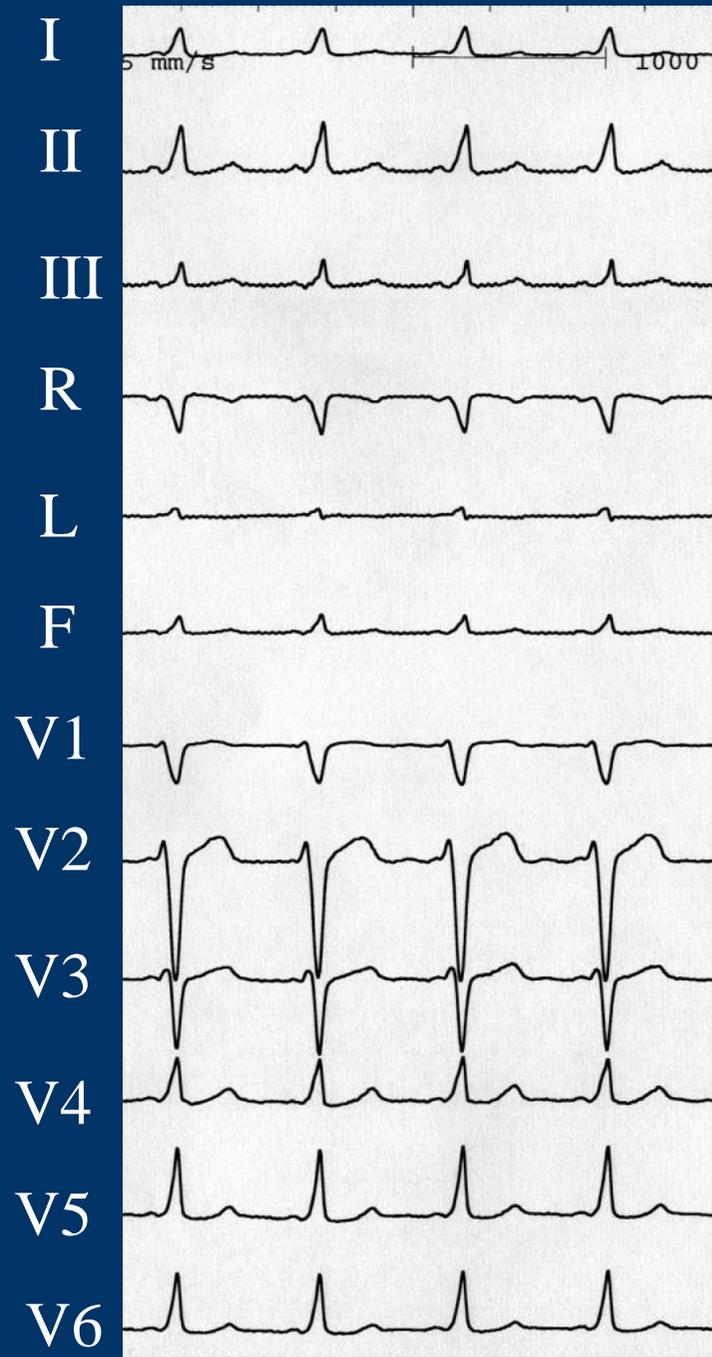
Ablation des voies accessoires : Cartographie conduction antérograde

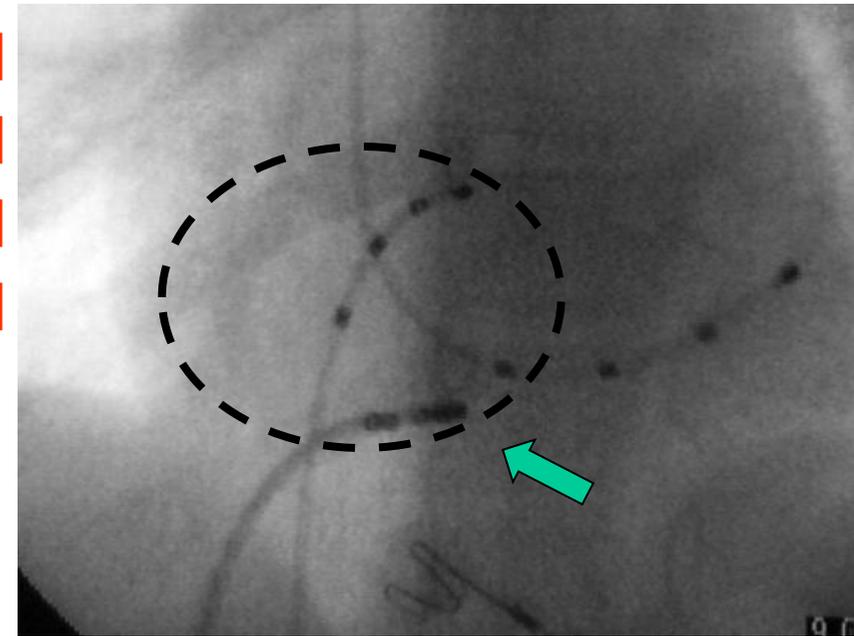
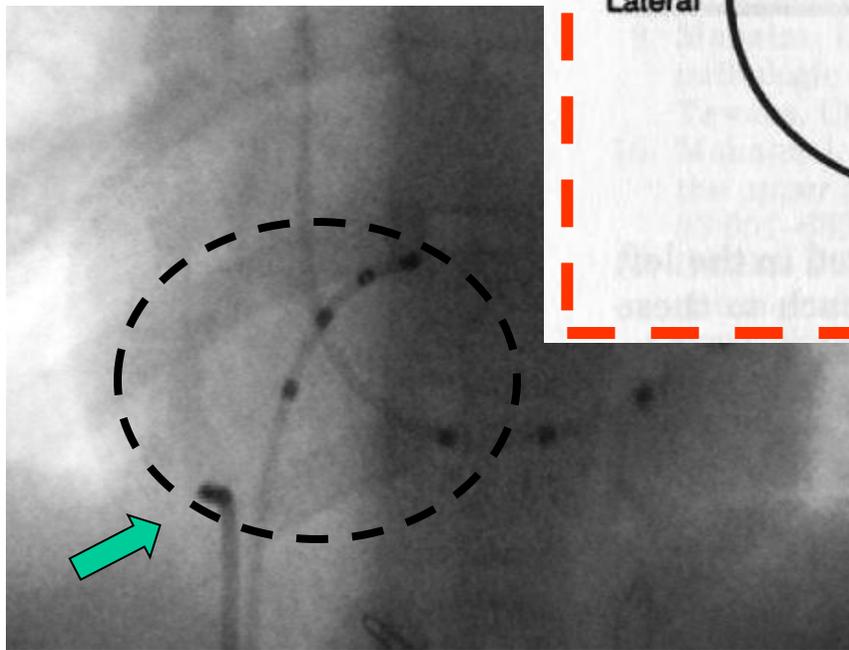
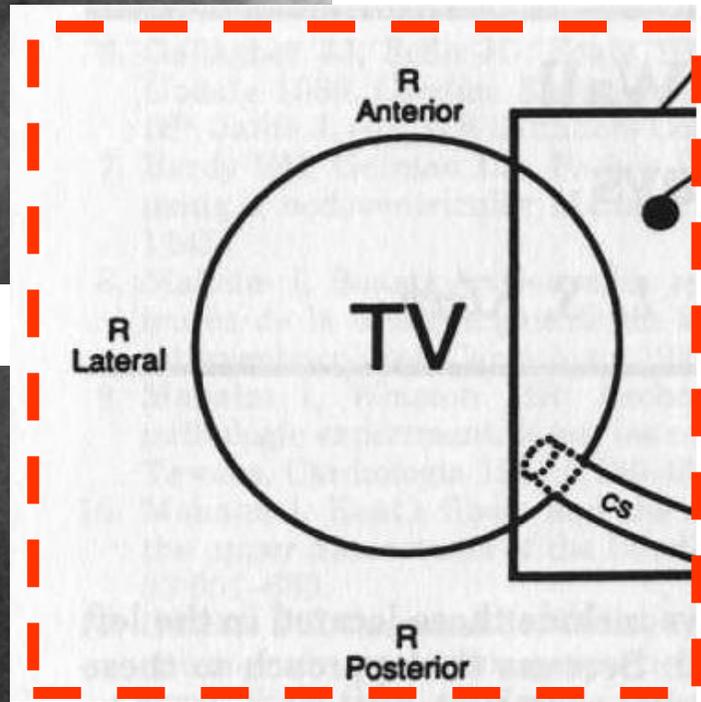
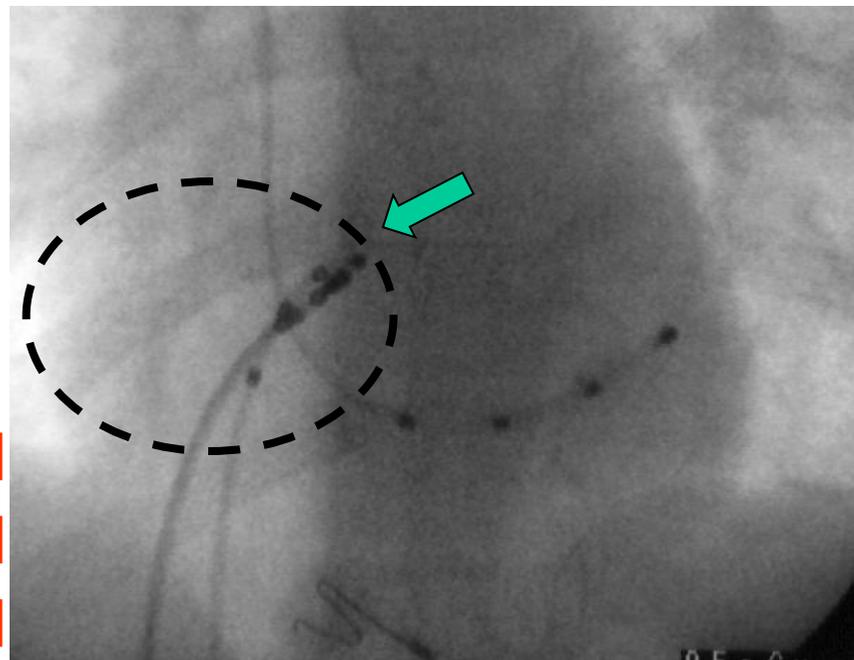
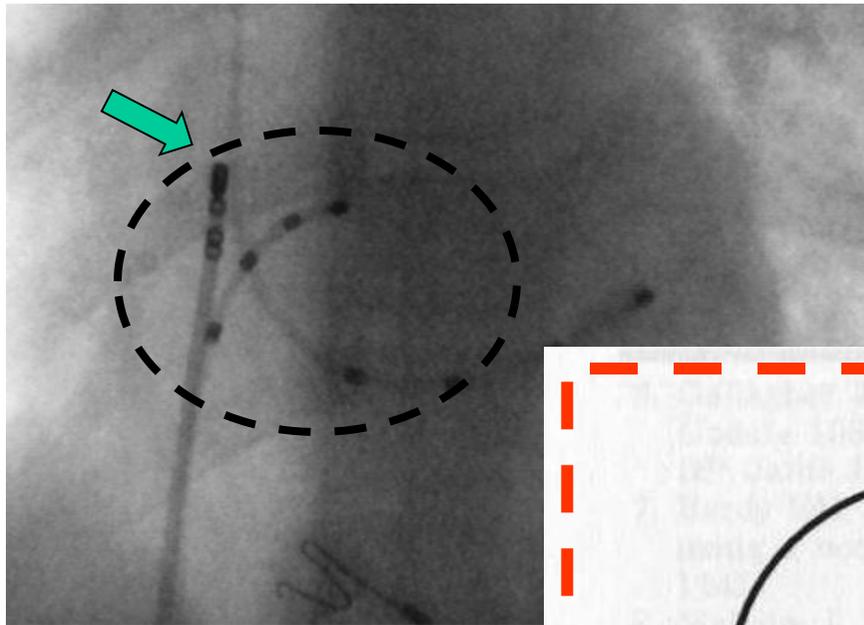
- Bon contact avec l'anneau : électrogrammes A et V bien voltés et stables
- Positionnement sur l'anneau :
 - début de l'électrogramme ventriculaire local le plus précoce possible par rapport à l'onde delta
 - Si utilisation de l'électrogramme ventriculaire unipolaire : aspect « P-QS » (absence de positivité du ventriculogramme)

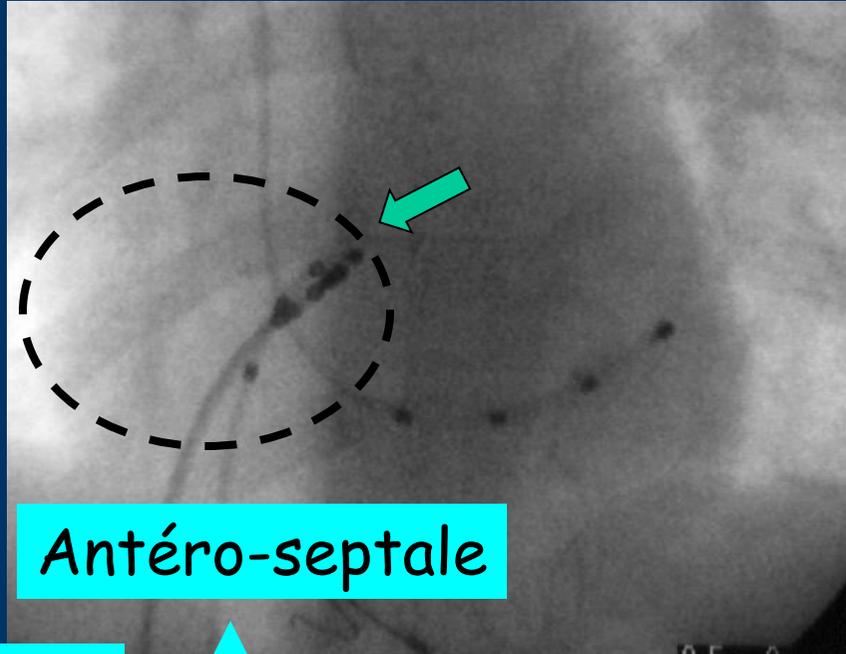
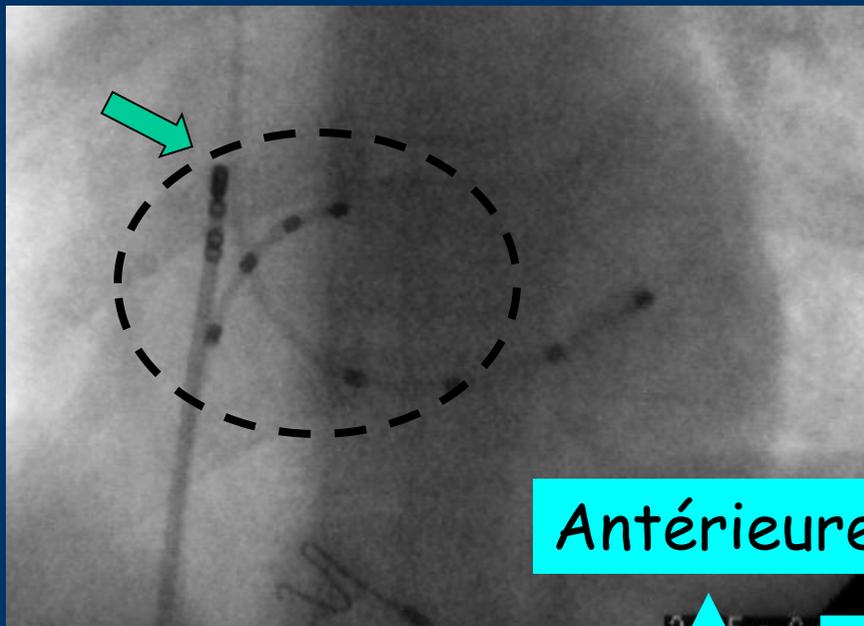
Incidence OAG



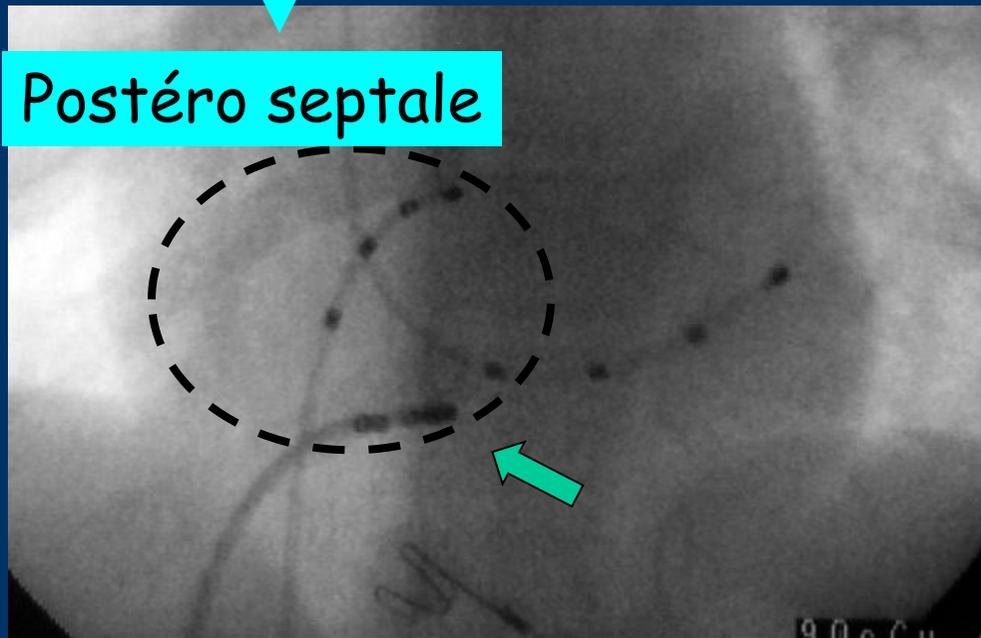
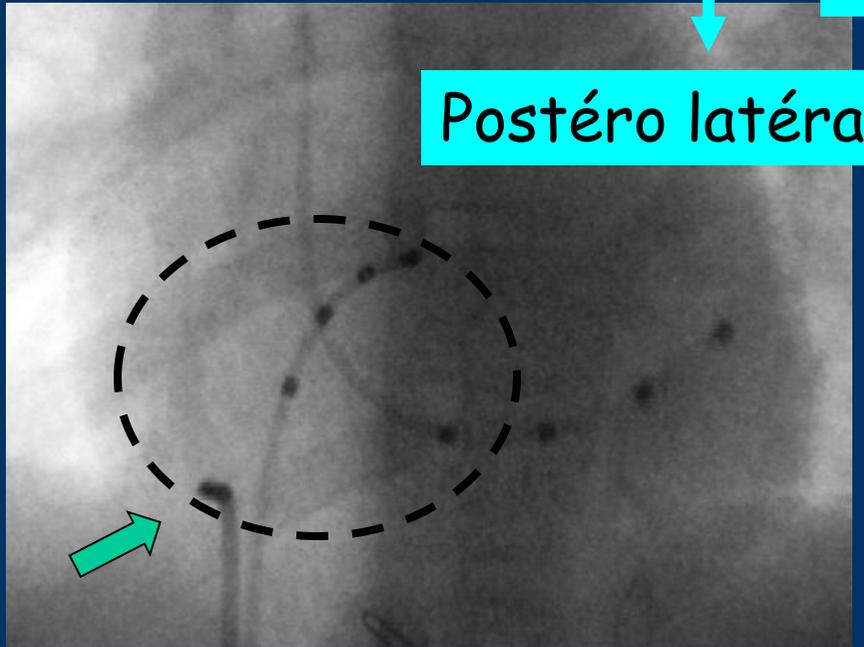
Ablation voies accessoires droites

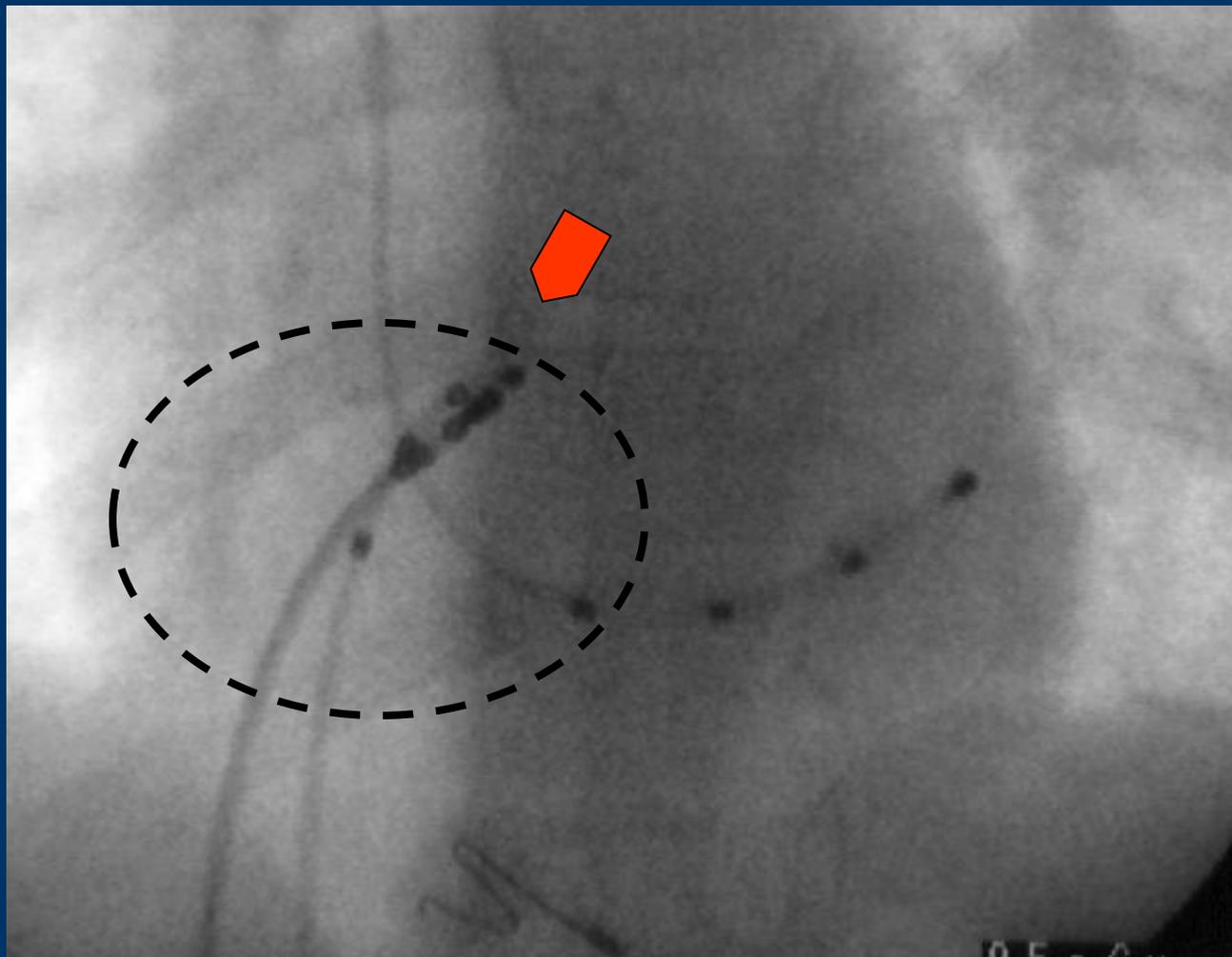
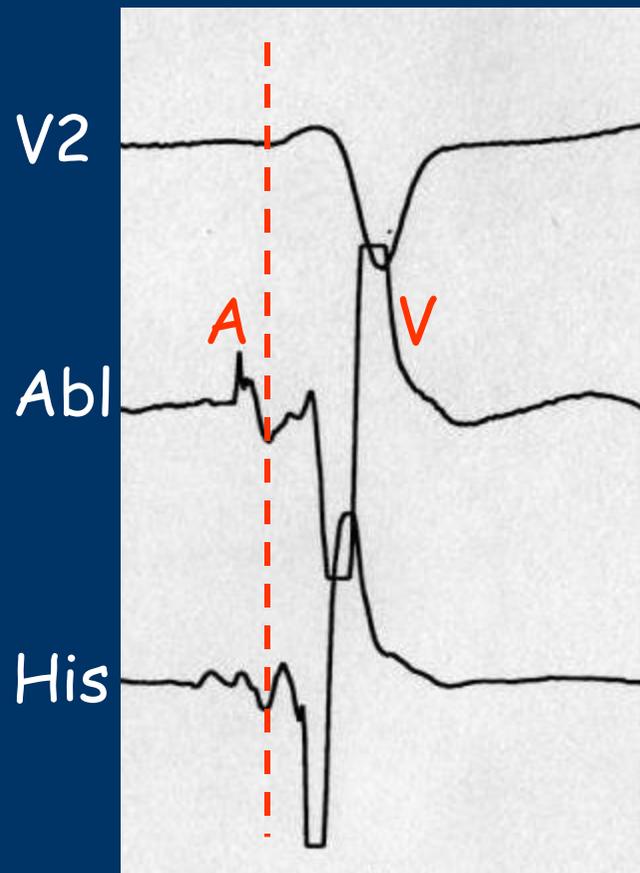


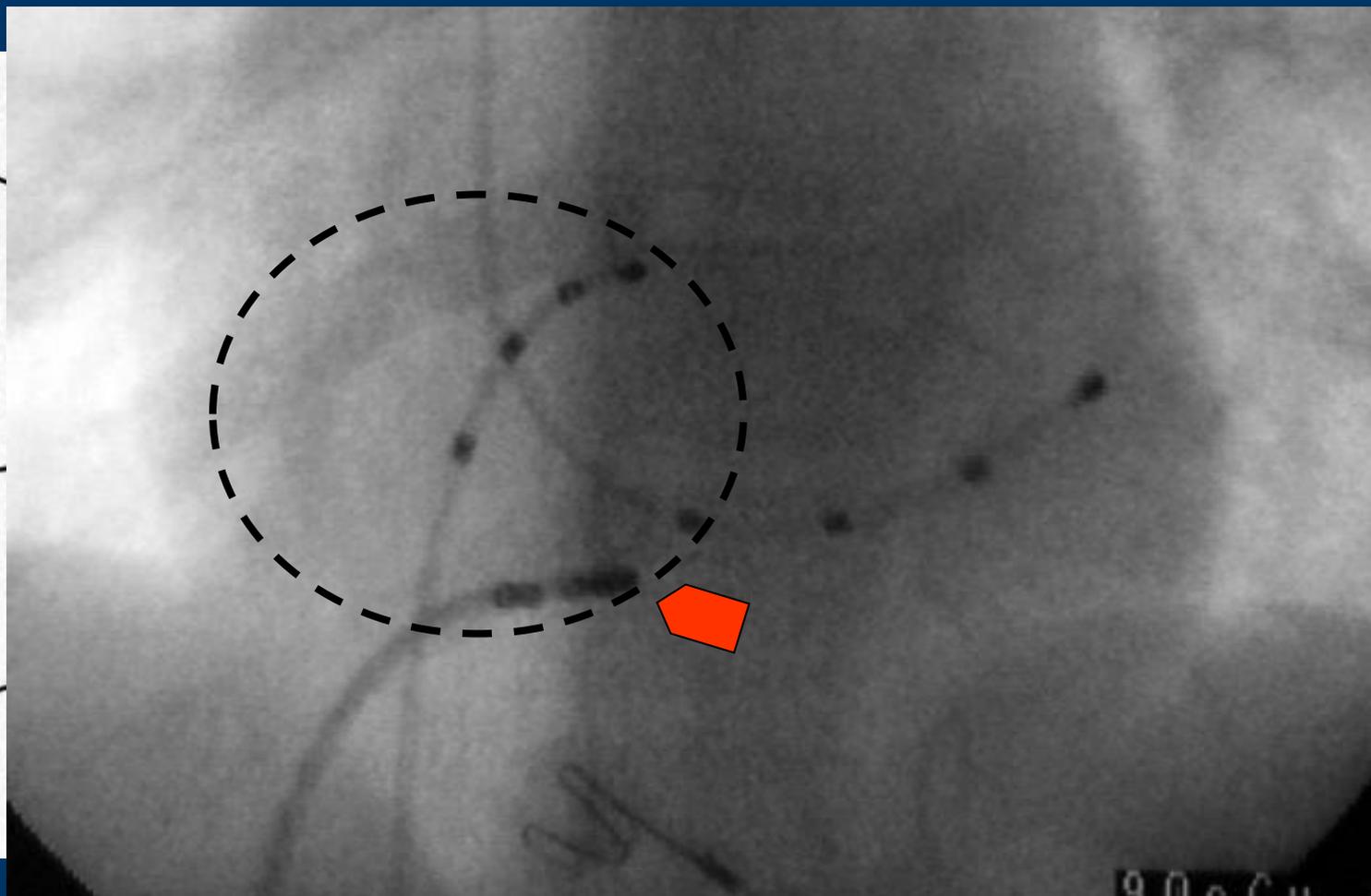
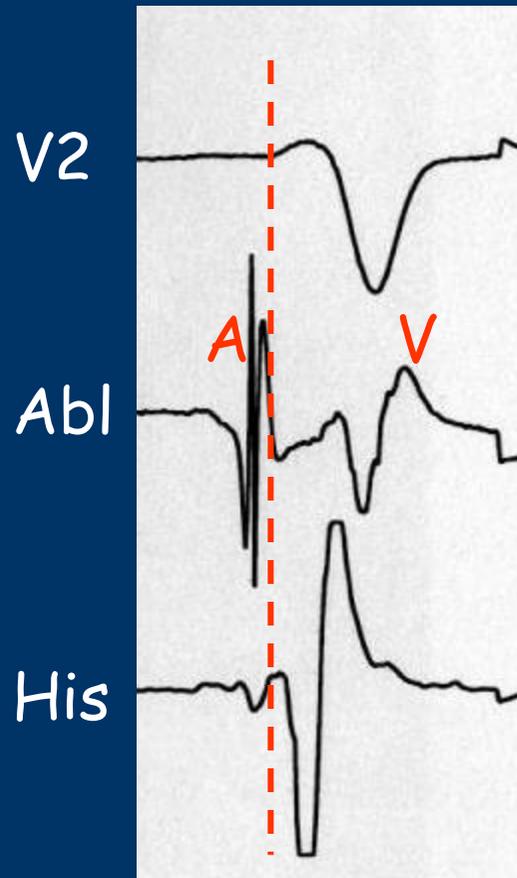


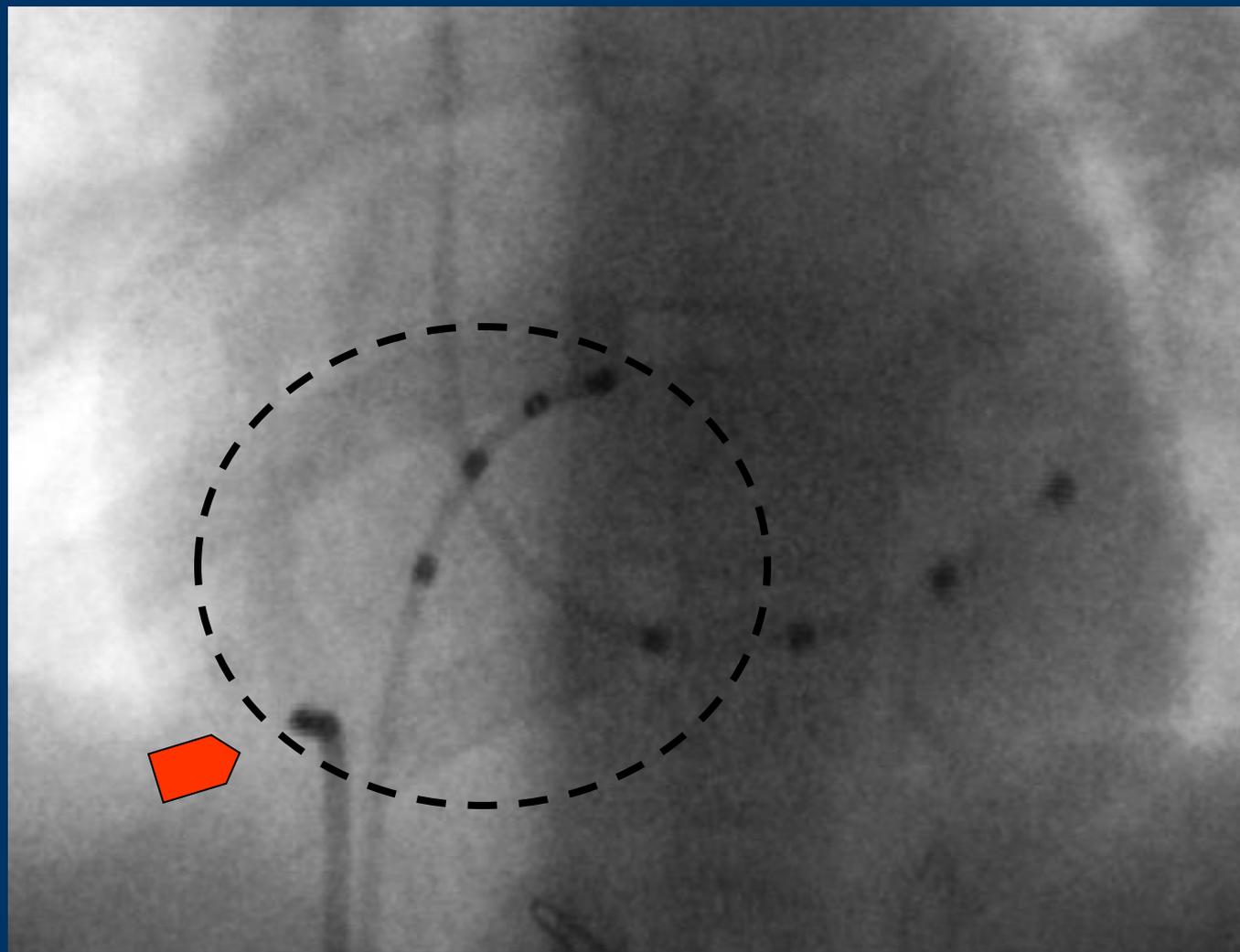
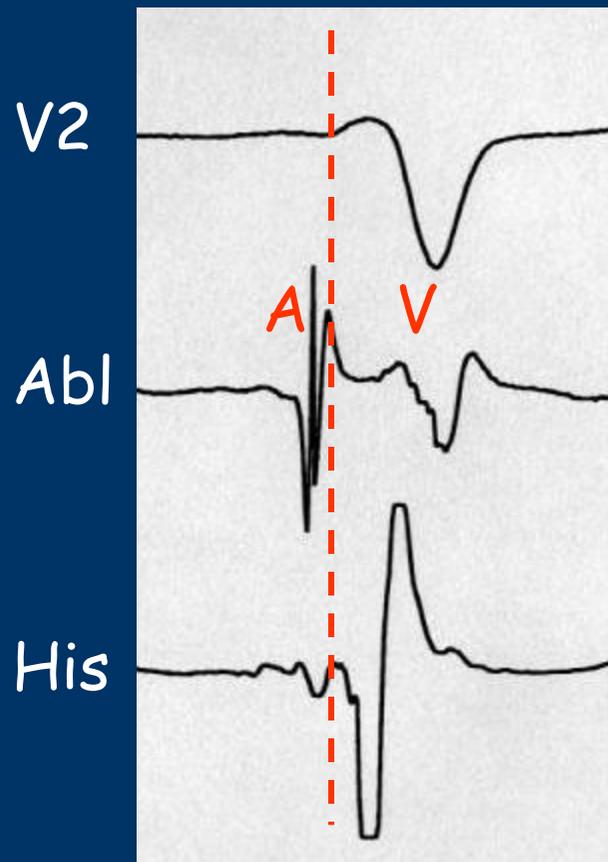


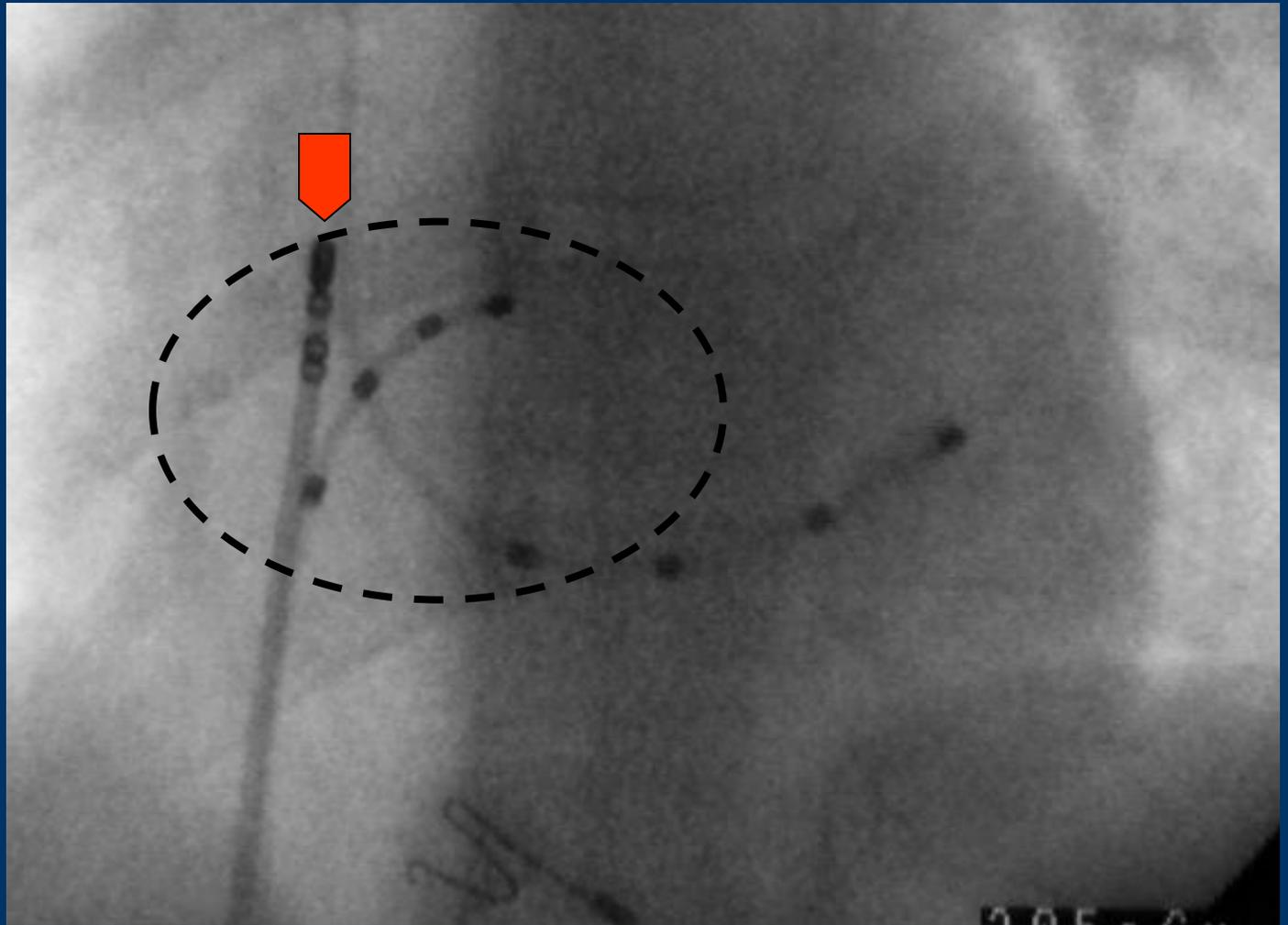
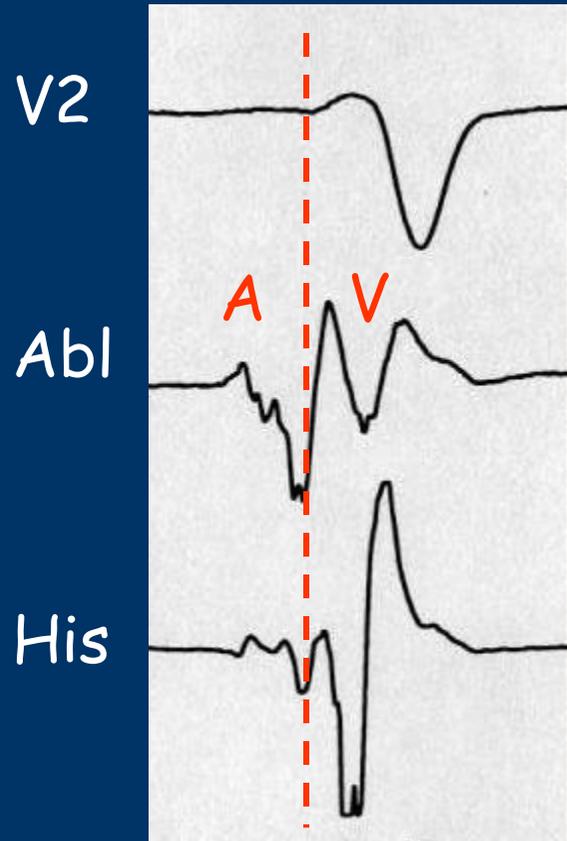
Tricuspide











Ant

AS

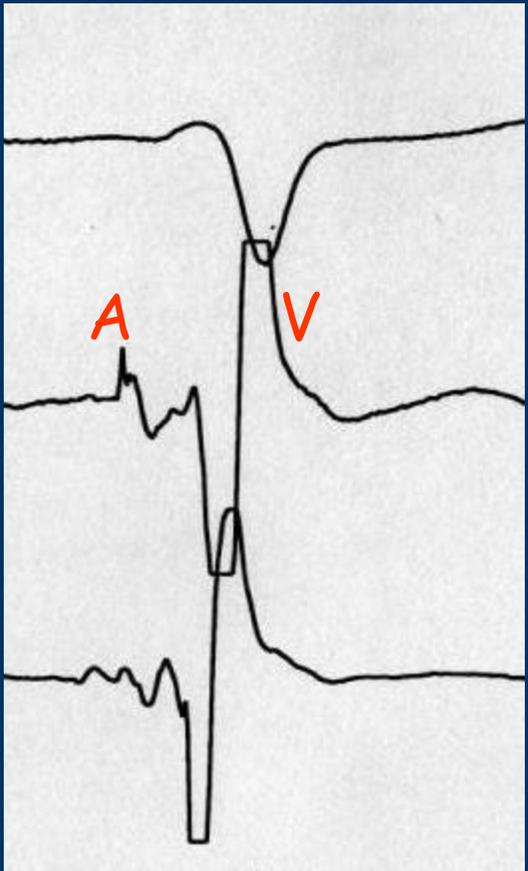
PS

PL

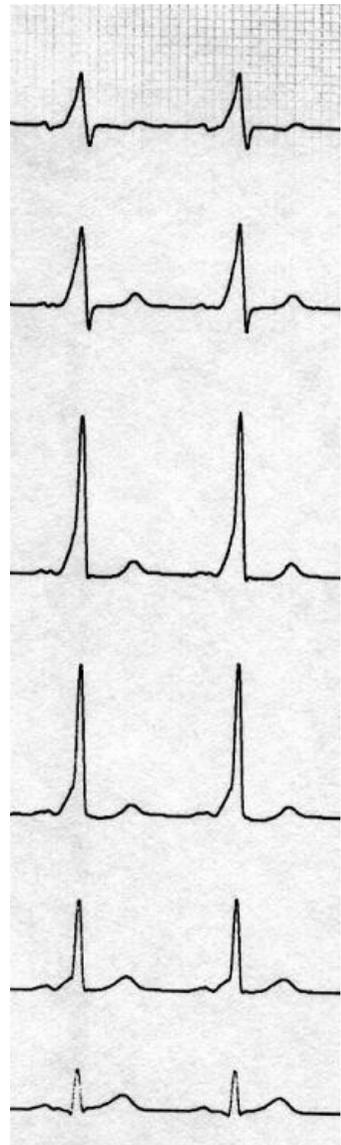
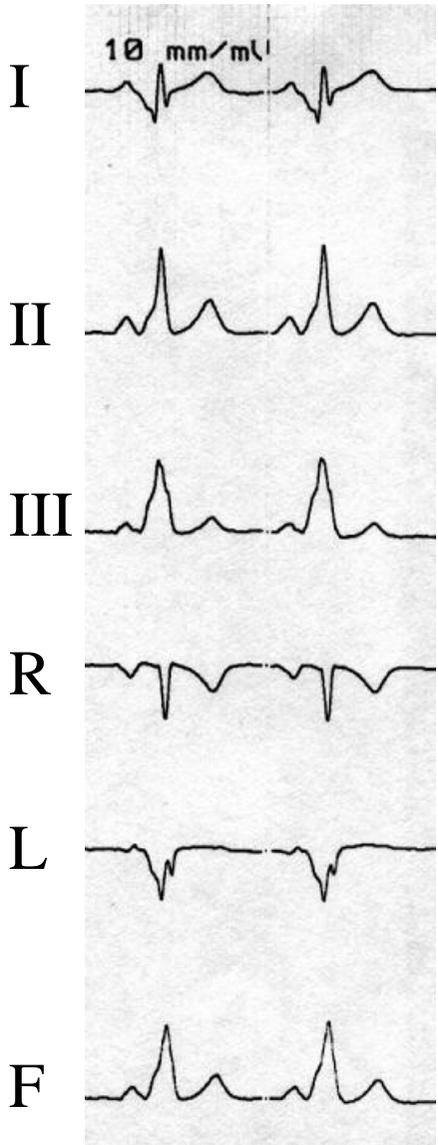
V2

Abl

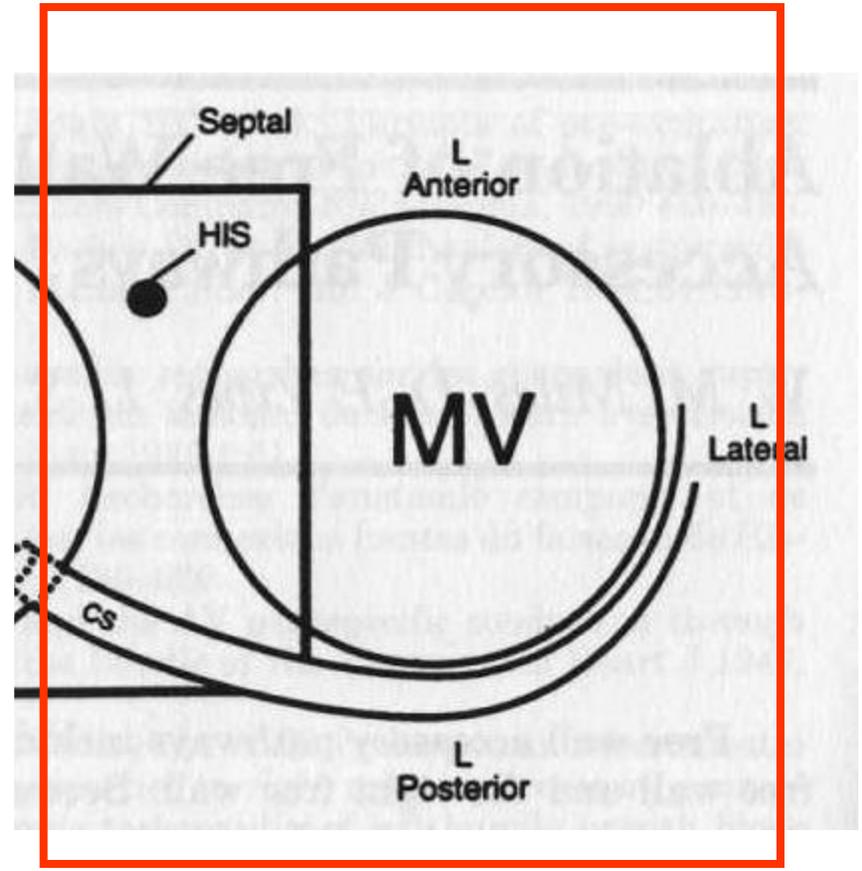
His



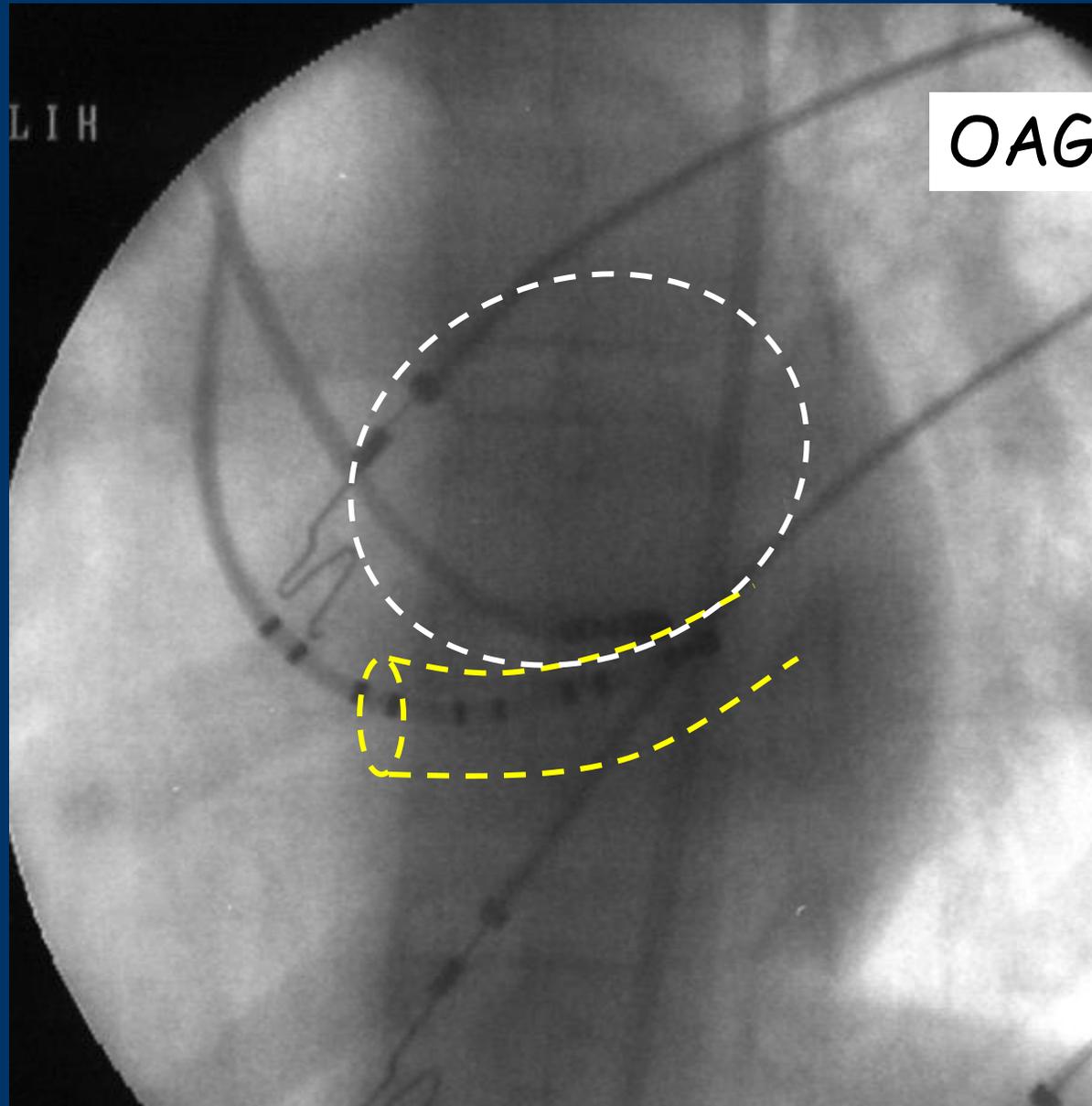
Ablation voies accessoires gauches



V1
V2
V3
V4
V5
V6

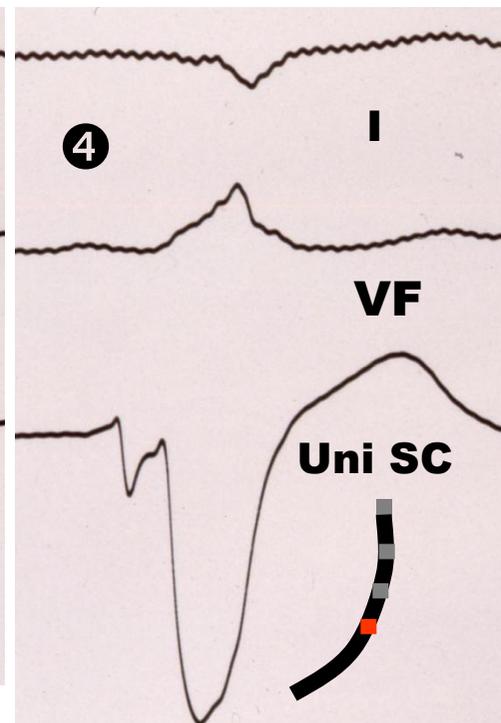
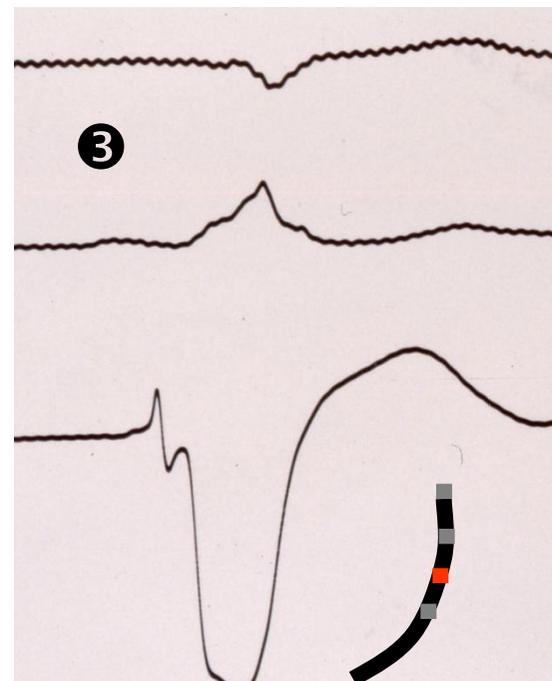
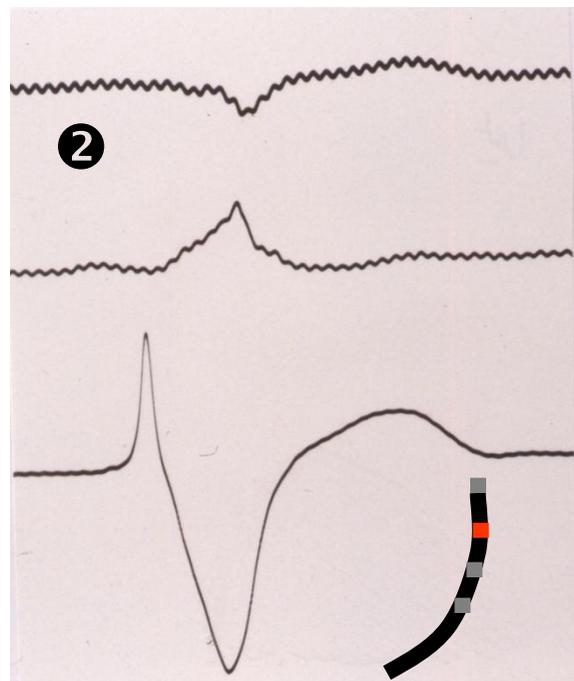
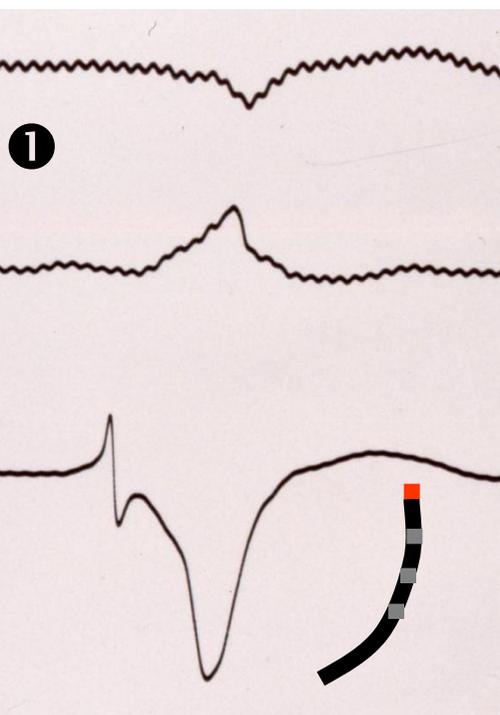
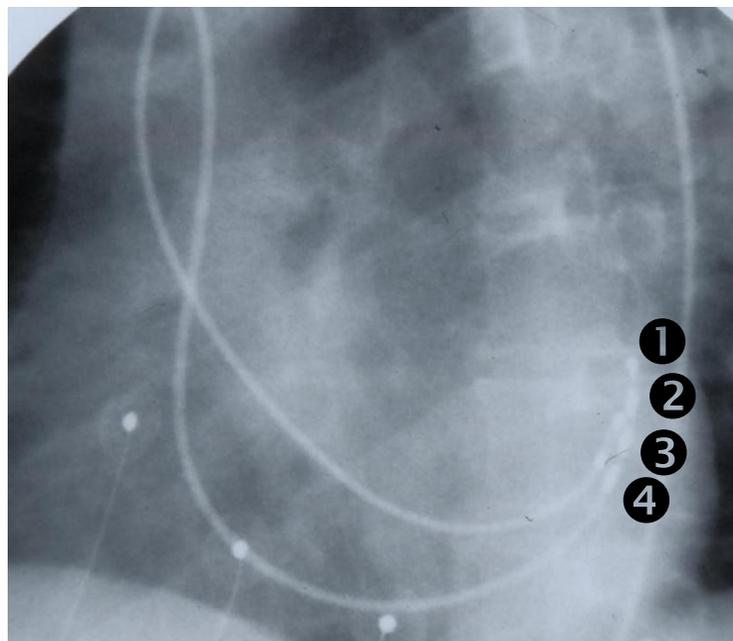


Ablation VA postérieure gauche

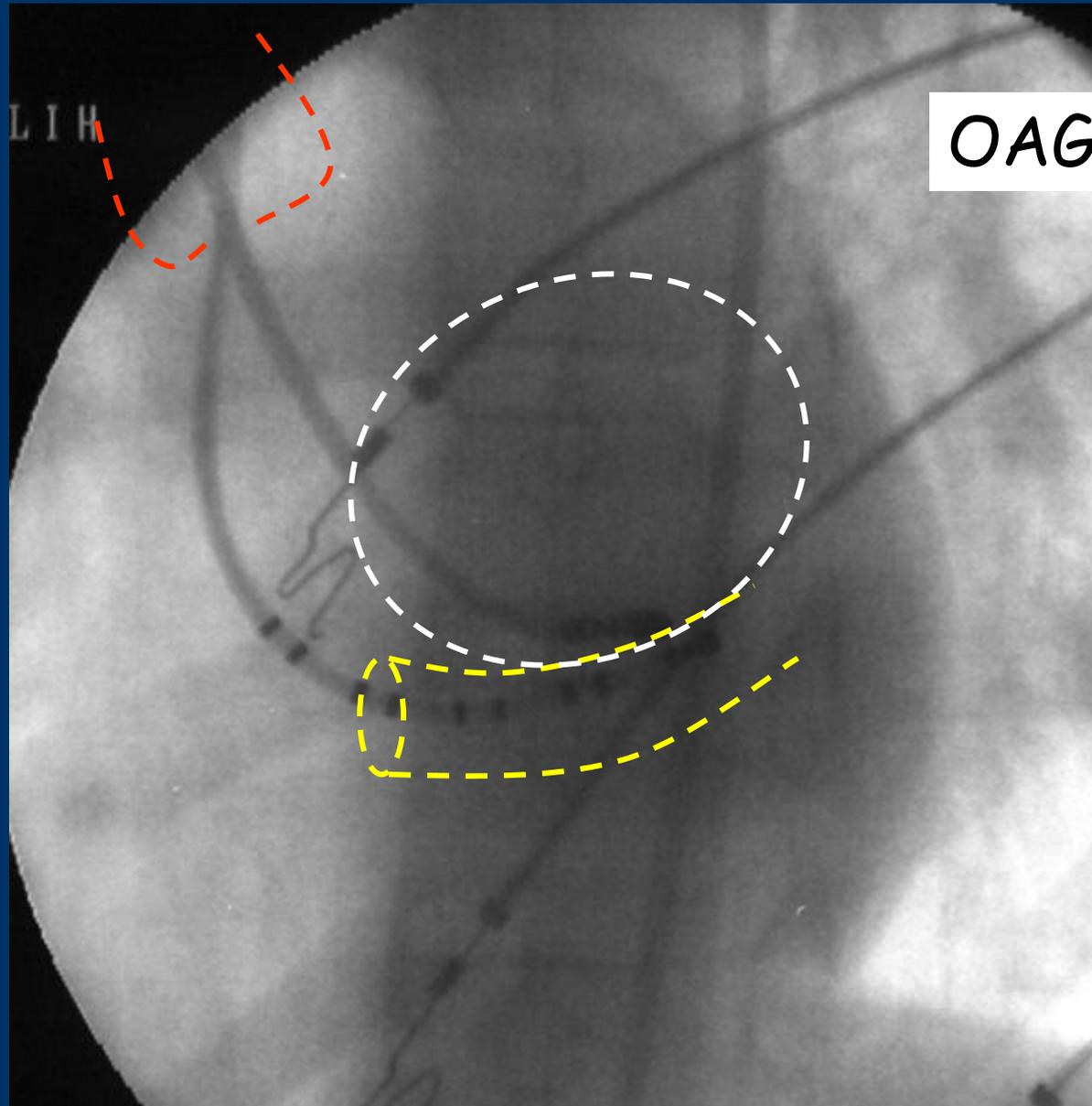


Cartographie VA Lat gauche

Utilisation de l'unipolaire

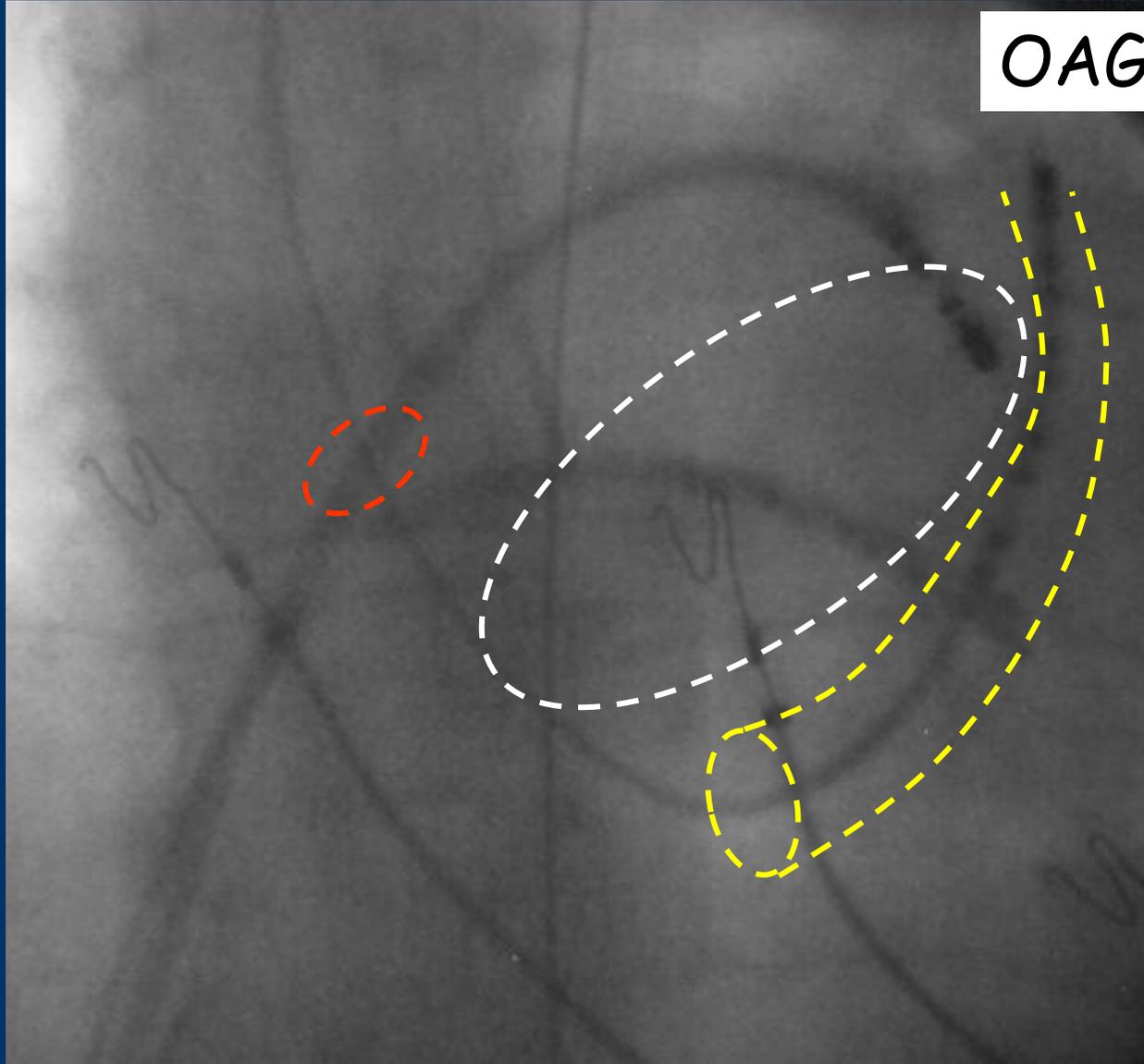


Ablation VA postérieure gauche

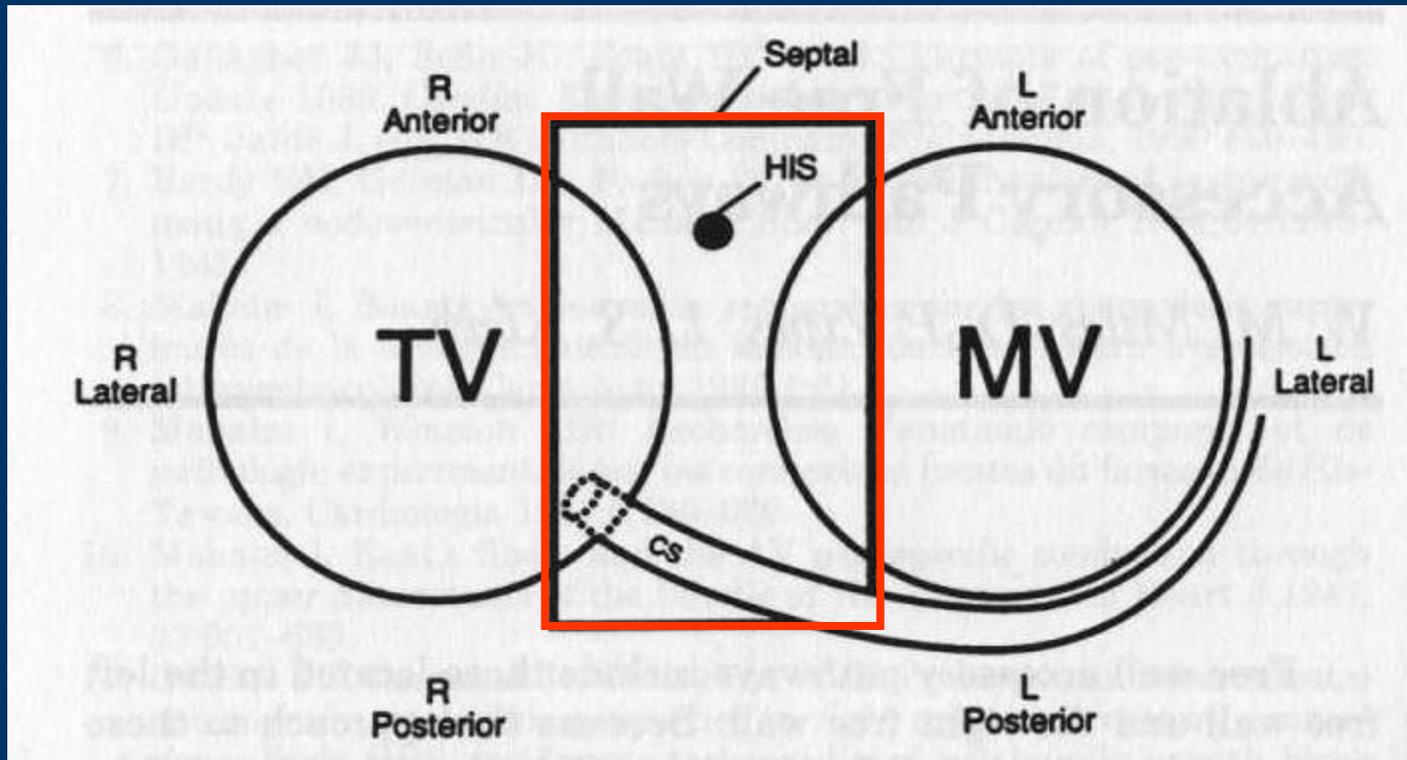


Ablation VA latérale gauche

OAG 20°

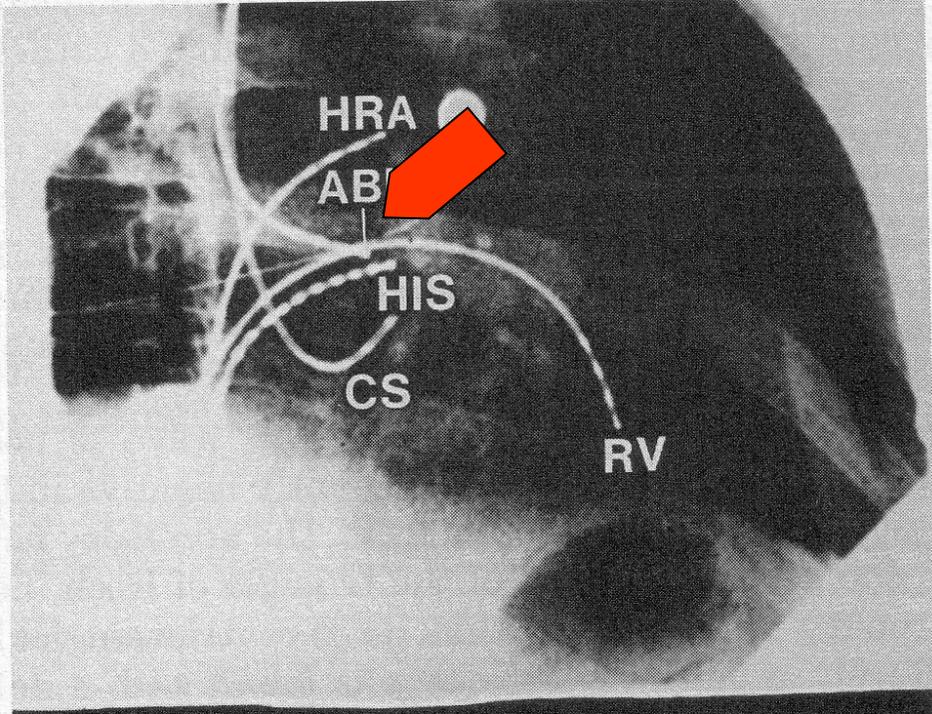
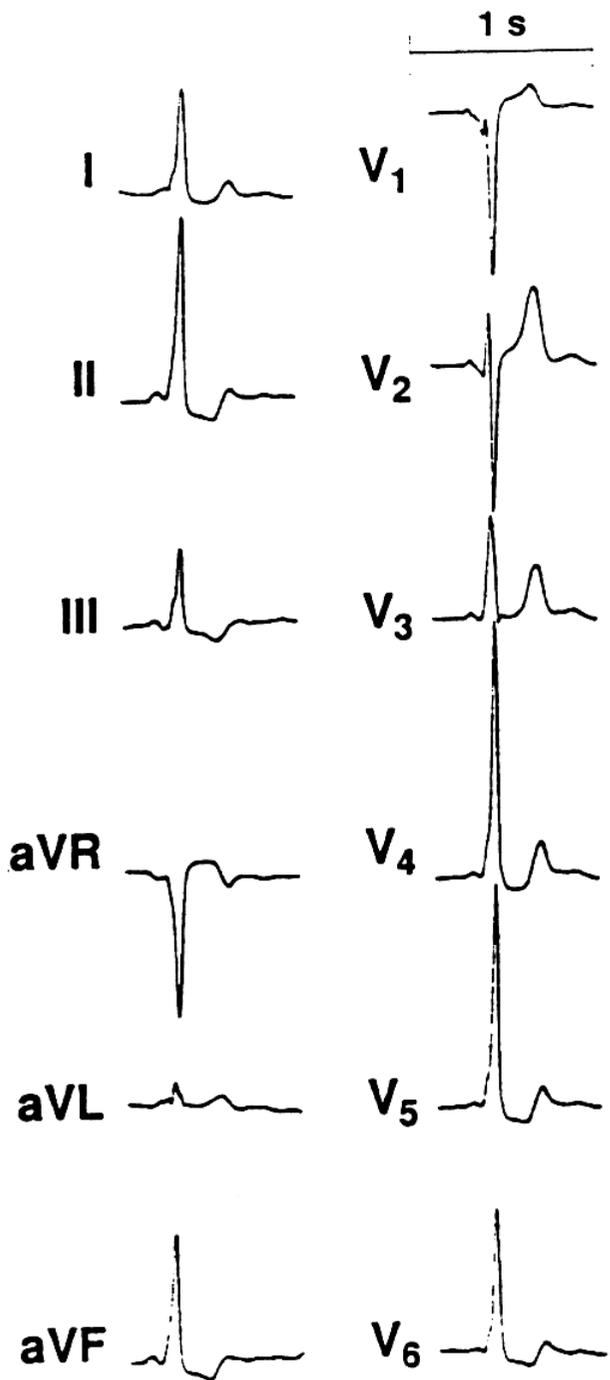


Ablation voies accessoires septales

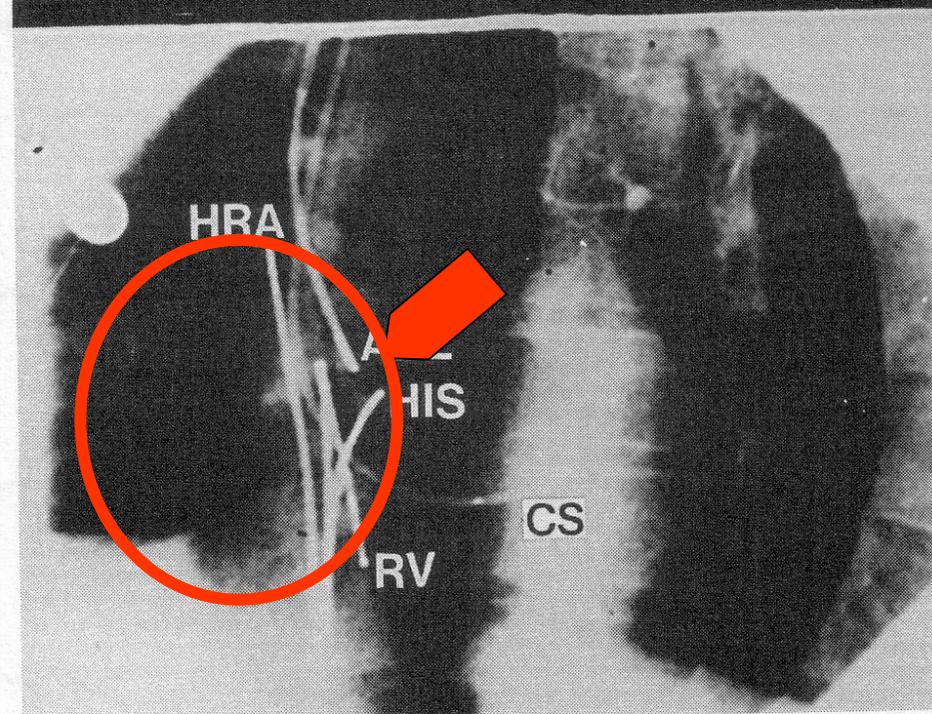


Voies accessoires antero-septales

- Enregistrement simultané His et Potentiel VA
- ECG : Delta + D1D2D3 VL VF
- Abord par voie haute



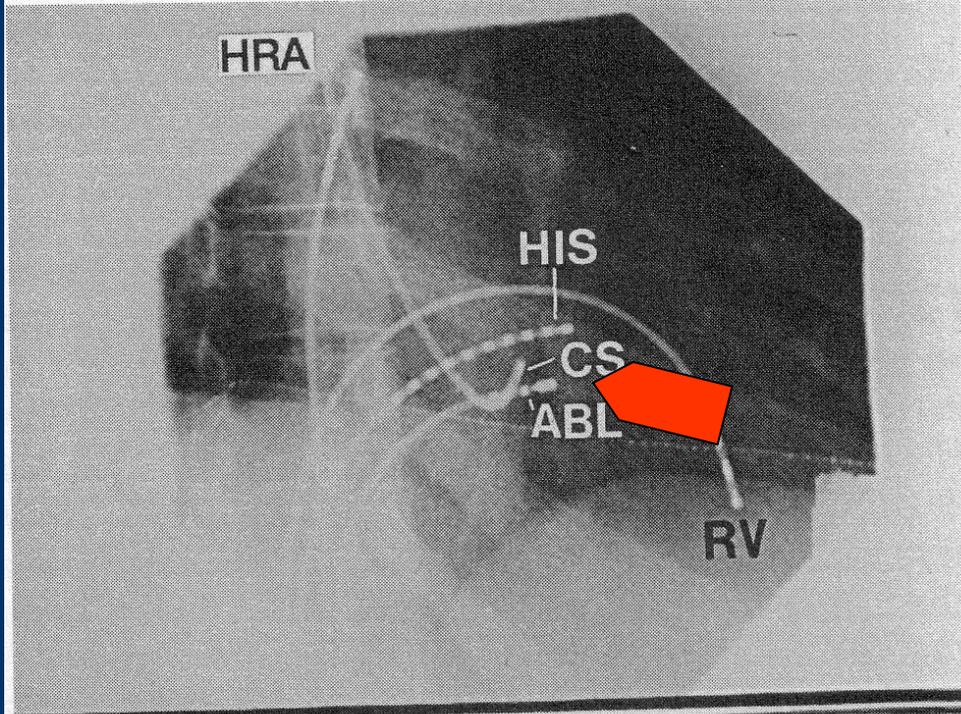
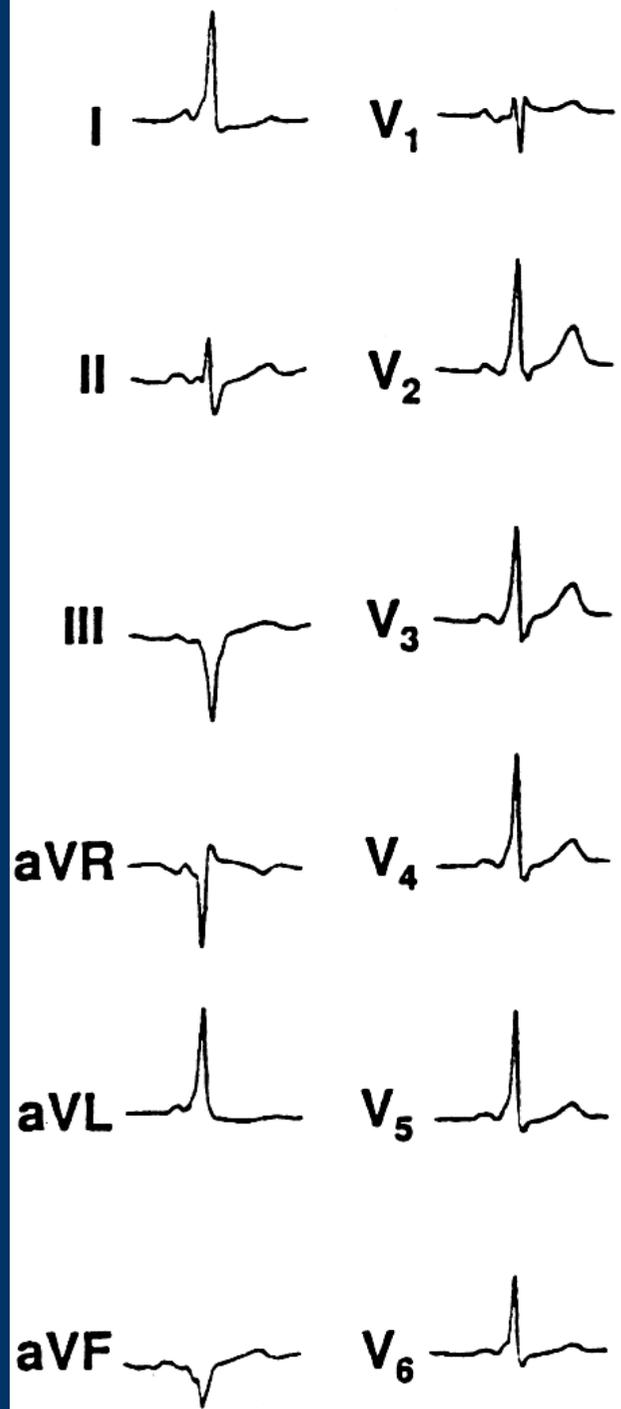
OAD



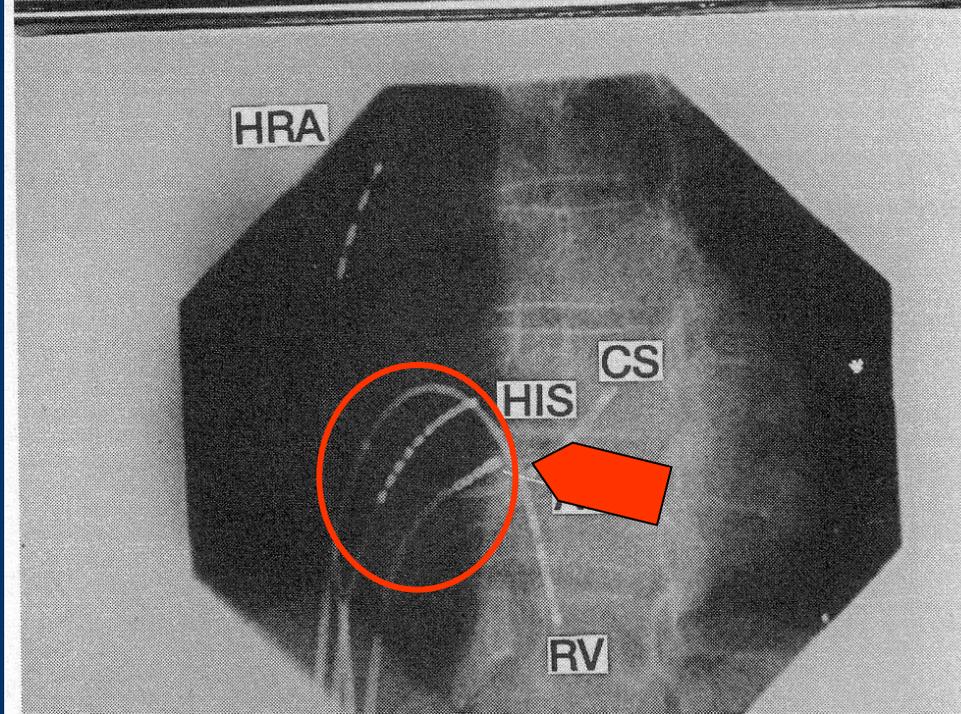
OAG

Voies accessoires septales moyennes (« mid-septal »)

- Entre le cathéter hisien et l'ostium du SC
- ECG : Delta + D1D2 VL et V2 à V6
Delta - D3 VF
Delta iso en V1
- Cathéter le plus ventriculaire possible



OAD

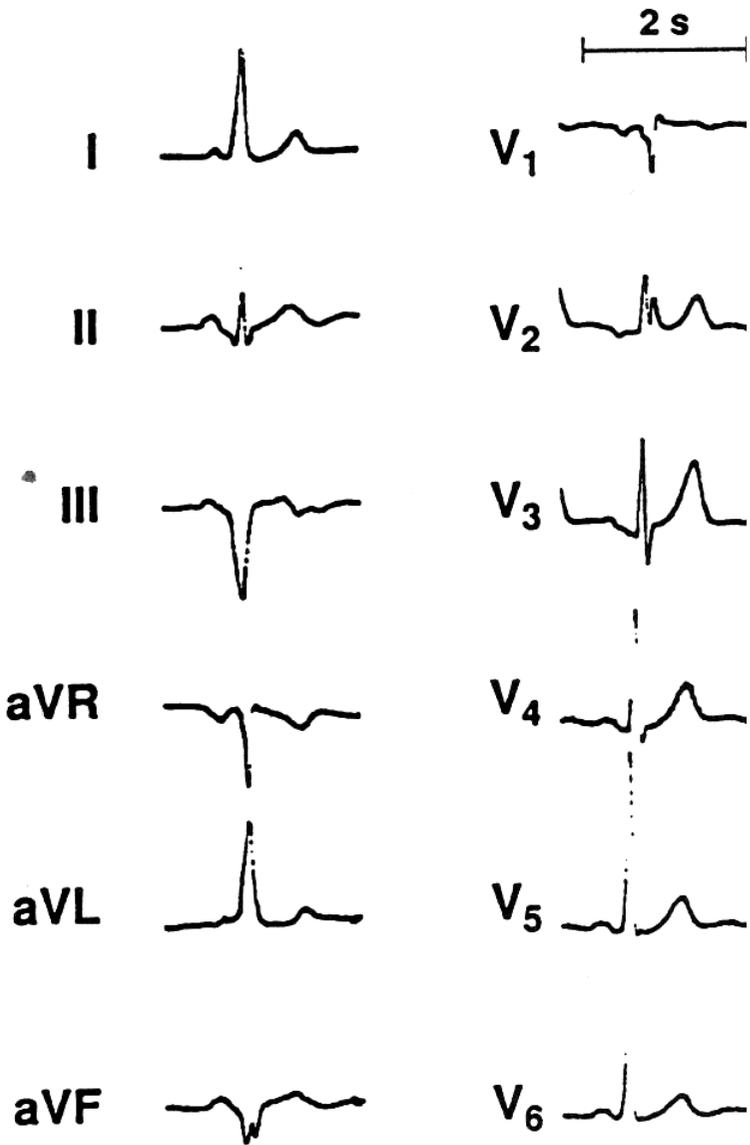


OAG

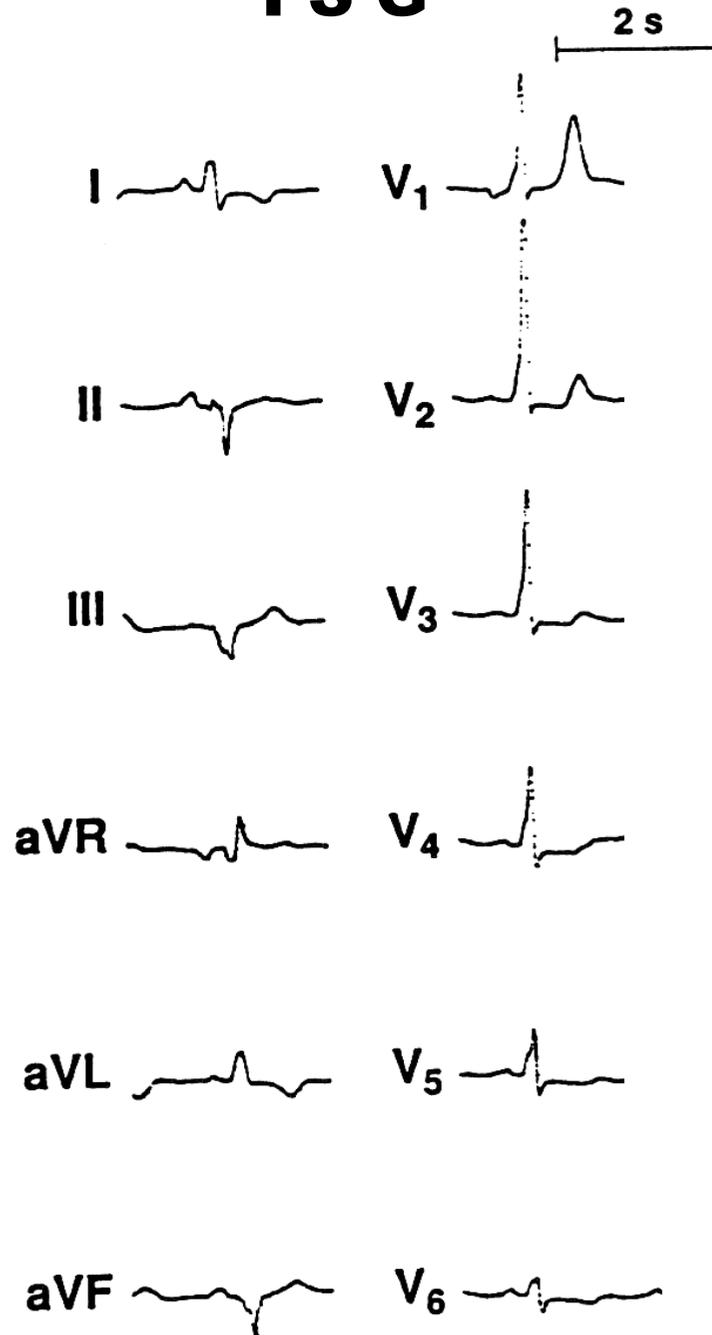
Voies accessoires postéro-septales

- Près de l'ostium du SC sur la tricuspide (dt) ou dans les 1er cm du SC (G)
- ECG : Delta - D2D3 VF et V1 (Dt)
Delta - D2D3 VF et + V1 (G)
Delta - profonde en D2D3 VF et + V1 (dans la veine cardiaque moy.)
- Penser aux abords dans le SC

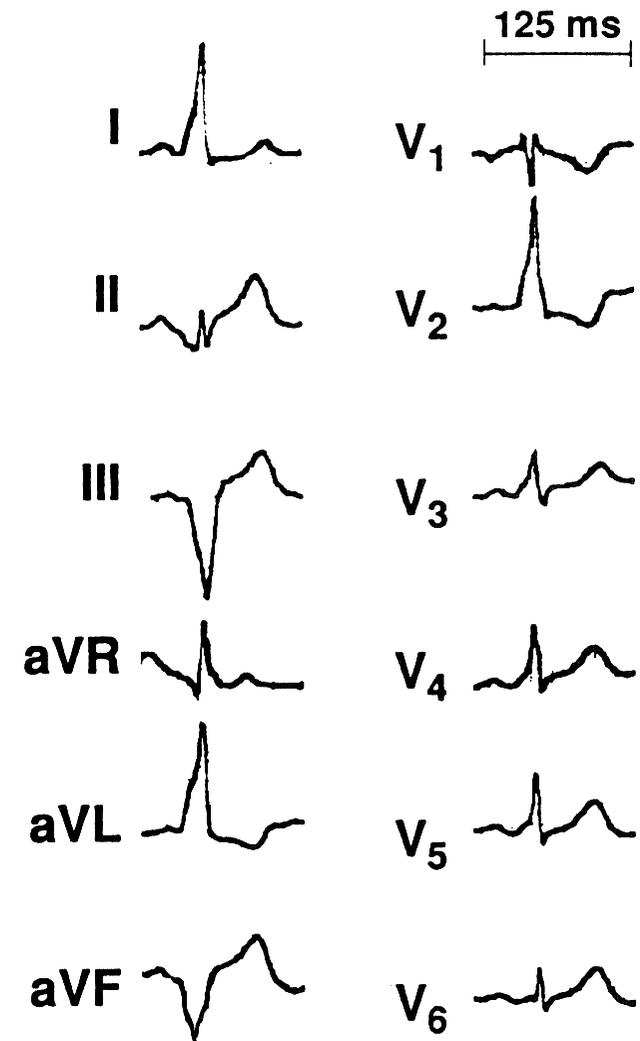
PS Dt



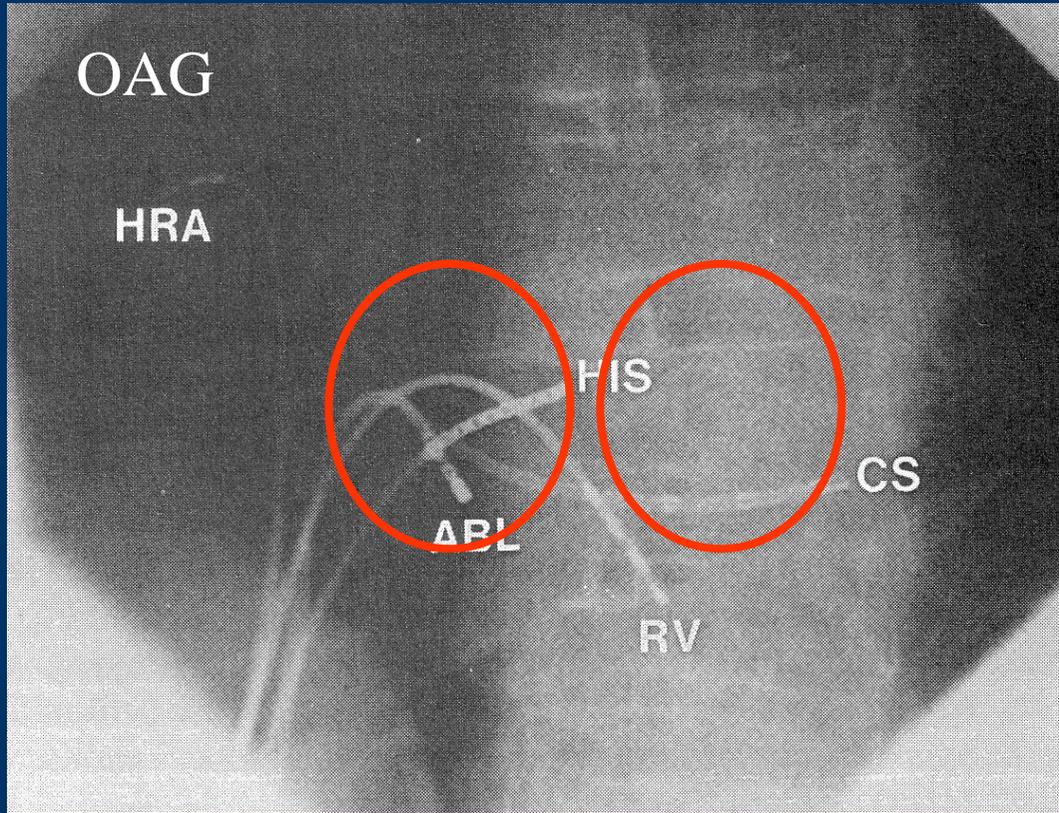
PS G



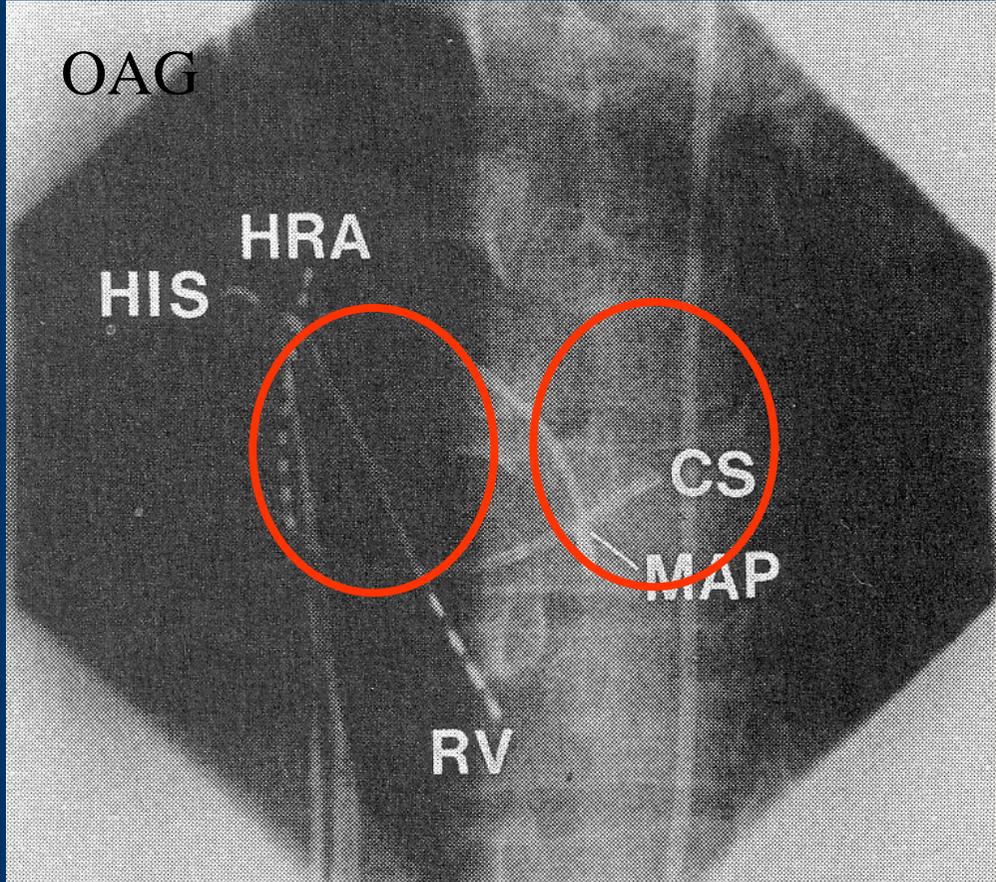
PS « SC »



PS Dt

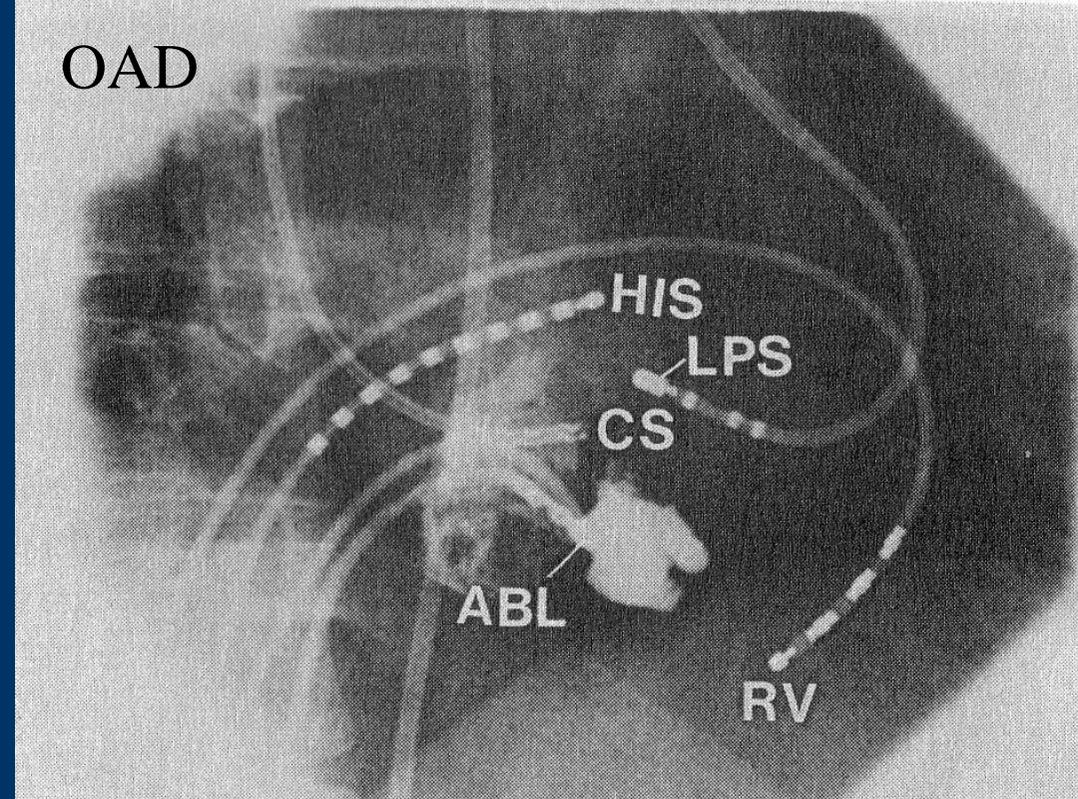
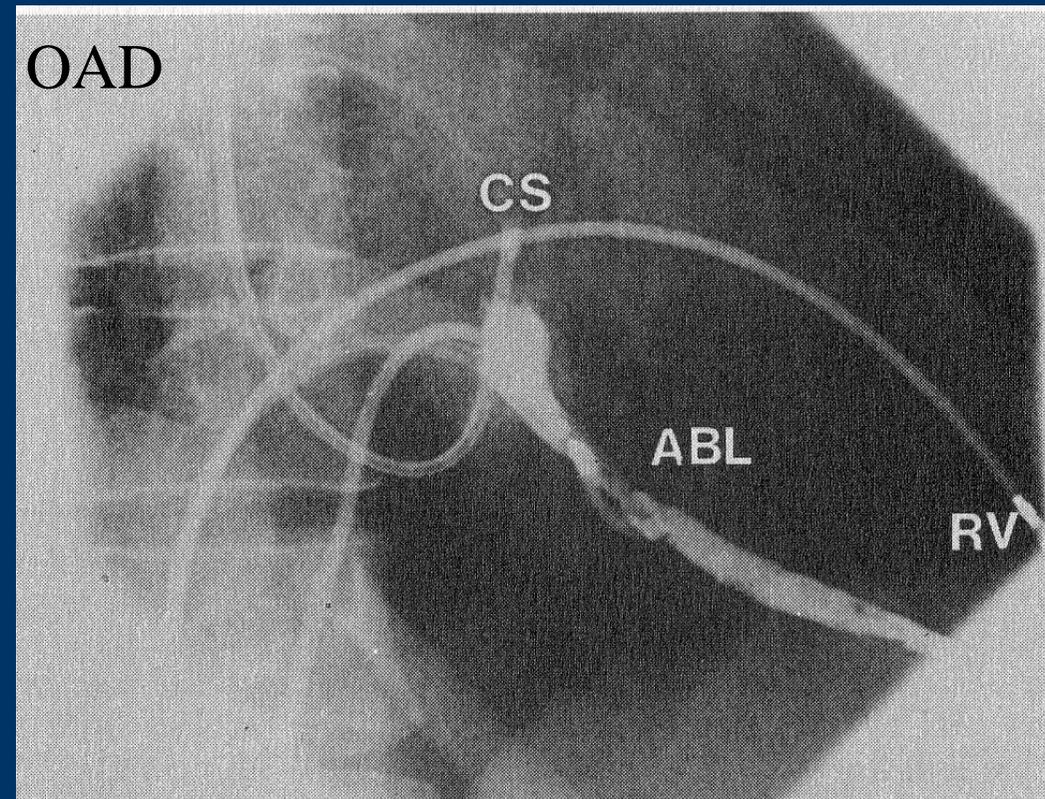


PS G

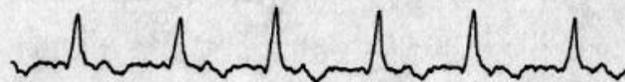
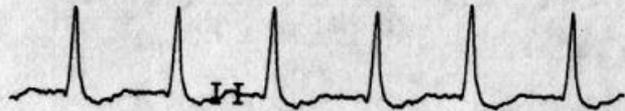
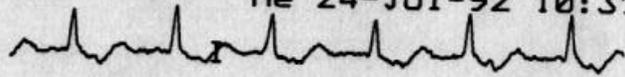


V C Moy

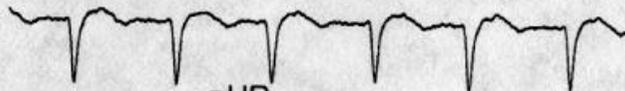
Diverticule du CS



Me 24-JUL-92 10:3:



III



aVR



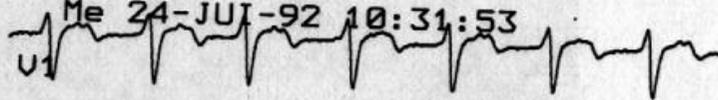
aVL



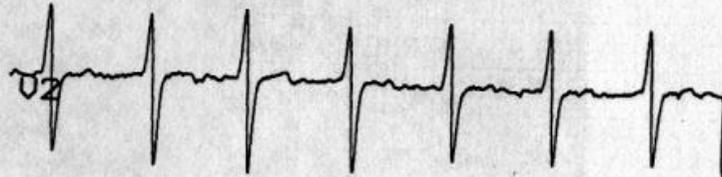
aVF

25 mm/s 10

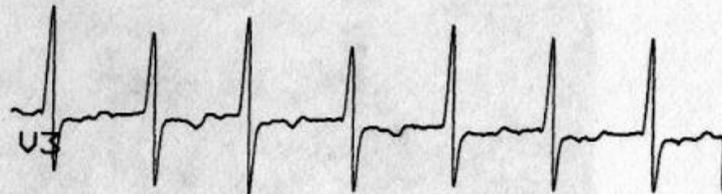
Me 24-JUL-92 10:31:53



V1



V2



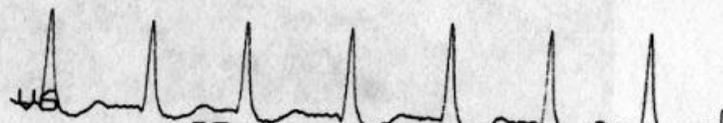
V3



V4

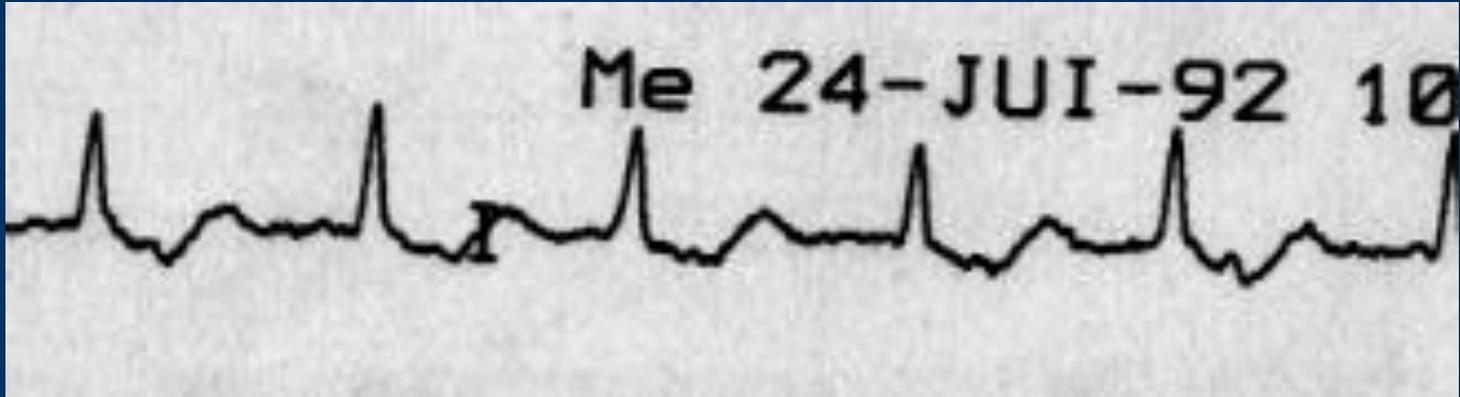


V5

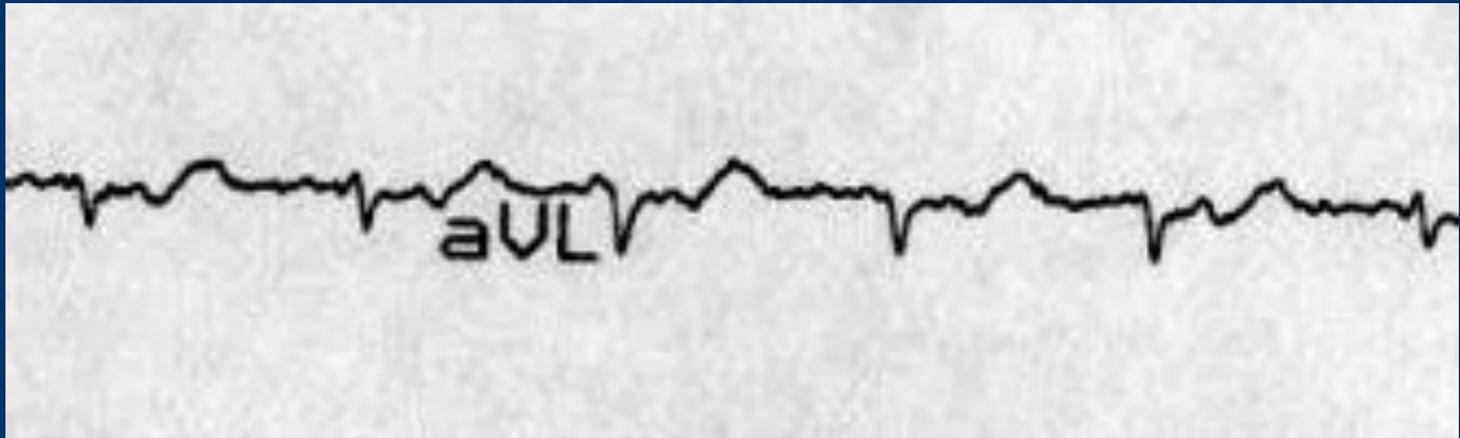


V6

25 mm/s 10 mm/mV 0.05-3s
149/min



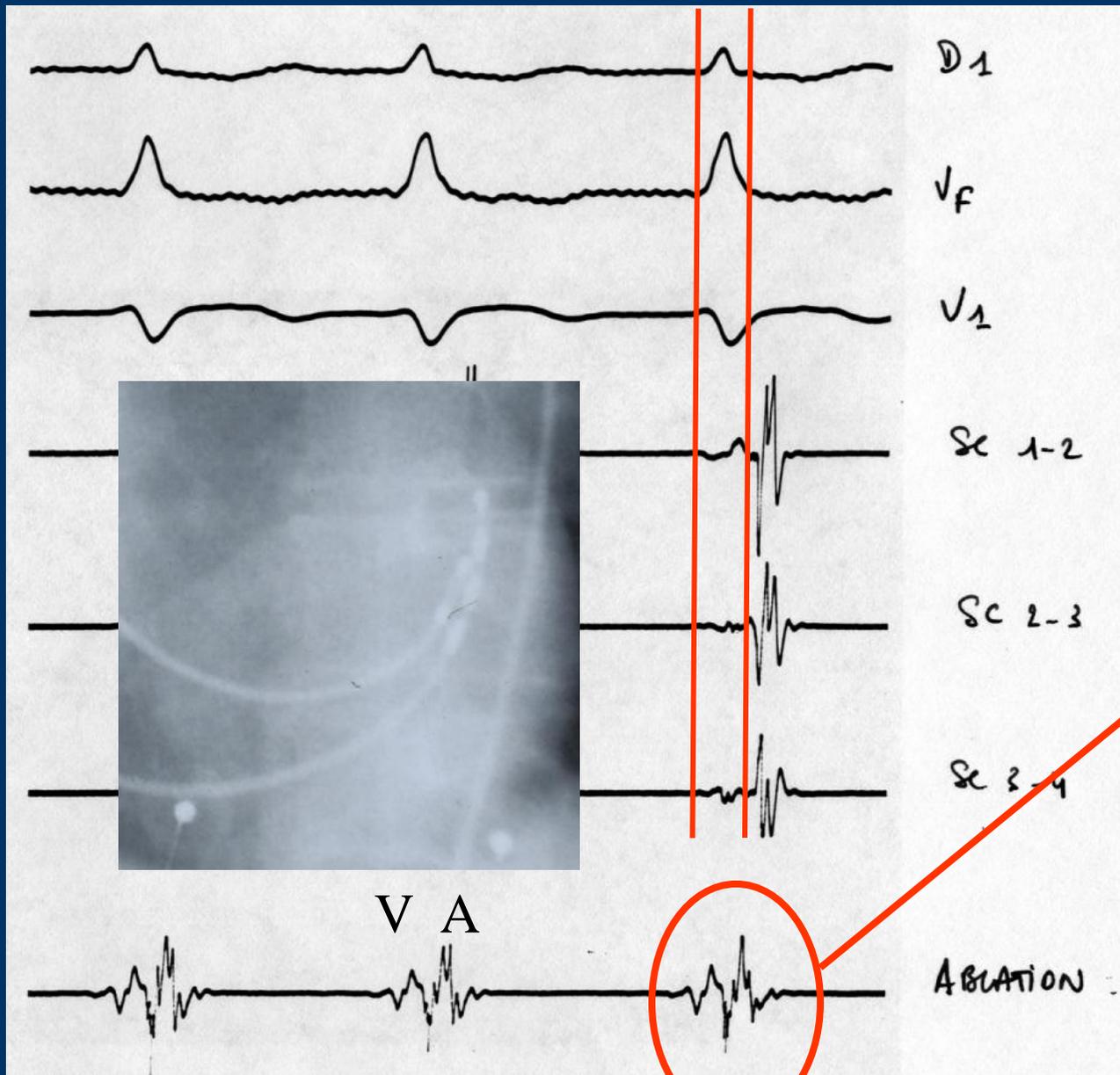
I



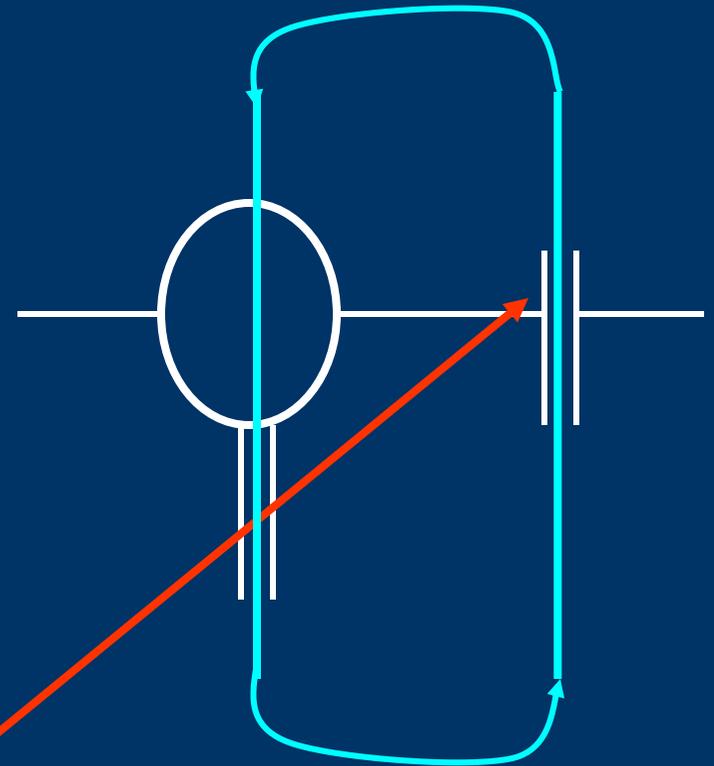
VL

Ablation des voies accessoires : Cartographie conduction rétrograde

- Bon contact avec l'anneau : électrogrammes A et V bien voltés et stables
- Positionnement sur l'anneau :
 - début de l'électrogramme atrial (rétrograde) le plus précoce possible par rapport à une référence non locale (pied du QRS par exemple)



Oreillette (A)

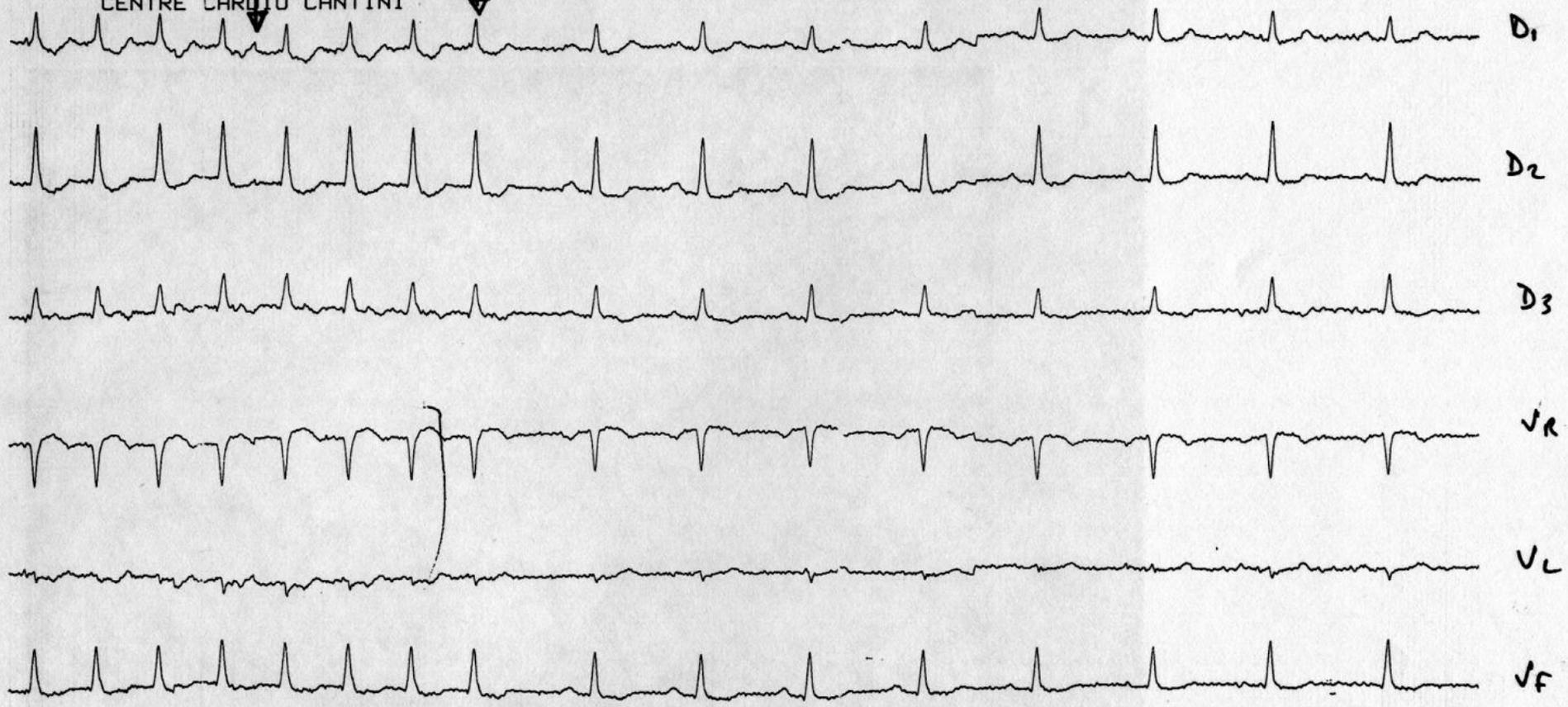


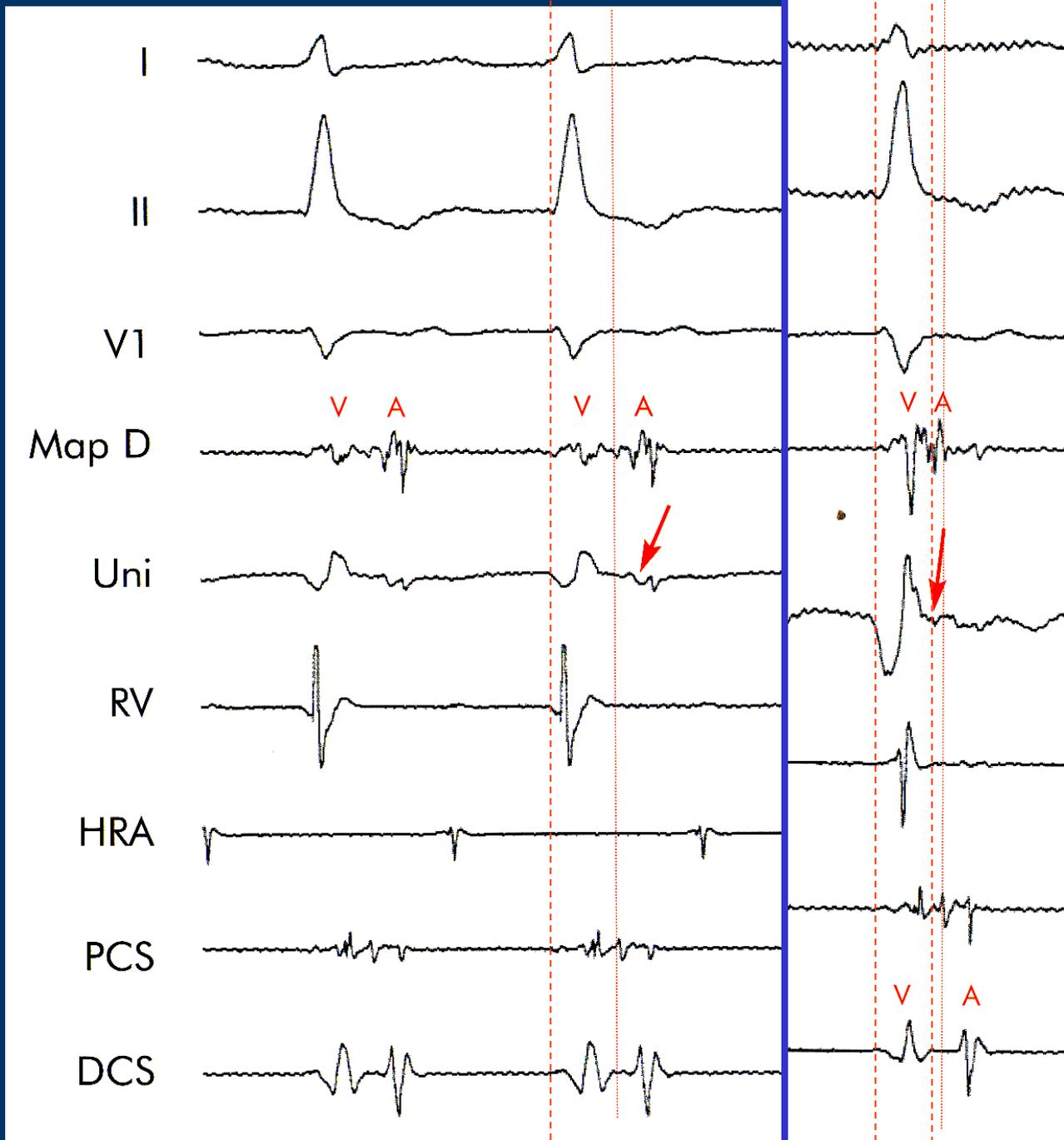
Ventricule (V)

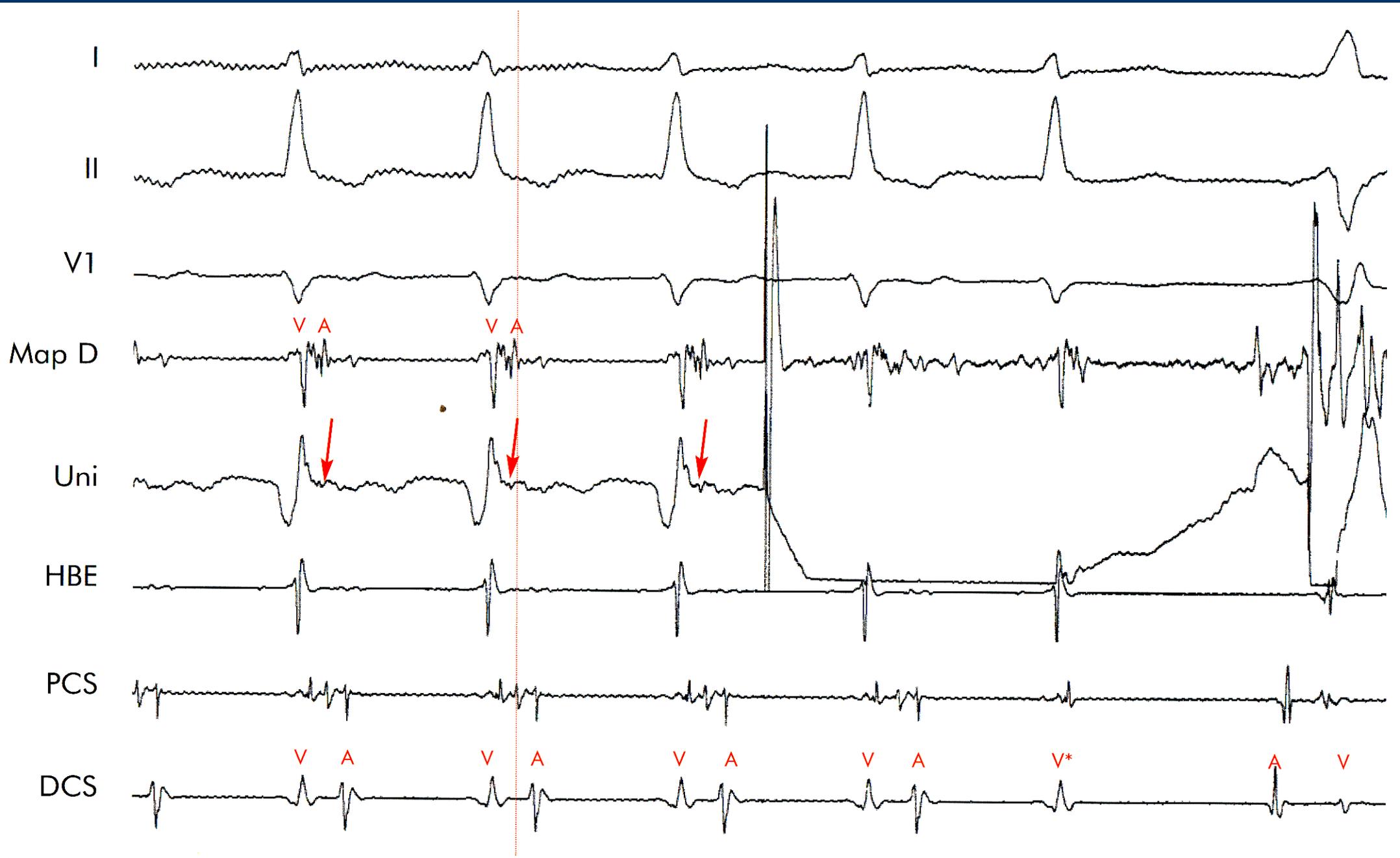
Radiofréquence 80 watts

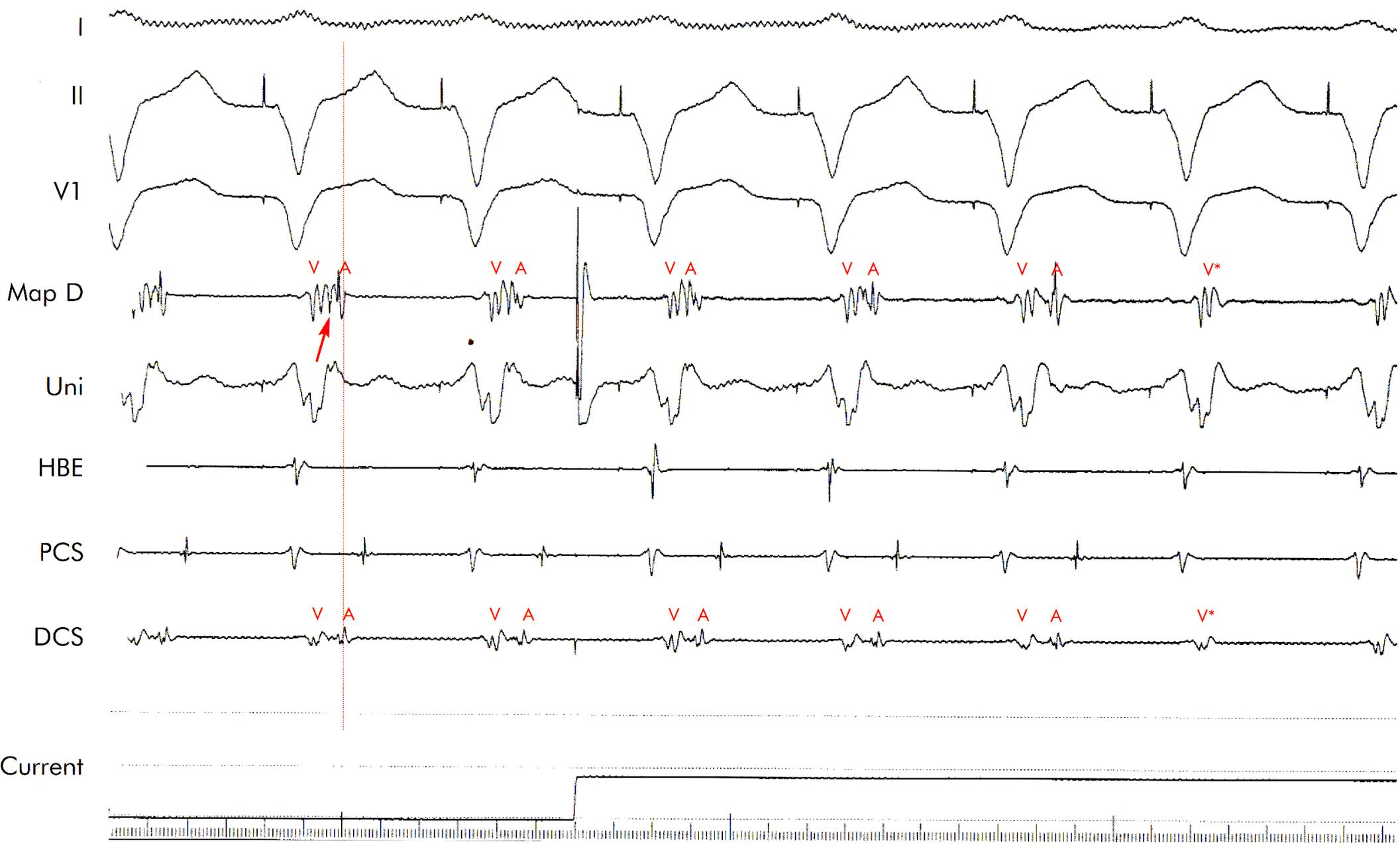
Debut
1,5 secnds.

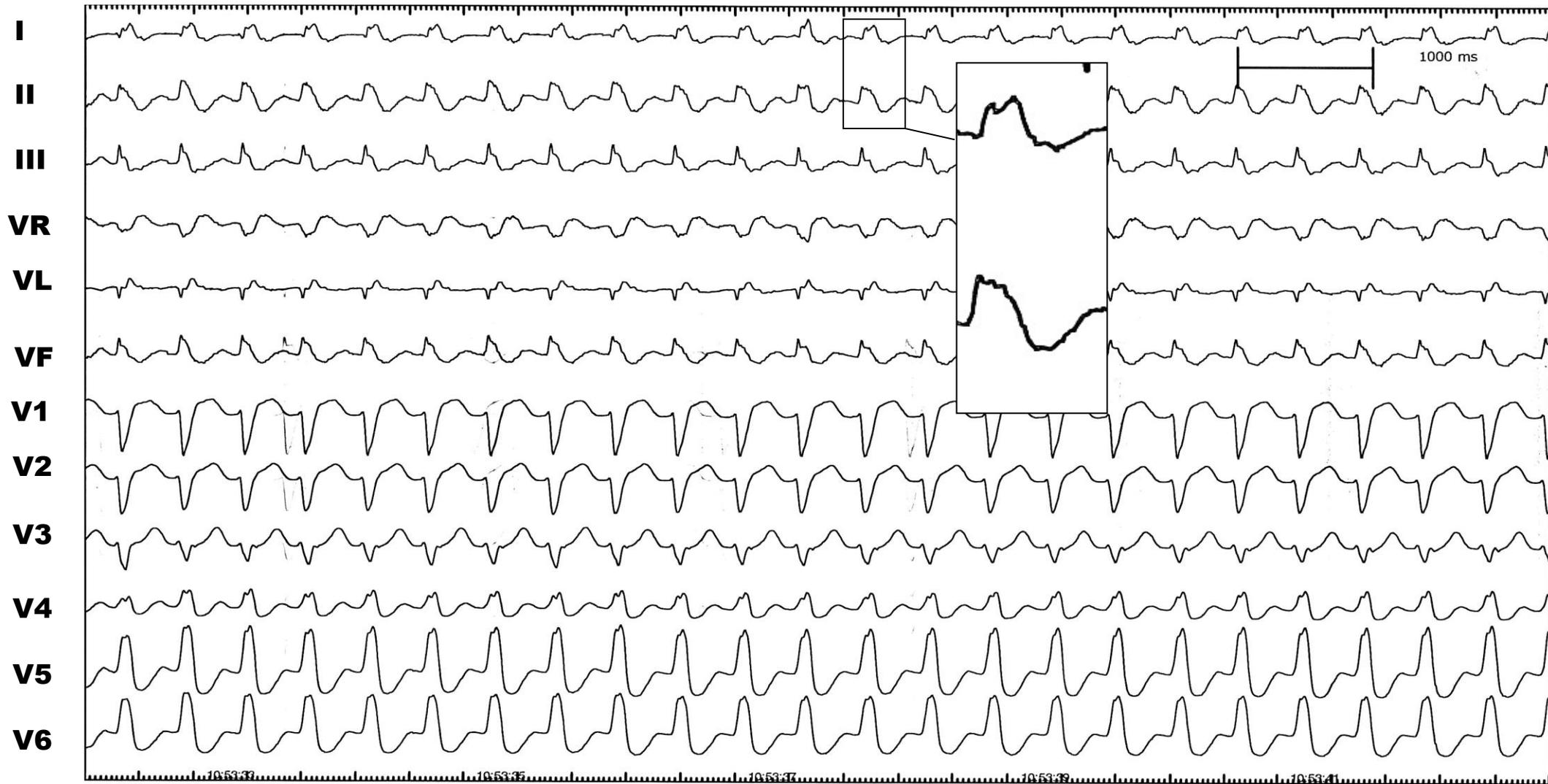
CENTRE CARDIO CANTINI

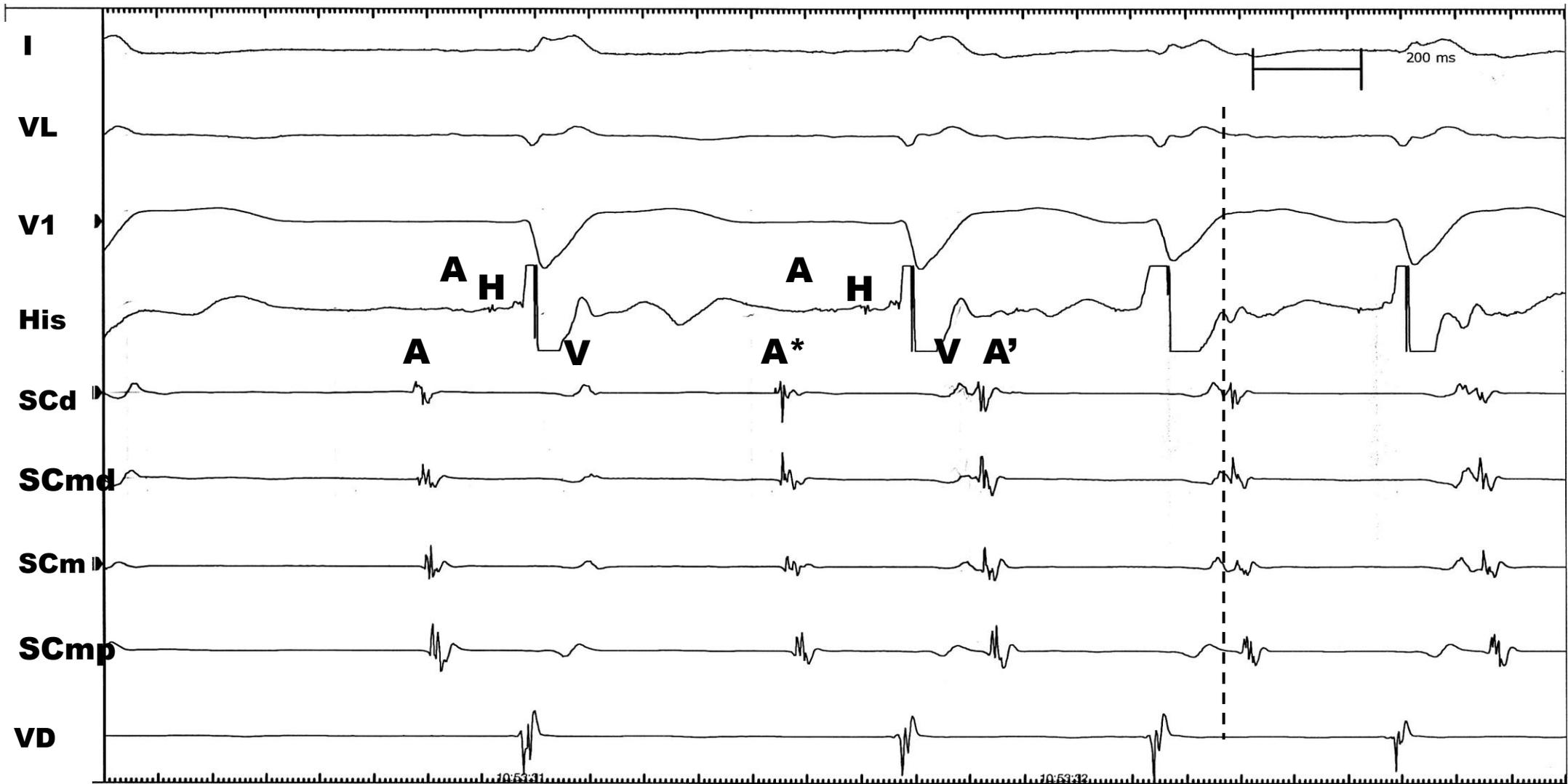


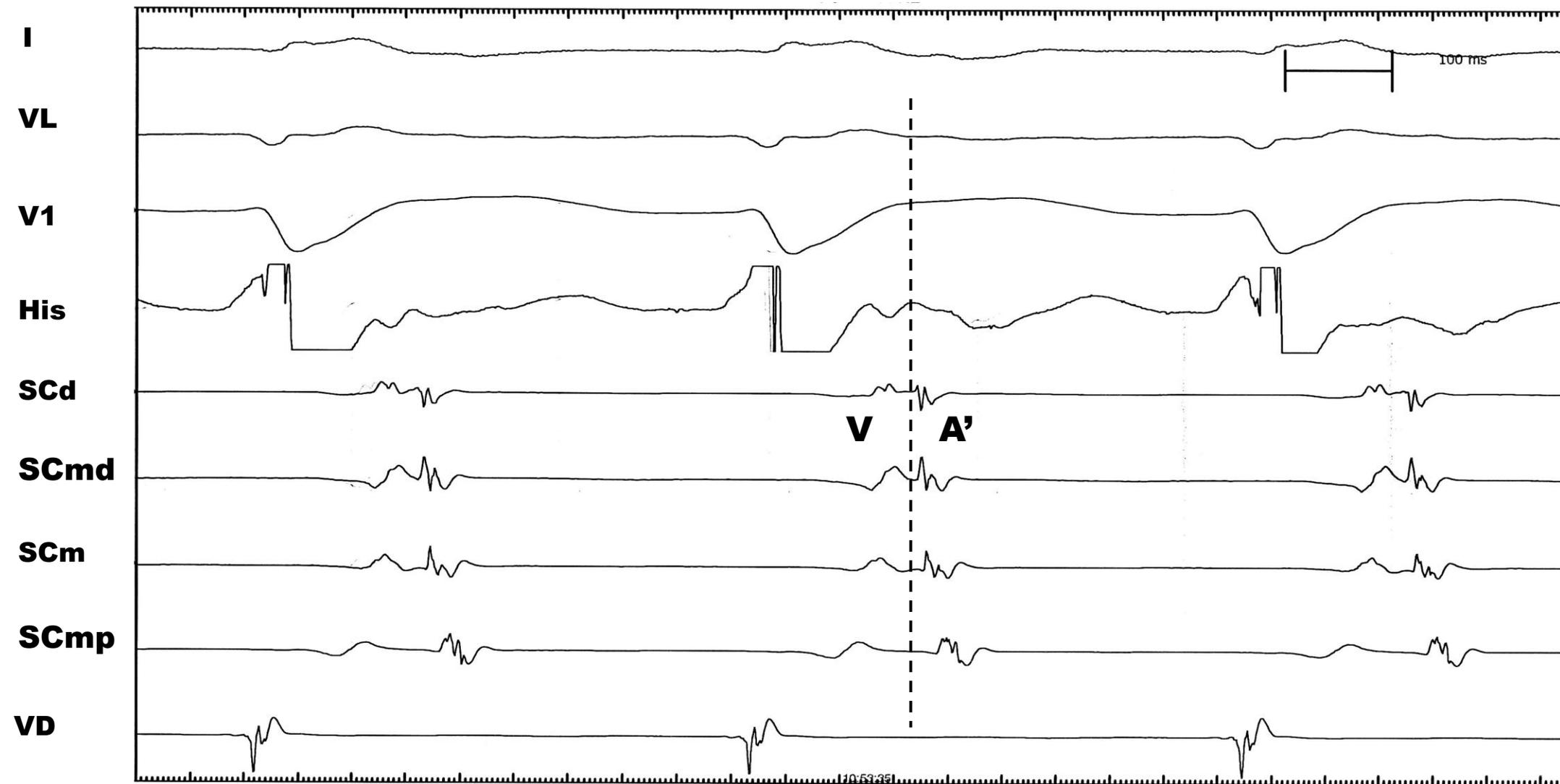


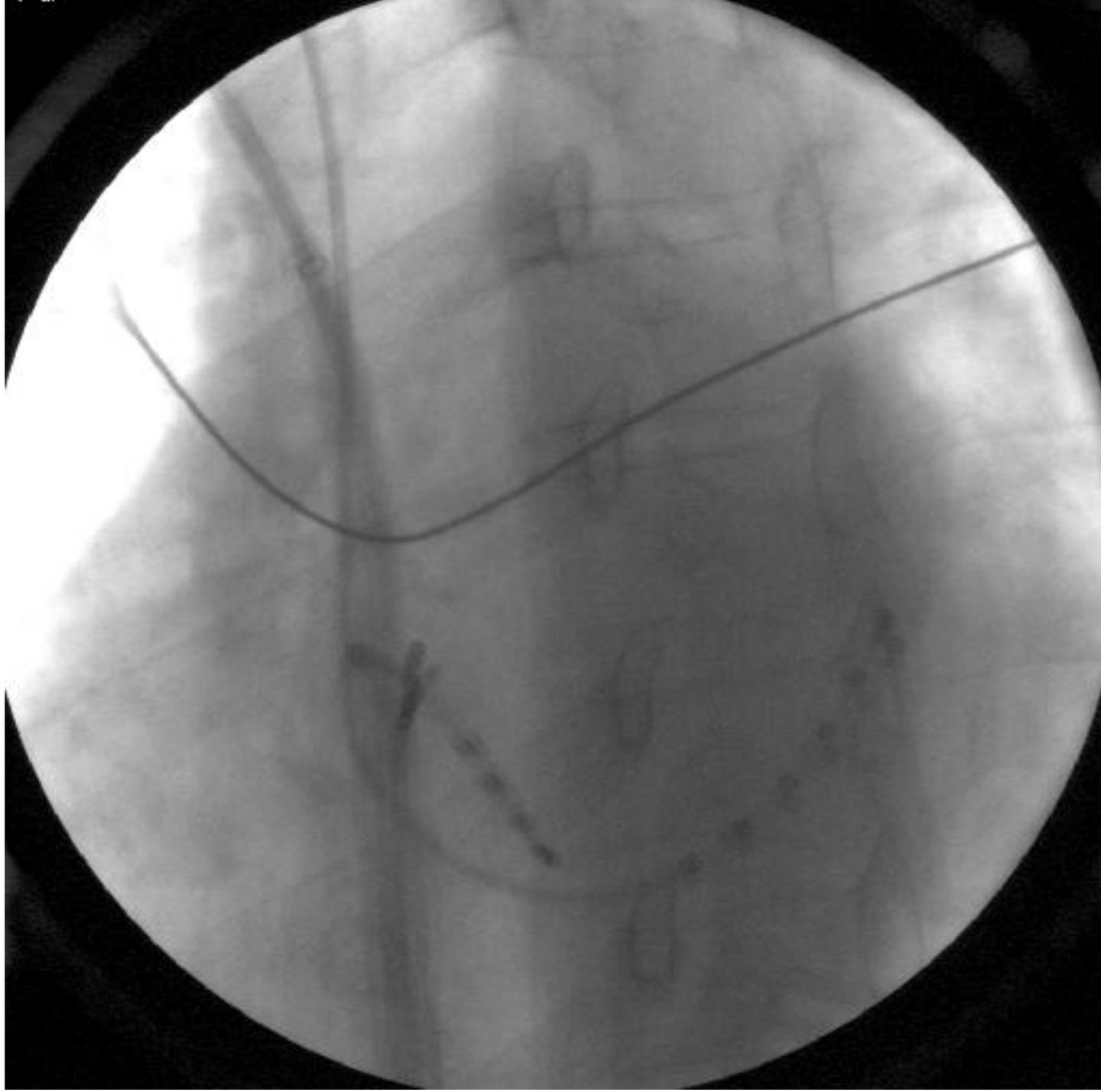


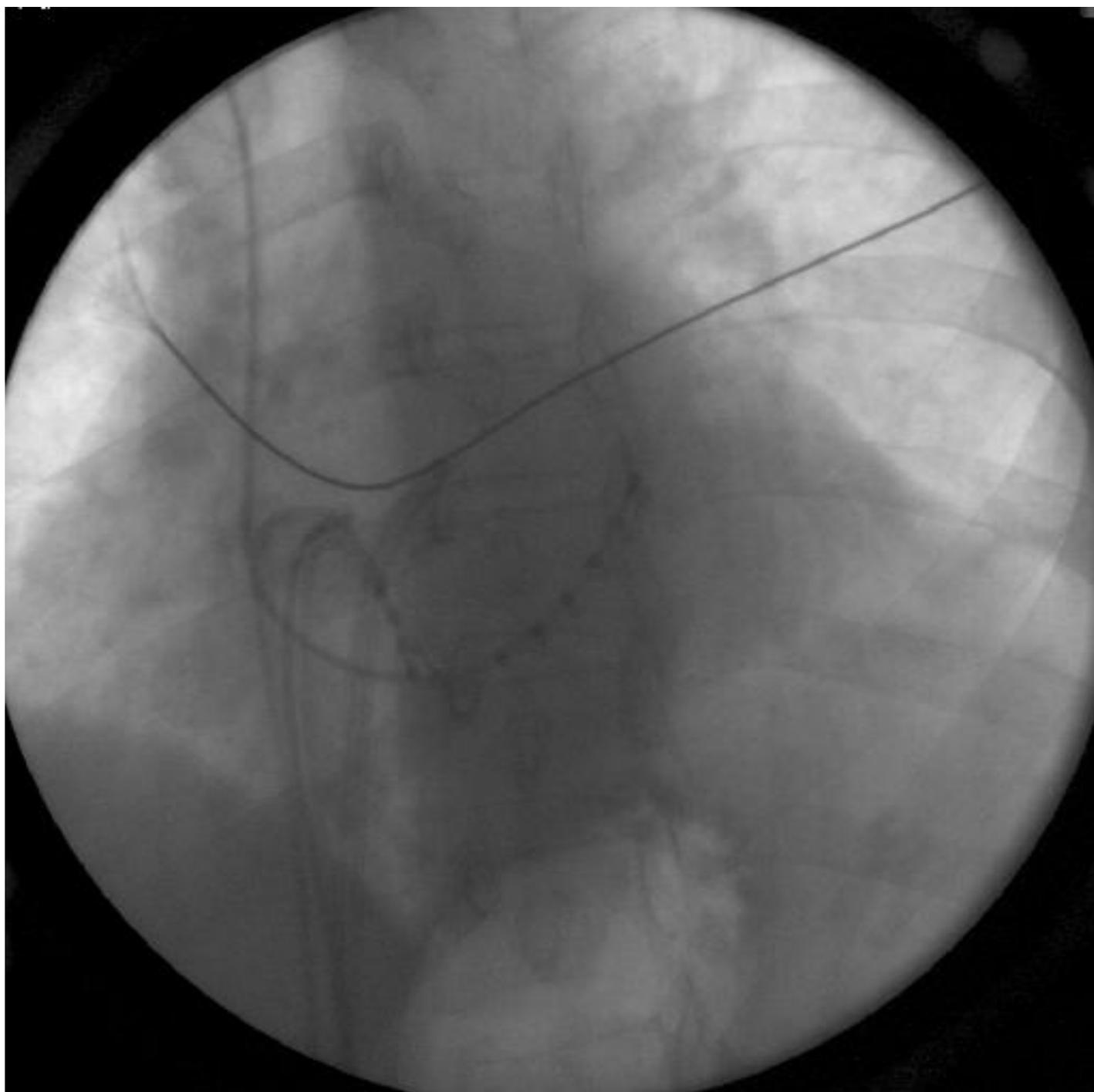












OAG 30°

32°
0°

Abl

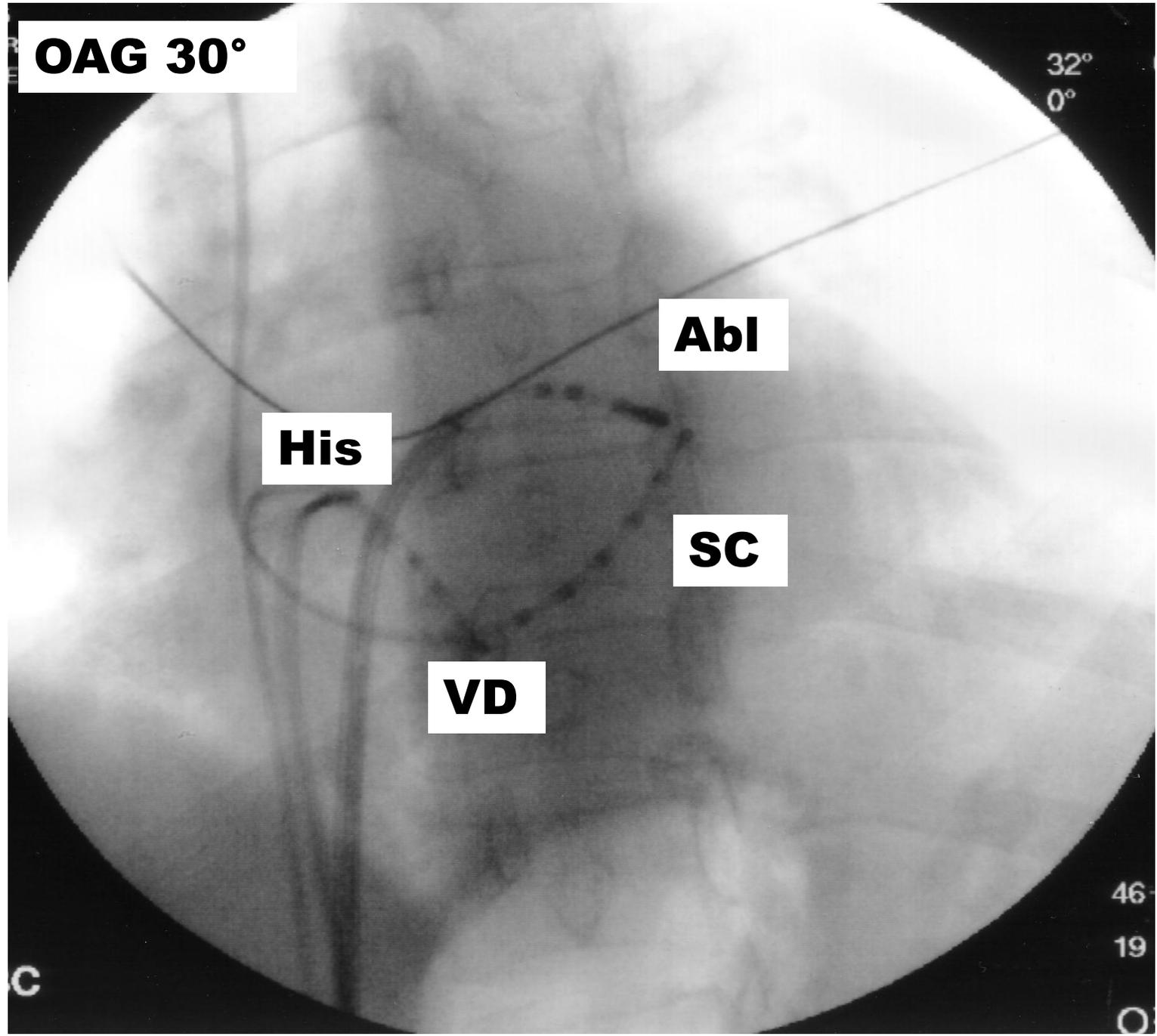
His

SC

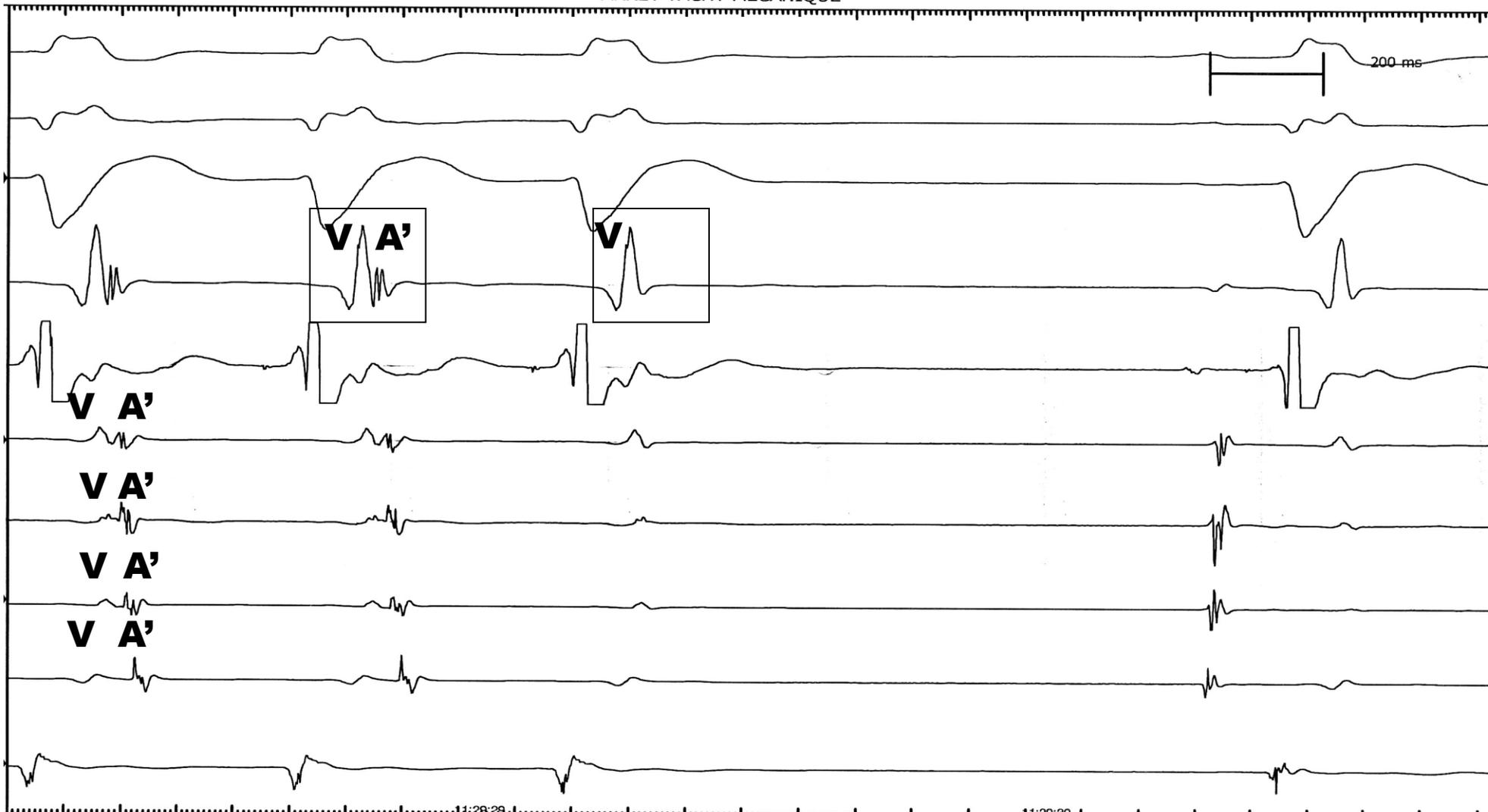
VD

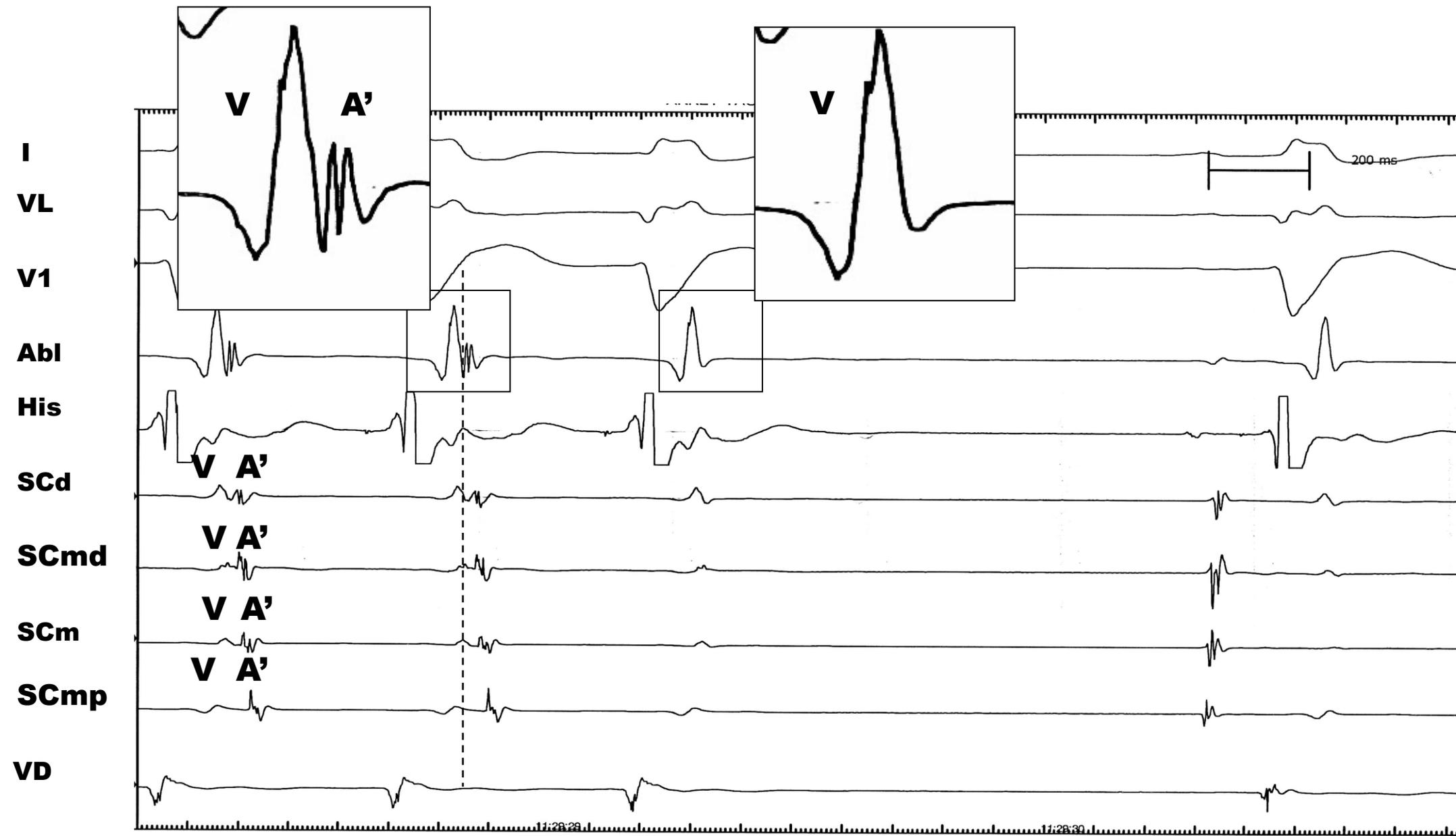
46
19
O

C



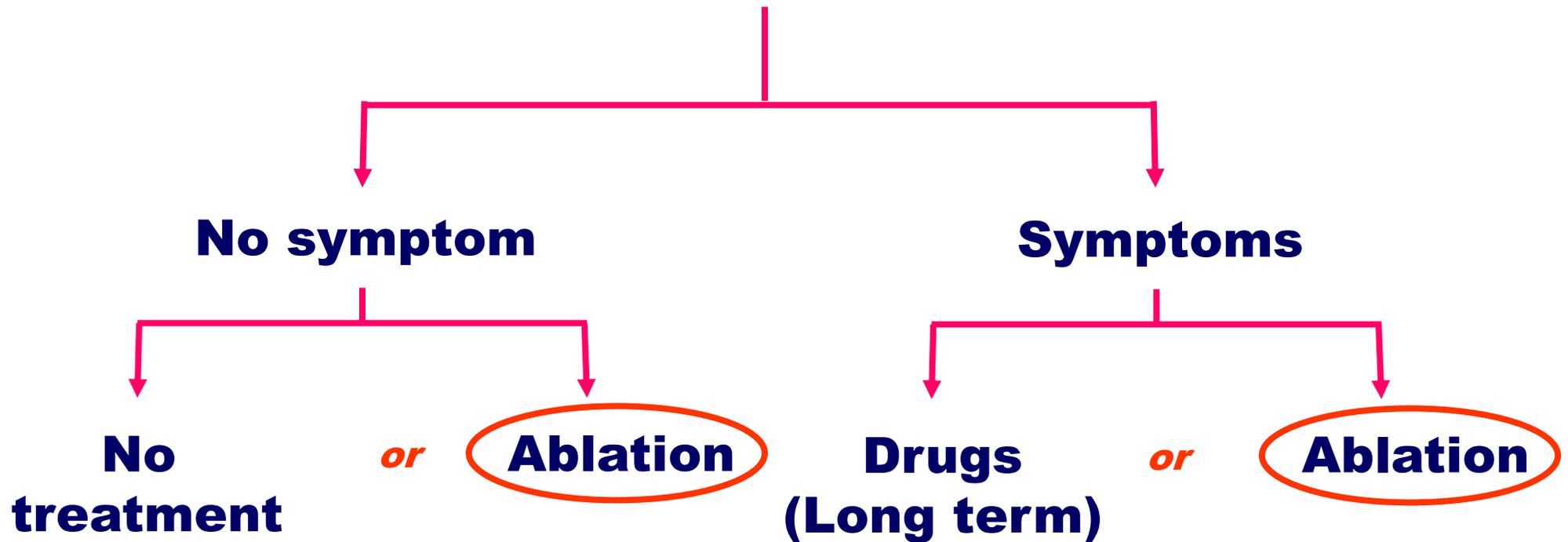
I
VL
V1
Abl
His
SCd
SCmd
SCm
SCmp
VD





Ventricular preexcitation – Therapeutic options

Ventricular preexcitation



Drug therapy in patients with AP

	Patients	Success rate	Follow Up
Propafenone	11	100% (+ beta-)	9 months
Flecainide	20	85%	15 months
Sotalol	17	81%	36 months

ACC/AHA/ESC Guidelines for the management of patients with supra ventricular arrhythmias, 2003

Drug therapy in WPW patients

WPW syndrome	Recommendation	Class	Level of evidence
Arrhythmia, well tolerated	Flecainide, Propafenone, Sotalol, Amiodarone, Beta-blockers	IIa	C!

ACC/AHA/ESC Guidelines for the management of patients with supra ventricular arrhythmias, 2003

RF ablation in WPW patients

	Left free wall	Antero septal	Postero septal	Right free wall
NonT° Control				
Calkins, 1991	152/161	13/15	41/44	46/47
Jackman, 1991	106/106	13/13	40/43	15/15
Chen, 1993	63/69	10/11	30/32	25/27
Swartz, 1994	74/76	21/21	13/13	8/12
Haissaguerre, 1994	282/286	40/41	73/77	30/32
	97%	96%	91%	88%
T° Control				
Calkins, 1994	257/270	39/40	86/98	83/92
	95%	98%	88%	90%

Complications associated with ablation of AP

	Pts (N)	Complic.	Death
MERFS, 1993	2222	4.4%	0.13%
NASPE, 1995	5427	1.8%	0.07%
Atakr, 1999	500	--	0.2%

AV Block 0.17-1.0 %
Tamponade 0.13-1.1 %

Complications d'ablations 1993-1995-1999

	N	Compli cations	Tampo nade	BAV	IdM	AVC	DC
MERFS 1993	2222	4,4% (98)	0,72% (16)	0,63% (14)	0	0,49% (11)	0,13% (3)
NASPE 1995	5427	1,8% (99)	0,13% (7)	0,17% (9)	0,06% (3)	0,15% (8)	0,07% (4)
ATAKR 1999	500	N/A	N/A	1% (5)	N/A	0,2% (1)	0,2% (1)

Ablation des voies accessoires : résultats

NASPE Registry (N = 654 pts)

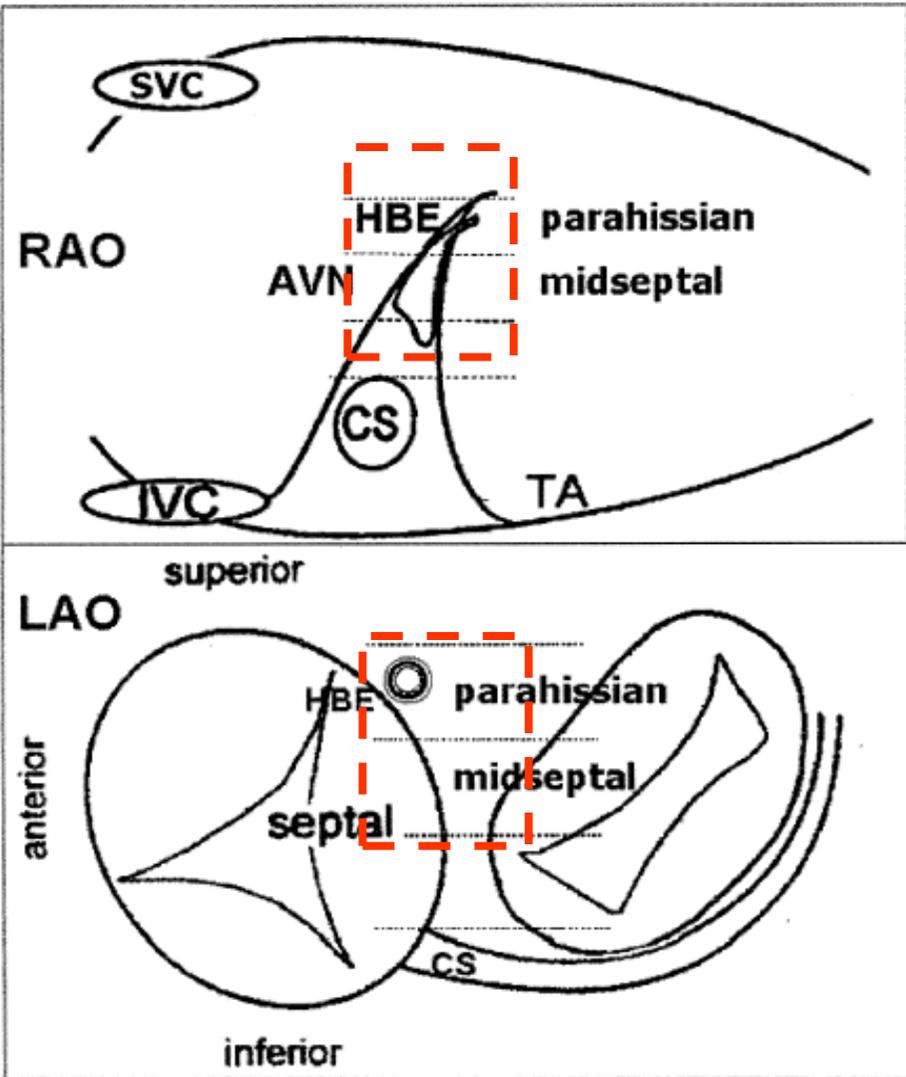
- WPW gauches (62% des pts) : 93% succès
- WPW septaux (27% des pts) : AS : 84% succès; PS : 88,8% succès
- WPW droits (11% des pts) : 96,4% succès

Ablation des voies accessoires : complications

NASPE Registry (N = 654 pts)

- WPW gauches : 5% de complications
(épanchement péricardique; point de ponction;
occlusion coronaire)
- WPW septaux : 4,8% de complications
(BAV, épanchement, pneumothorax, saignement)
- WPW droits : 2,4% de complications
(BAV; thrombo-embolie)

RF ablation of parahissian and midseptal pathways

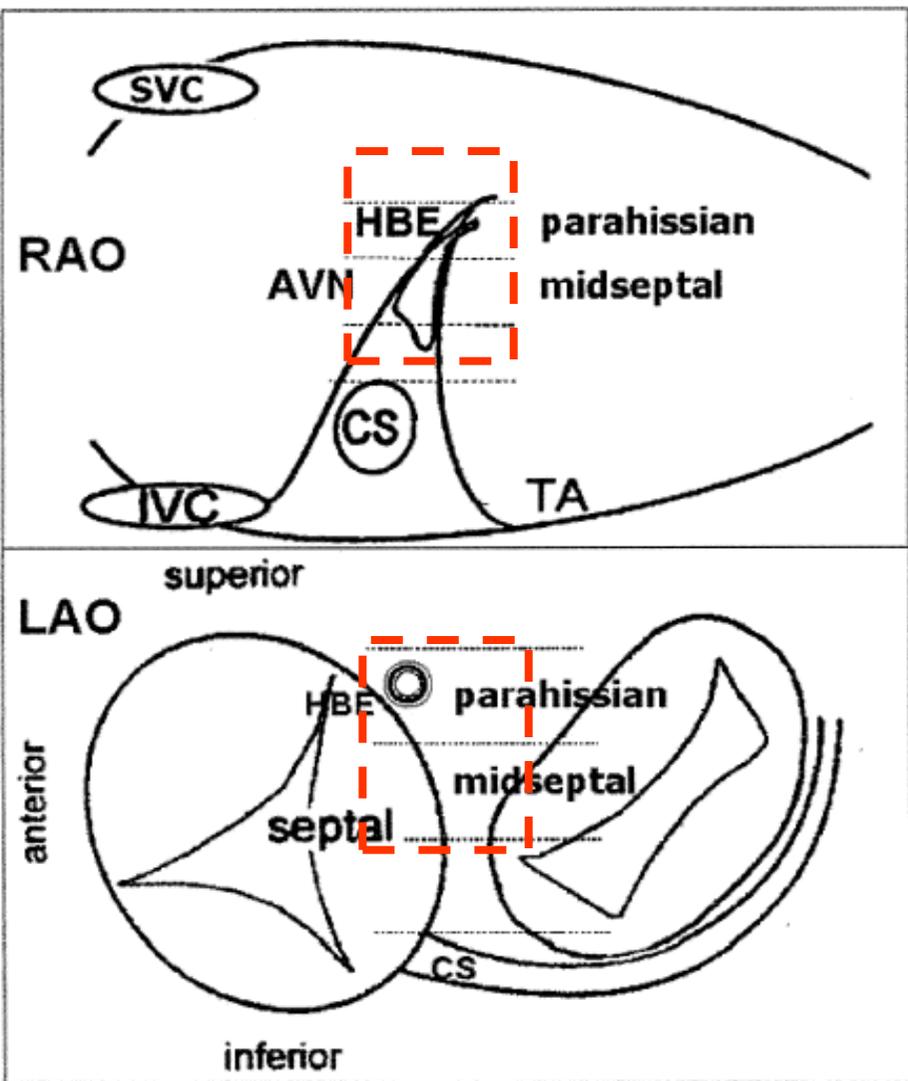


Anteroseptal pathways

		N	AVB	RBBB
Jackman	1991	13	0	38%
Lesh	1992	7	0	57%
Calkins	1992	10	20%	--
Swartz	1993	10	0	--
Kay	1993	19	0	--
Kuck	1994	33	0	6%
Jazayeri	1994	15	0	20%
Tai	1996	23	4%	--

RF ablation of parahissian and midseptal pathways

Midseptal pathways



		N	AVB
Lesh	1992	6	0
Calkins	1992	5	0
Swartz	1993	11	0
Kay	1993	11	1 (T)
Kuck	1994	21	0
Jazayeri	1994	10	0
Yeh	1994	10	4 (T) 1 (P)
Haissaguerre	1994	8	0
Tai	1996	8	0

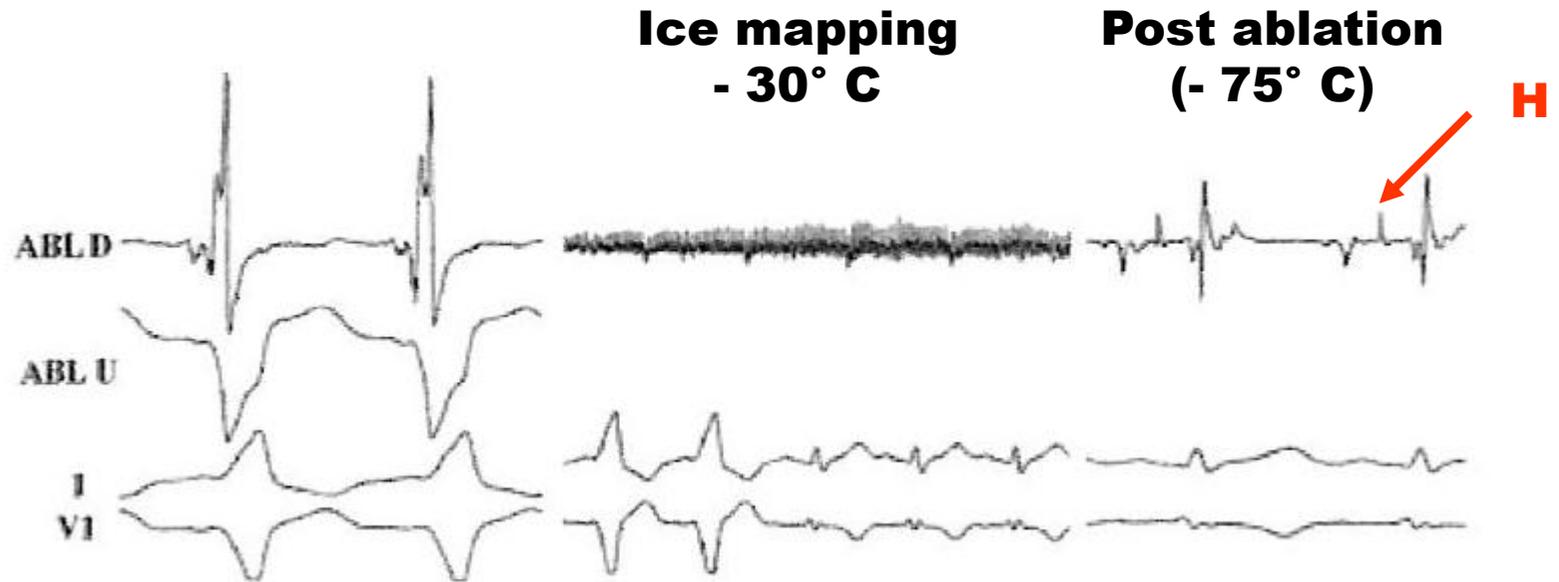
Cryoablation of septal AP

Gaïta et al, *J Cardiovasc Electrophysiol* 2003

N = 20 patients **100% success rate**
20% recurrence
No complication



Para-hissian AP



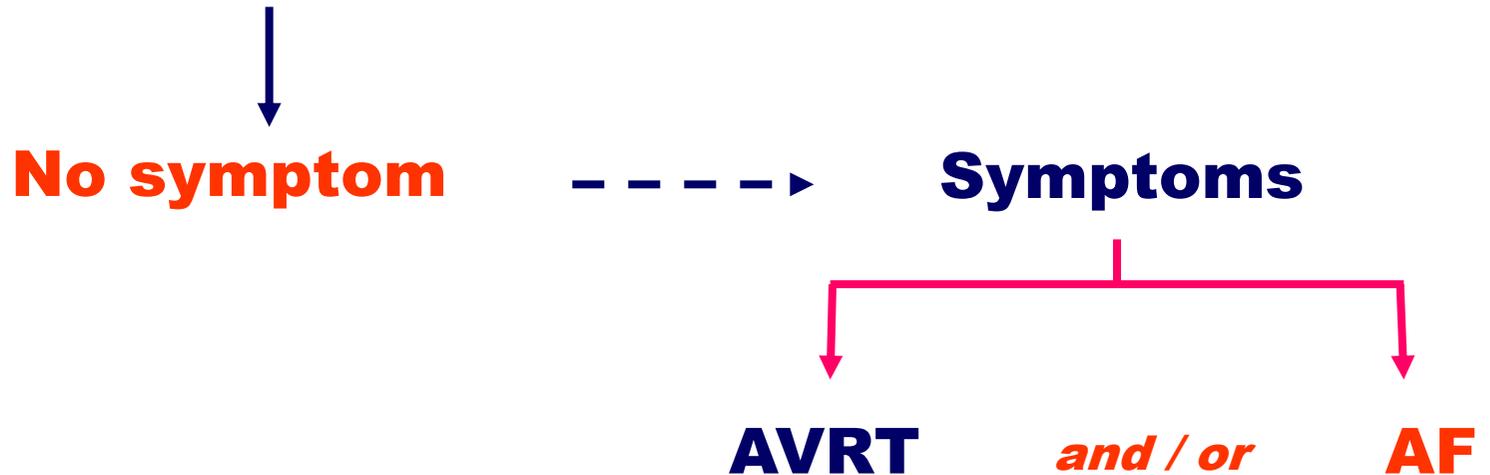
Ablation therapy in WPW patients

WPW syndrome	Recommendation	Class	Level of evidence
Arrhythmia, well tolerated	Ablation	I	B
Arrhythmia, poorly tolerated	Ablation	I	B

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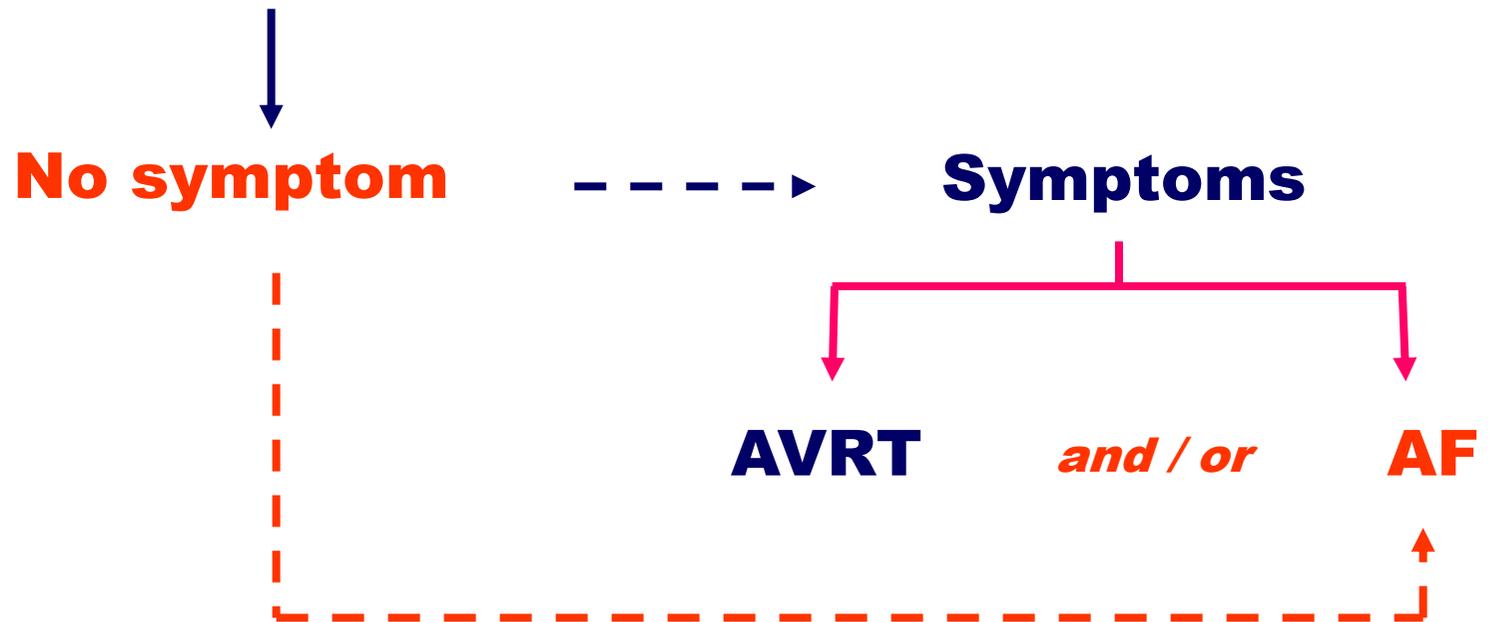
Ventricular preexcitation – The asymptomatic patient

Ventricular preexcitation



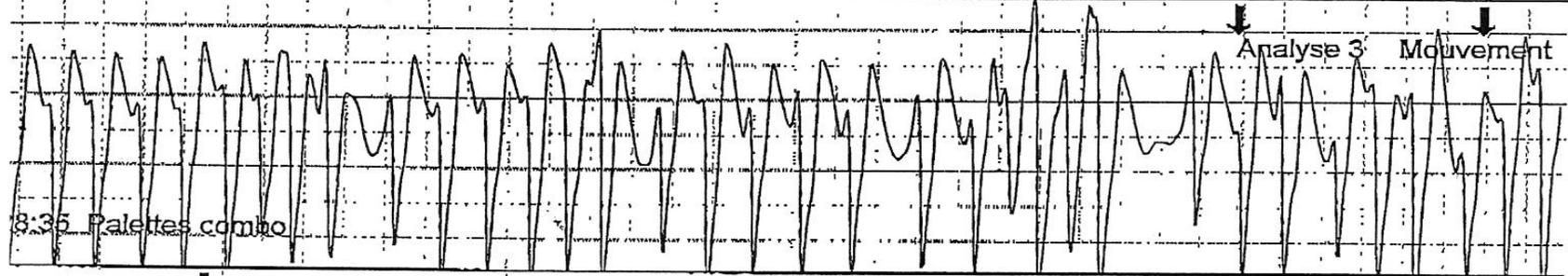
Ventricular preexcitation – The asymptomatic patient

Ventricular preexcitation

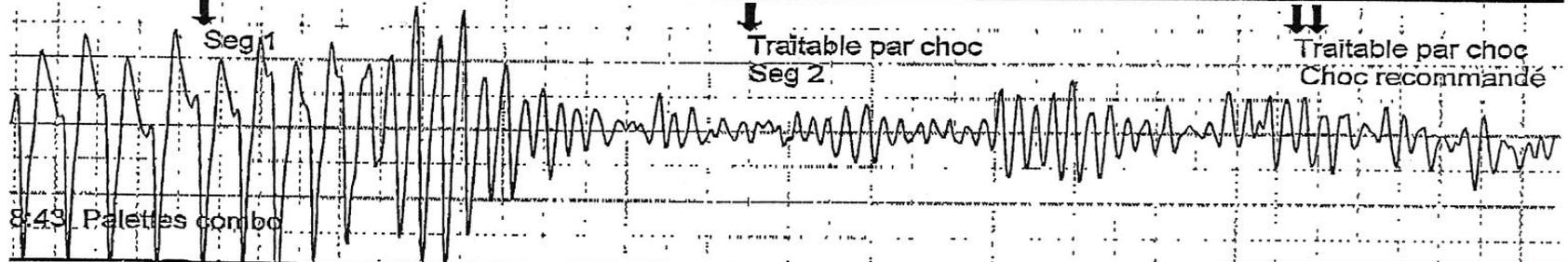




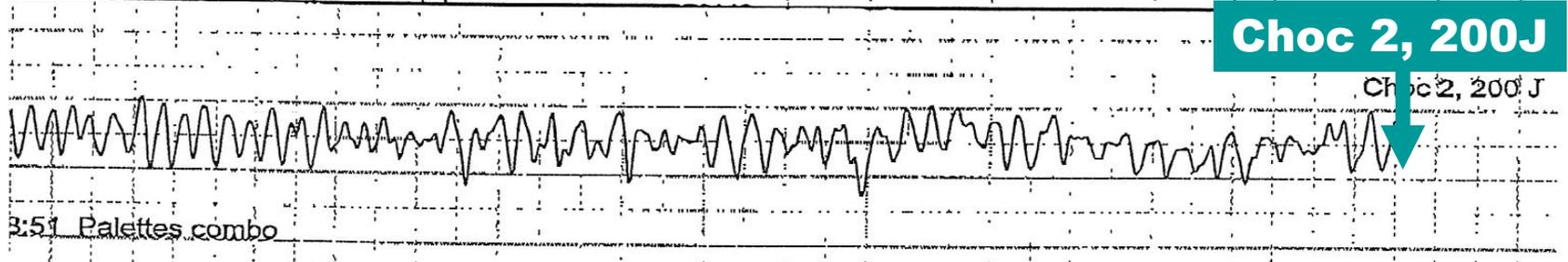
2 mn 08 s



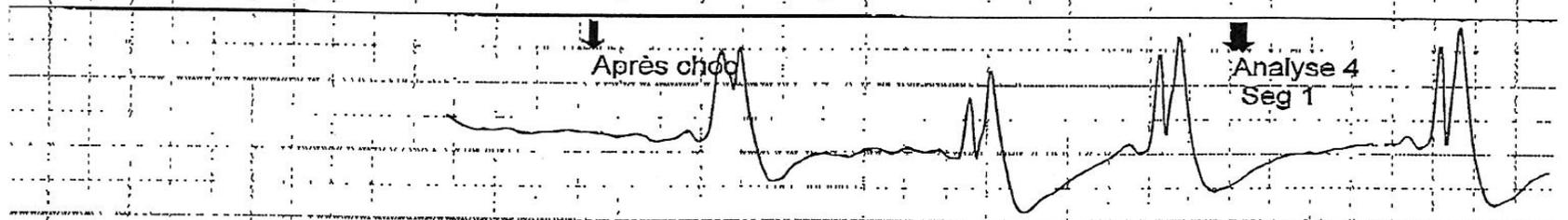
2 mn 20 s



2 mn 28 s



2 mn 36 s



2 mn 44 s

VF as the 1st manifestation

Klein, 1979

3/25

Montoya, 1991

6/23

Timmermans, 1995

8/15

Uncommon after 30 y.

SCD incidence in the WPW Syndrome

	Pts (N)	SD (N)	SD (pt-Y)
Smith (1964)	50	0	0.0000
Berkman (1968)	128	1	<0.0009
Flensted-Jensen (1969)	47	4	<0.006
Gillette (1979)	105	2	0.0039
Guize (1985)	170	1	0.0014
Munger (1993)	113	2	0.0015

Risk assessment

Non invasive markers (intermittent, treadmill test, AA drugs):

PPV = 12% !

Invasive markers:

Shortest preexcited RR interval < 250 ms during AF

Multiple accessory pathways

Inducible reciprocating tachycardia

Superior to noninvasive tests

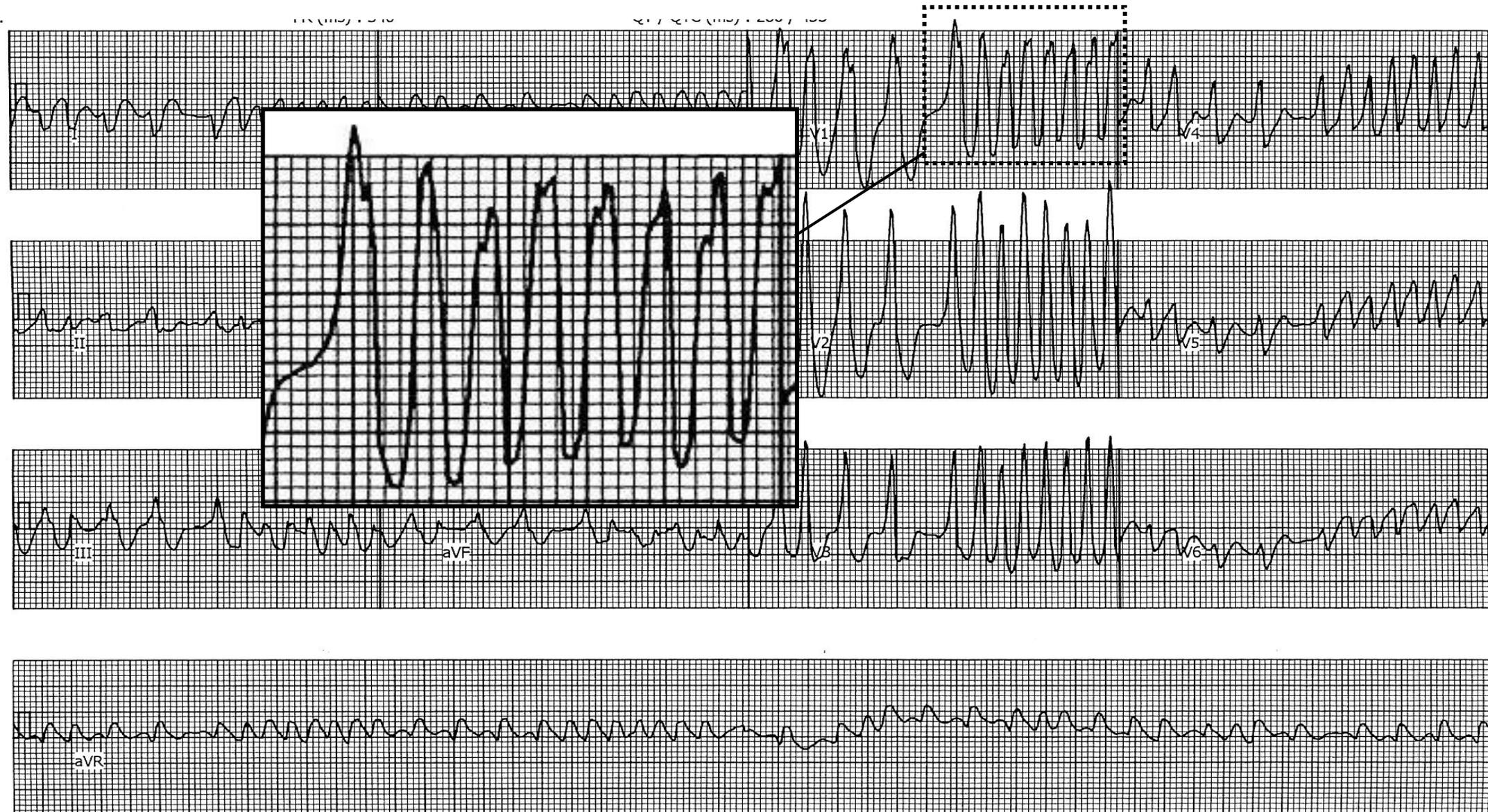
Risk assessment ?

- Shortest preexcited RR interval (AF) < 250 ms

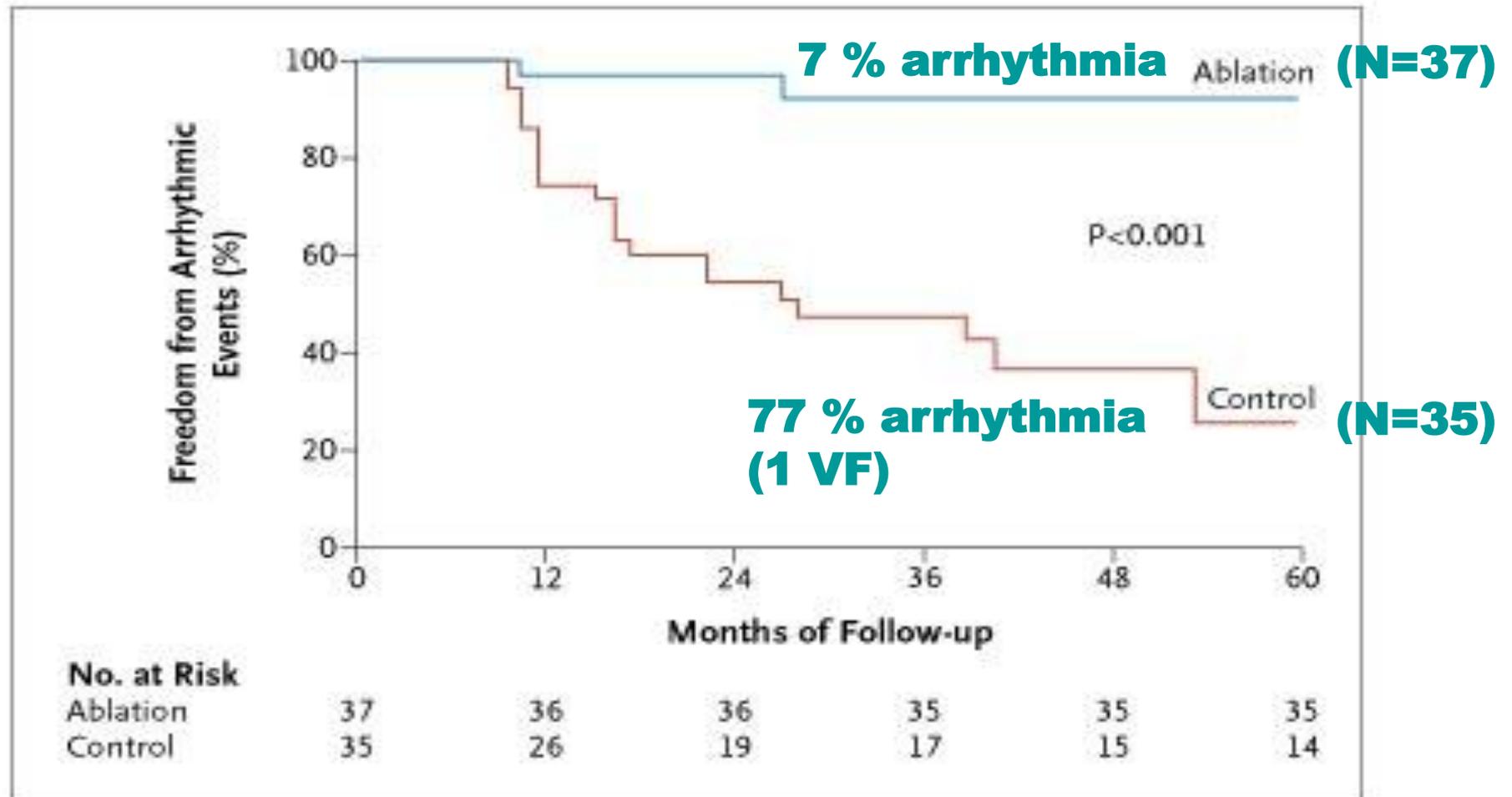
Sensitivity	95%
Positive predictive value	5.6%
Negative predictive value	99.9%

... for a SCD risk of 1% à 10 years

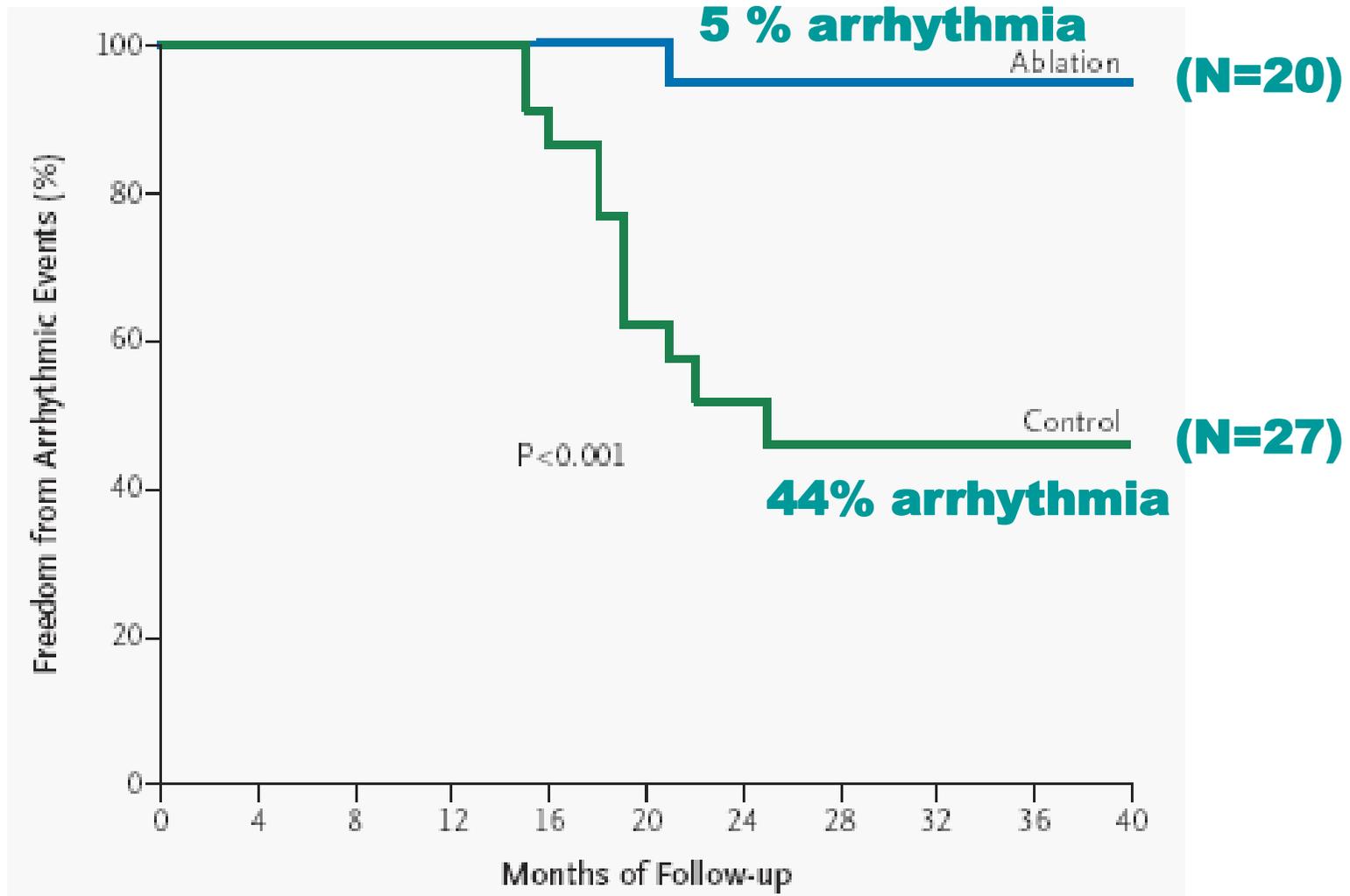
Asymptomatic Patient – EP study



A Randomized study of ablation in WPW syndrome (Pappone et al NEJM 2003)



A Randomized study of ablation in WPW syndrome in children (5-12 y) (Pappone et al NEJM 2004)

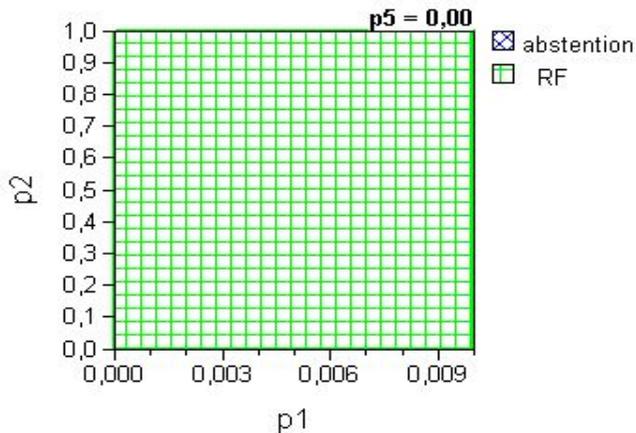


Decision tree : Sensitivity analysis

from F. Cadi
Thèse Médecine Lyon
2005

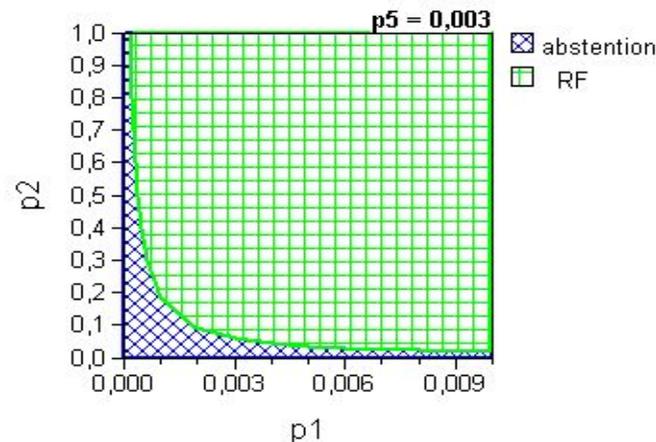
p1 = SCD risk
p2 = RF ablation succes rate
p5 = Severe complication of RF

Sensitivity Analysis on p1 and p2 and p5



Severe complication rate = 0

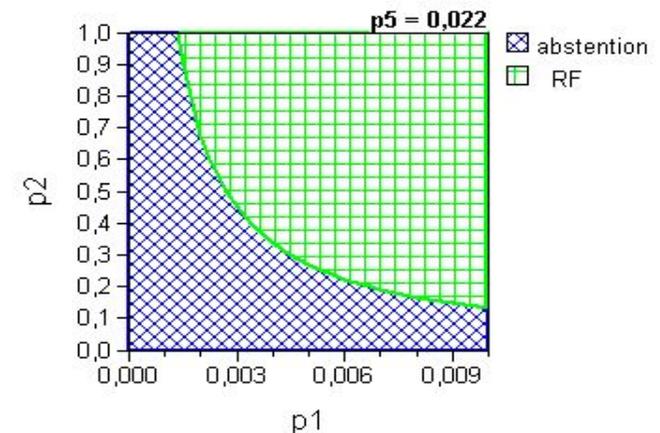
Sensitivity Analysis on p1 and p2 and p5



Severe complication rate = 3/1000

Severe complication rate = 22/1000 (MERFS)

Sensitivity Analysis on p1 and p2 and p5



Asymptomatic patients

Ventricular preexcitation	Recommendation	Class	Level of evidence
Asymptomatic	None	I	C
	Ablation	IIa	B

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Recommendations in WPW patients

ACC/AHA/ESC Guidelines for the management of patients with supra ventricular arrhythmias, 2003

Ventricular preexcitation	Recommendation	Class	Level of evidence
Arrhythmia well tolerated	Ablation	I	B
Arrhythmia, poorly tolerated	Ablation	I	B
Asymptomatic	Ablation	IIa	B

Ablation des voies accessoires :

Indications

- Absolues : FA rapide conduite par la VA
- Consensuelles : pts symptomatiques malgré un trt bien conduit (localisation non dangereuse surtout)
- Discutables :
 - pts symptomatiques en première intention (localisation non dangereuse uniquement)
 - pts asymptomatiques (activités, souhaits...) selon les résultats de l'EEP (localisation non dangereuse uniquement)