Mapping and Ablating Coronary Sinus Pathways

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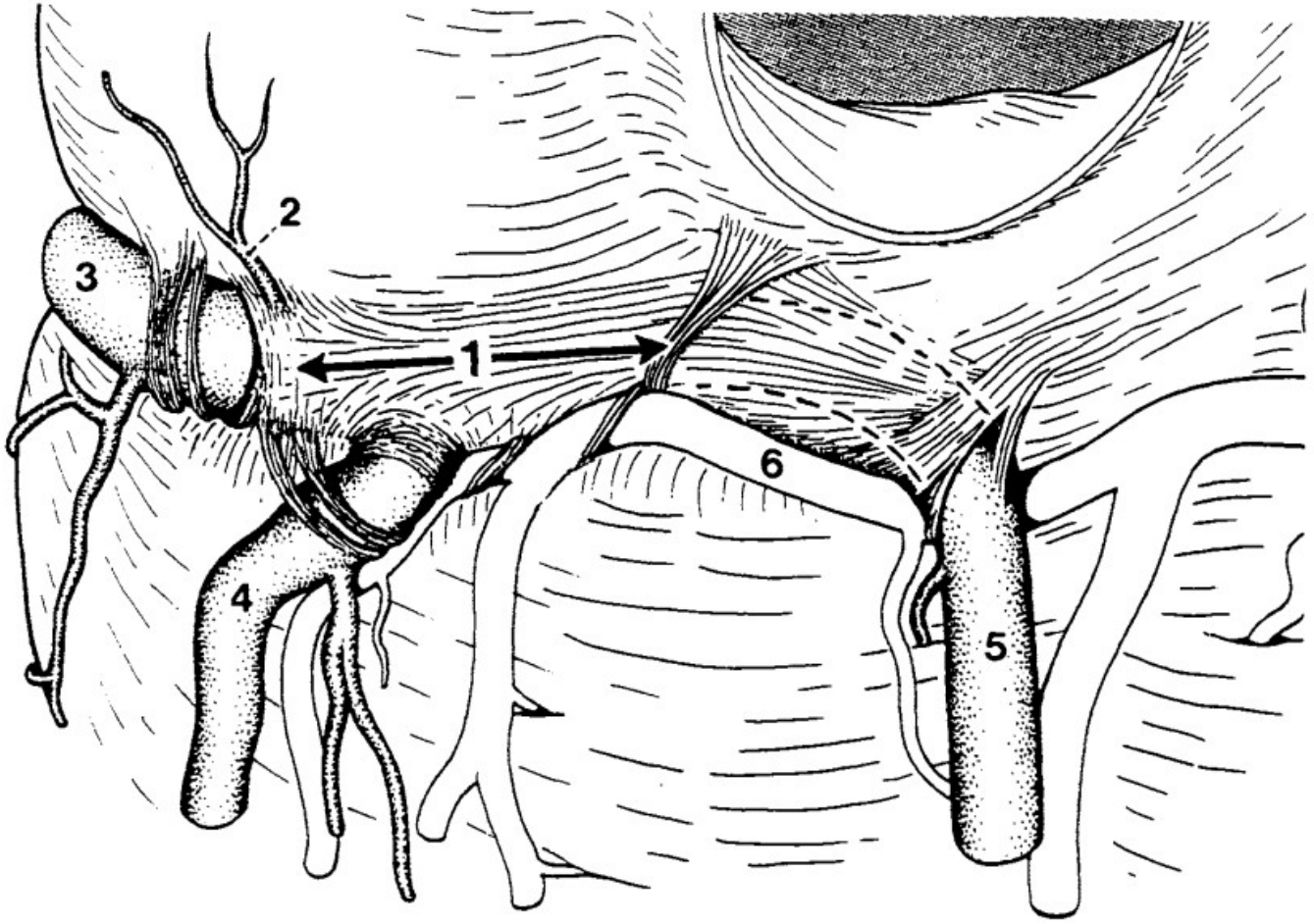
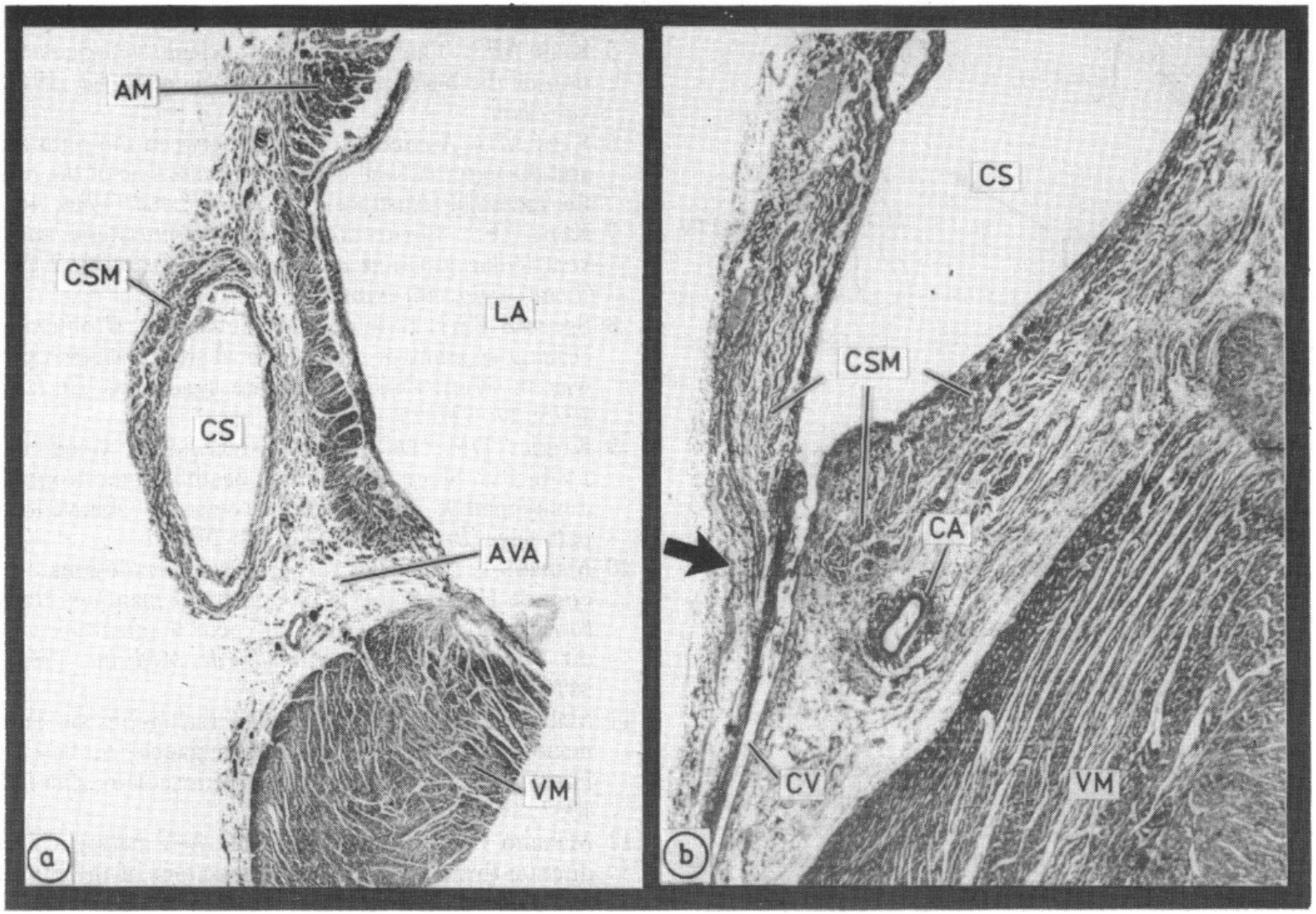
Coronary sinus muscle coat



v. Lüdinghausen, M., Ohmachi, N., & Boot, C. (1992). Myocardial coverage of the coronary sinus and related veins. Clinical Anatomy, 5(1), 1–15.

CS muscle coat



Gerlis LM, Davies MJ, Boyle R, et al. Pre-excitation due to accessorysinoventricular connexions associated with coronary aneurysms: a report of two cases.Br Heart J. 1985;53:314–322

CS pathways - Prevalence

- CSAP among posteroseptal and posterior APs - 171/480 (36%)
- CS anomalies
  - Diverticulum in 36/171 (21%)
  - Other anomalies in 15/171 (9%)
- CSAP not related to diverticulum in 2/36
- Previous unsuccessful ablation in 58%

Sun Y, .., Jackman W. Coronary sinus-ventricular accessory connections producing posteroseptal and left posterior accessory pathways: incidence and electrophysiological identification. Circulation. 2002 Sep 10;106(11):1362-7

CS pathways - Prevalence

- CSAP among posteroseptal APs – 18/53 (34%)
- CS anomalies
  - Diverticulum in 14/18 (78%)
  - Other anomalies in 2/18 (11%)
- CSAP not related to diverticulum in 0/14

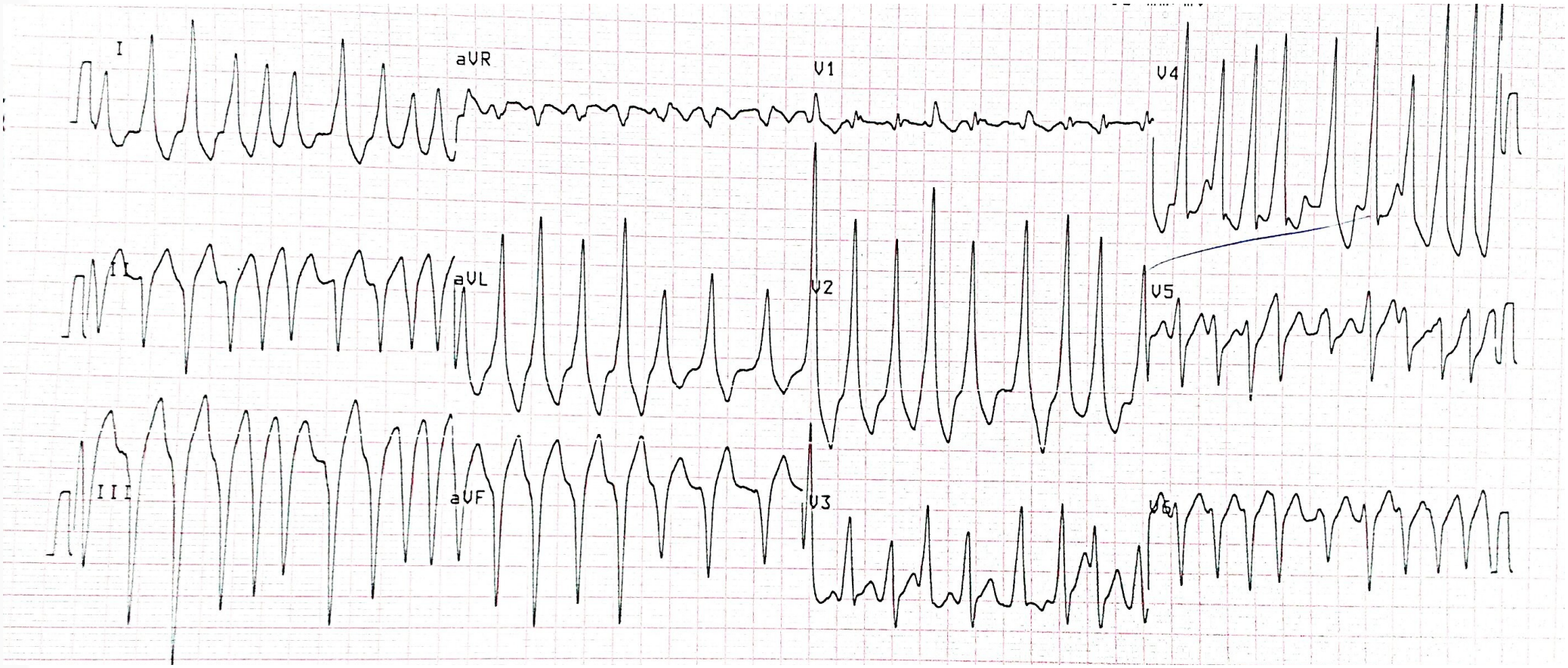
Raja Selvaraj et al. Radiofrequency ablation of posteroseptal accessory pathways associated with coronary sinus diverticula. J Interv Card Electrophysiol. 2016;47:253–259

Identification - History

- History of previous ablation
- History of atrial fibrillation (1)
- High risk of sudden death (2)

1) Raja Selvaraj et al. Radiofrequency ablation of posteroseptal accessory pathways associated with coronary sinus diverticula. J Interv Card Electrophysiol. 2016;47:253–259
2) Gerlis LM, Davies MJ, Boyle R, et al. Pre-excitation due to accessory sinoventricular connexions associated with coronary aneurysms: a report of two cases.Br Heart J. 1985;53:314–322

Preexcited AF



Identification - ECG

	Sensitivity (%)	Specificity (%)
Baseline ECG		
Negative delta in lead II	69	67
Steep negative delta in lead II	44	88
Positive delta in lead aVR	31	94
R/S in V6 < 1	19	94
Preexcited ECG (atrial pacing)		
Negative delta in lead II	81	52
Steep negative delta in lead II	69	82
Positive delta in lead aVR	31	88
R/S in V6 < 1	56	58

1) Raja Selvaraj et al. Radiofrequency ablation of posteroseptal accessory pathways associated with coronary sinus diverticula. J Interv Card Electrophysiol. 2016;47:253–259

Identification - Echo

- Echolucent pouches on epicardial surface of LV
- Better seen with TEE
- 4 of 6 diverticula seen

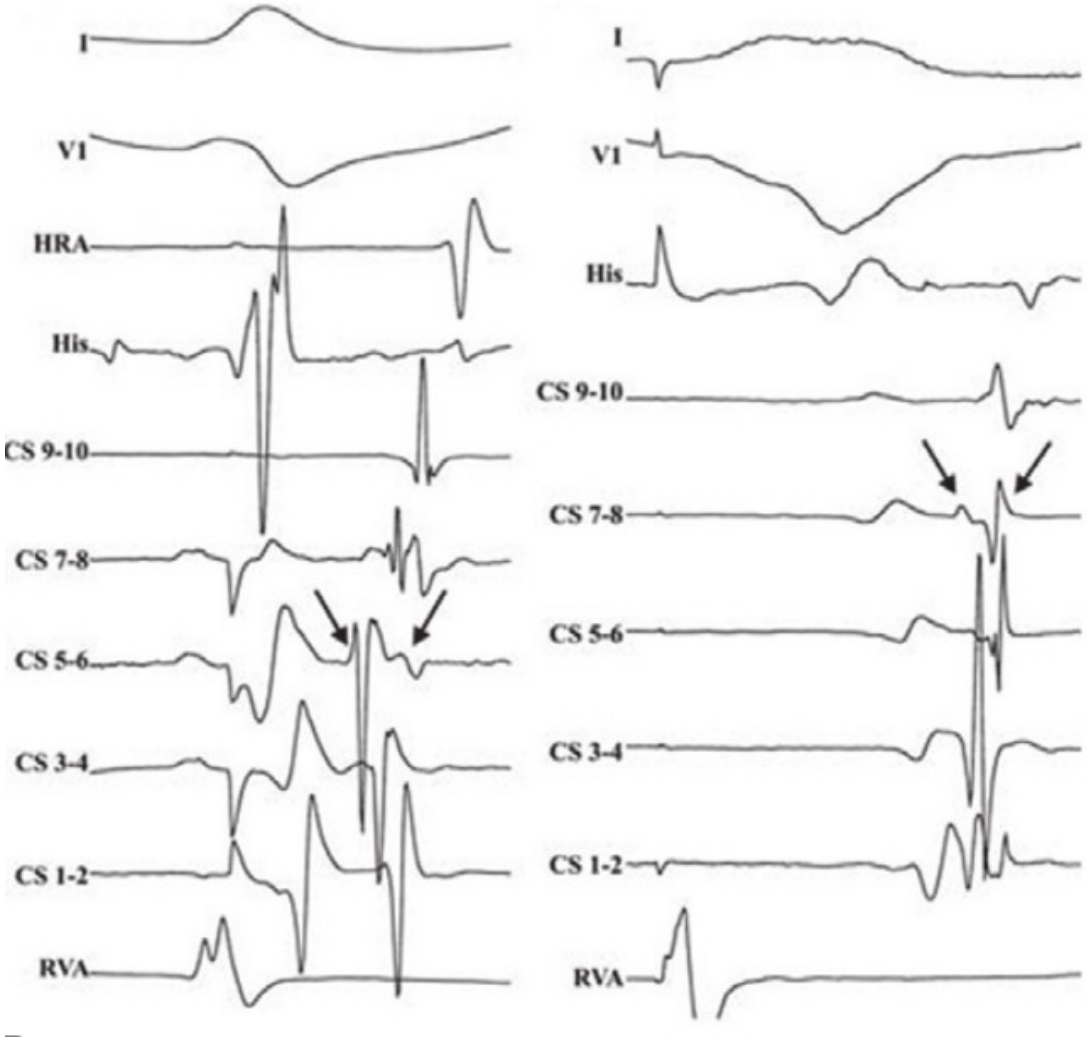
1) Karen Hamilton, Michael Castillo, Mauricio Arruda, Warren Jackman. Echocardiographic demonstration of coronary sinus diverticula in patients with Wolff-Parkinson-White syndrome Journal of the American Society of Echocardiography, Volume 9, Issue 3, 337 - 343

Unlikely right endocardial

- Retrograde atrial activation sequence
- Earliest CS to His A > 25 ms

Chiang et al. Prediction of successful ablation site of concealed posteroseptal accessory pathways by a novel algorithm using baseline electrophysiological parameters: implication for an abbreviated ablation procedure. Circulation. 1996.

Endocardial or epicardial



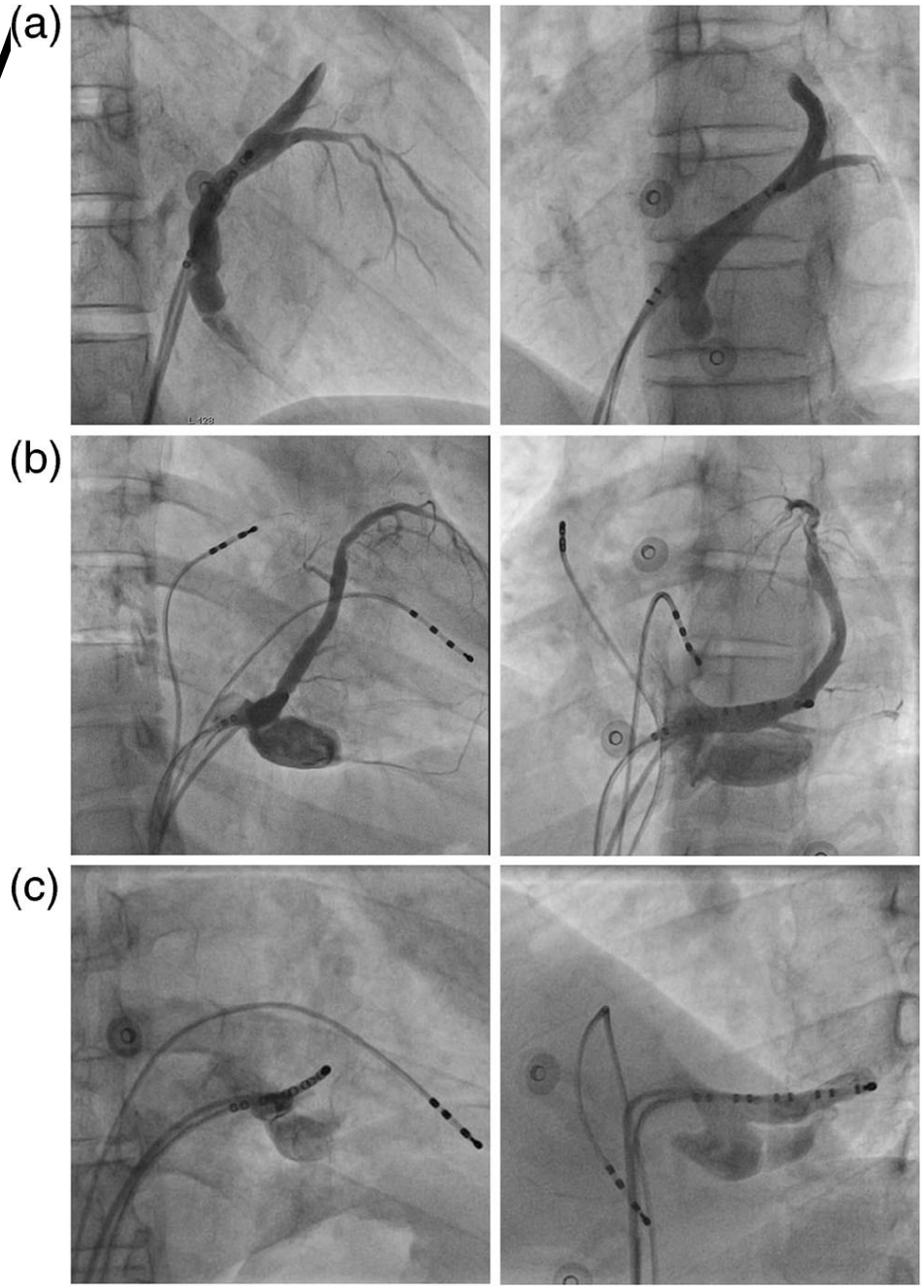
Pap R, Traykov VB, Makai A, et al. Ablation of posteroseptal and left posterior accessory pathways guided by left atrium-coronary musculature activation sequence. J Cardiovasc Electrophysiol. 2008;19:653-658.

Mapping and Ablating CS pathways

CS visualization

- Levophase
- Retrograde with balloon
- Retrograde without balloon

CS v



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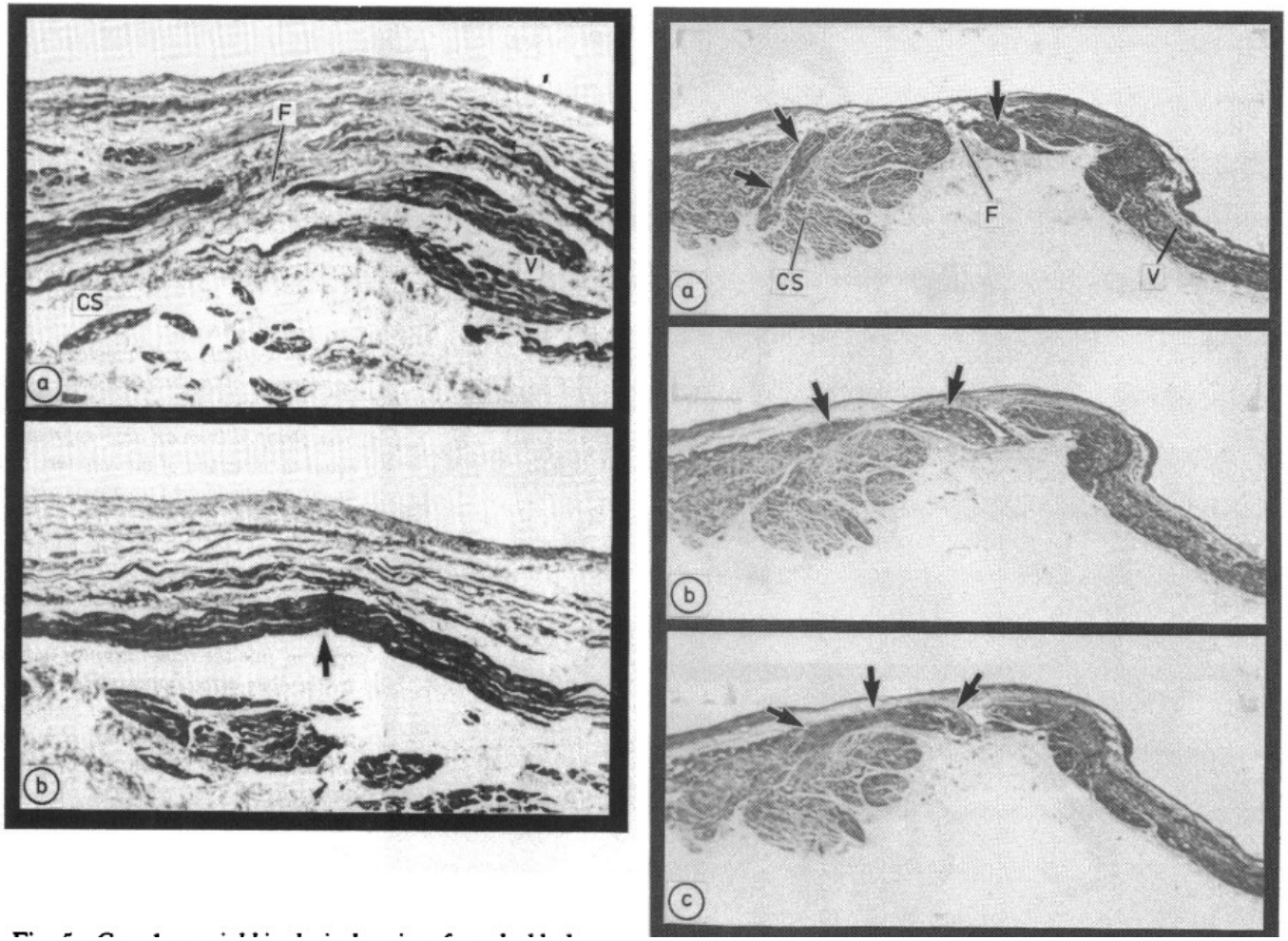
Mapping retrograde or antegrade ?

- Most of the pathways conduct antegrade
- Ventricular insertion discrete / few
- Atrial connections may be multiple

CS diverticulum – Discrete connections



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Mapping in diverticulum

- Venography to delineate
- Mapping in neck
- Local V not very early (19 ms vs 33 ms)
- CSE potential

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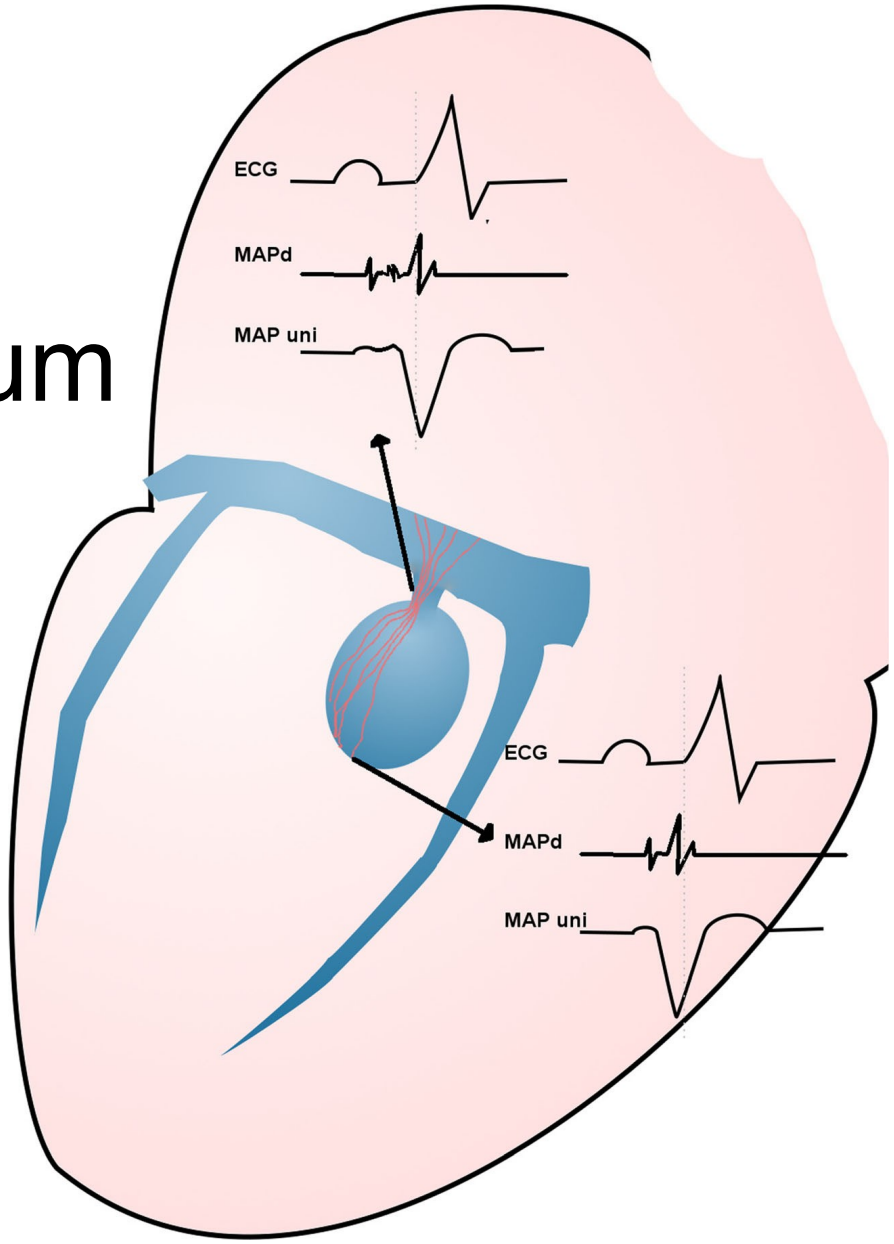
Mapping in diverticulum



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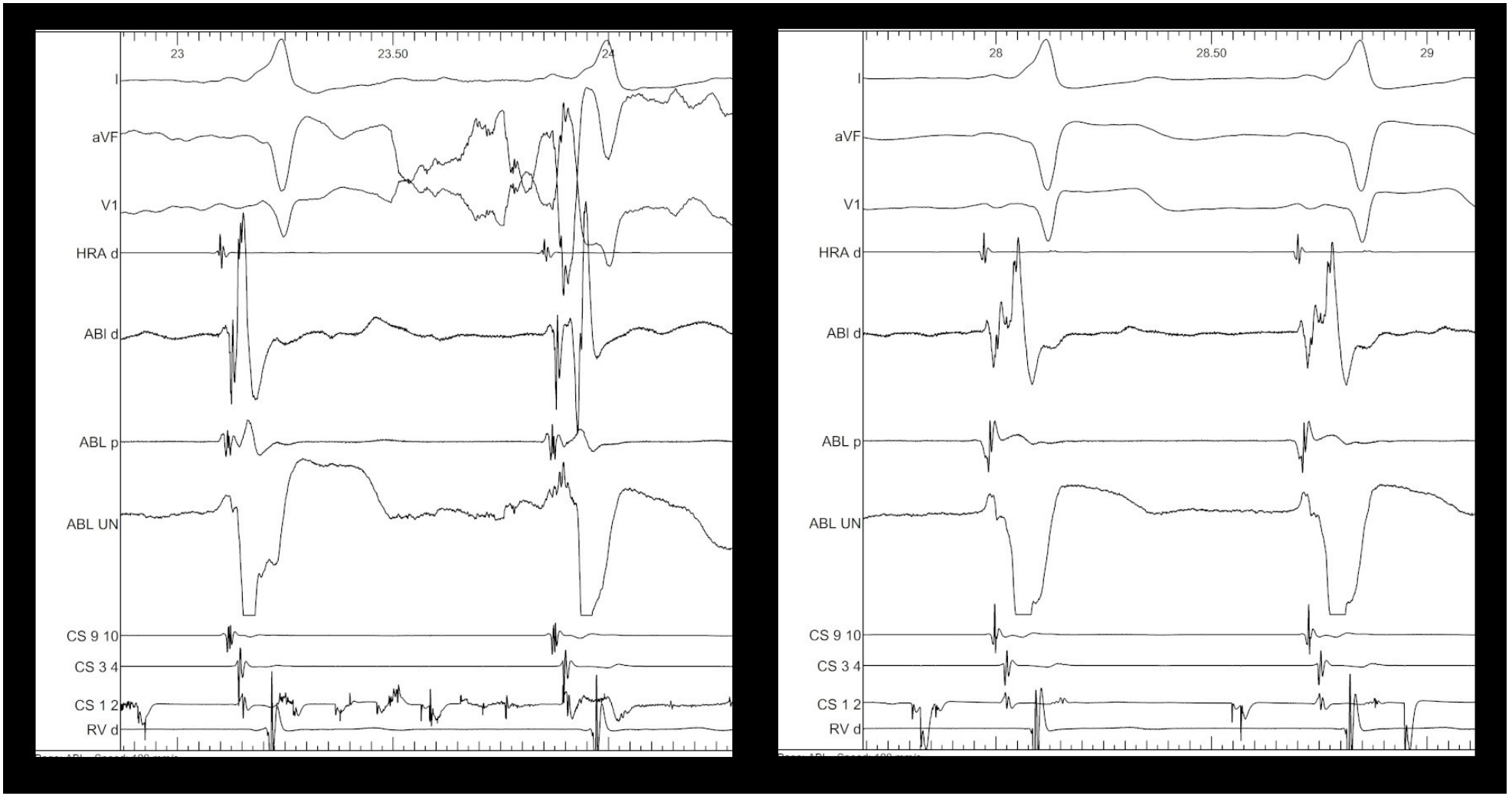
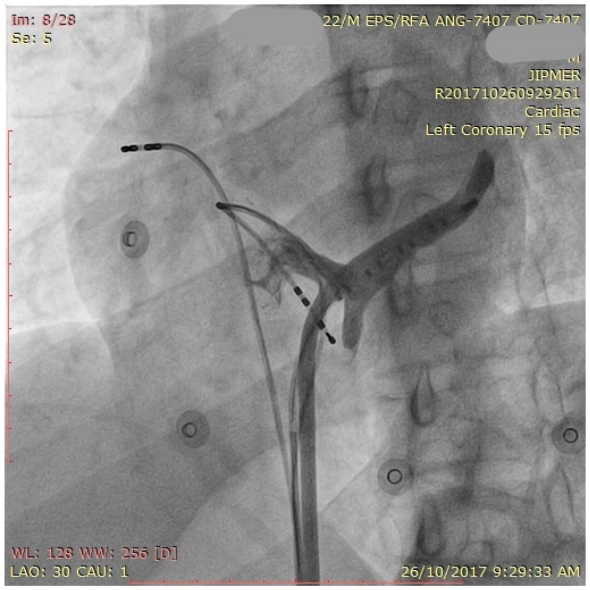
Mapping in diverticulum

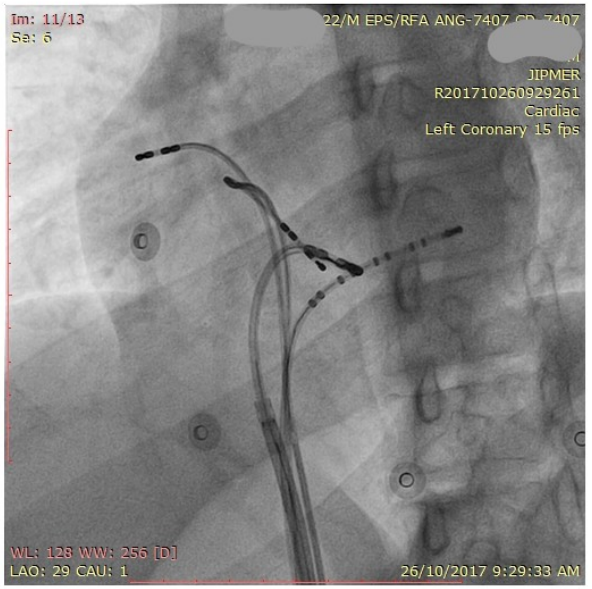


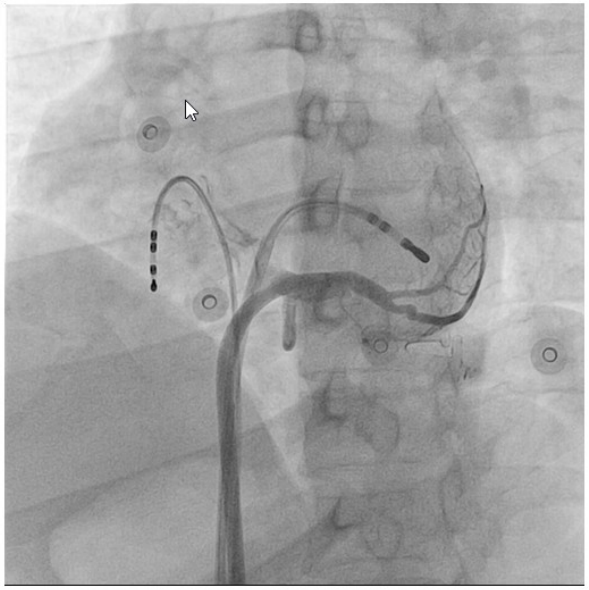
Mapping in absence of diverticulum

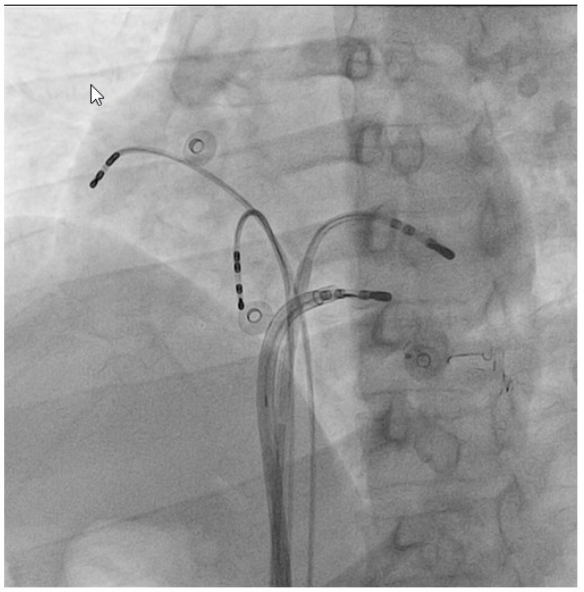
- Venography to delineate (systolic contraction)
- Map along branches – MCV / Post V
- CSE potential
- Early V

Mapping in absence of diverticulum

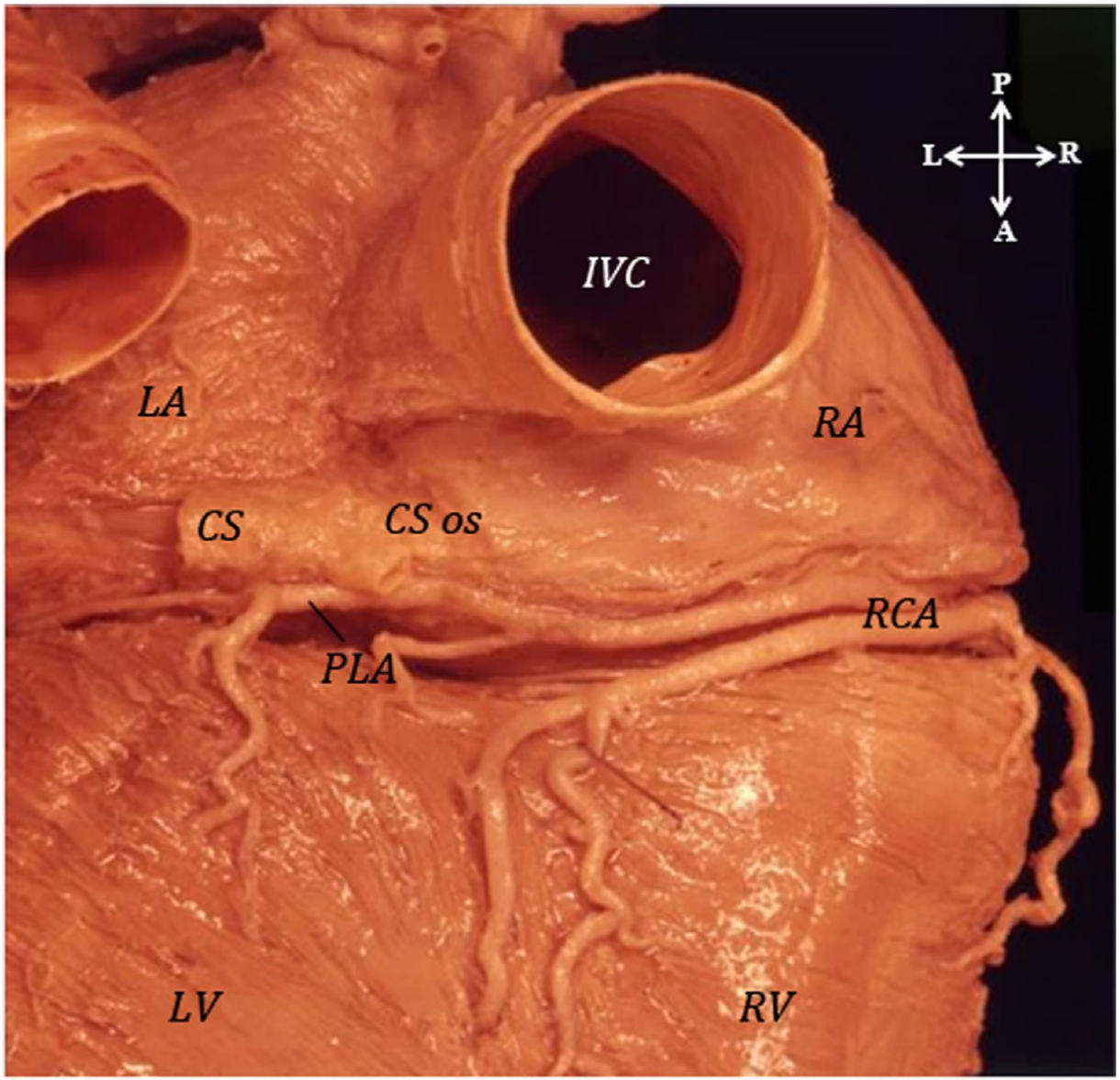








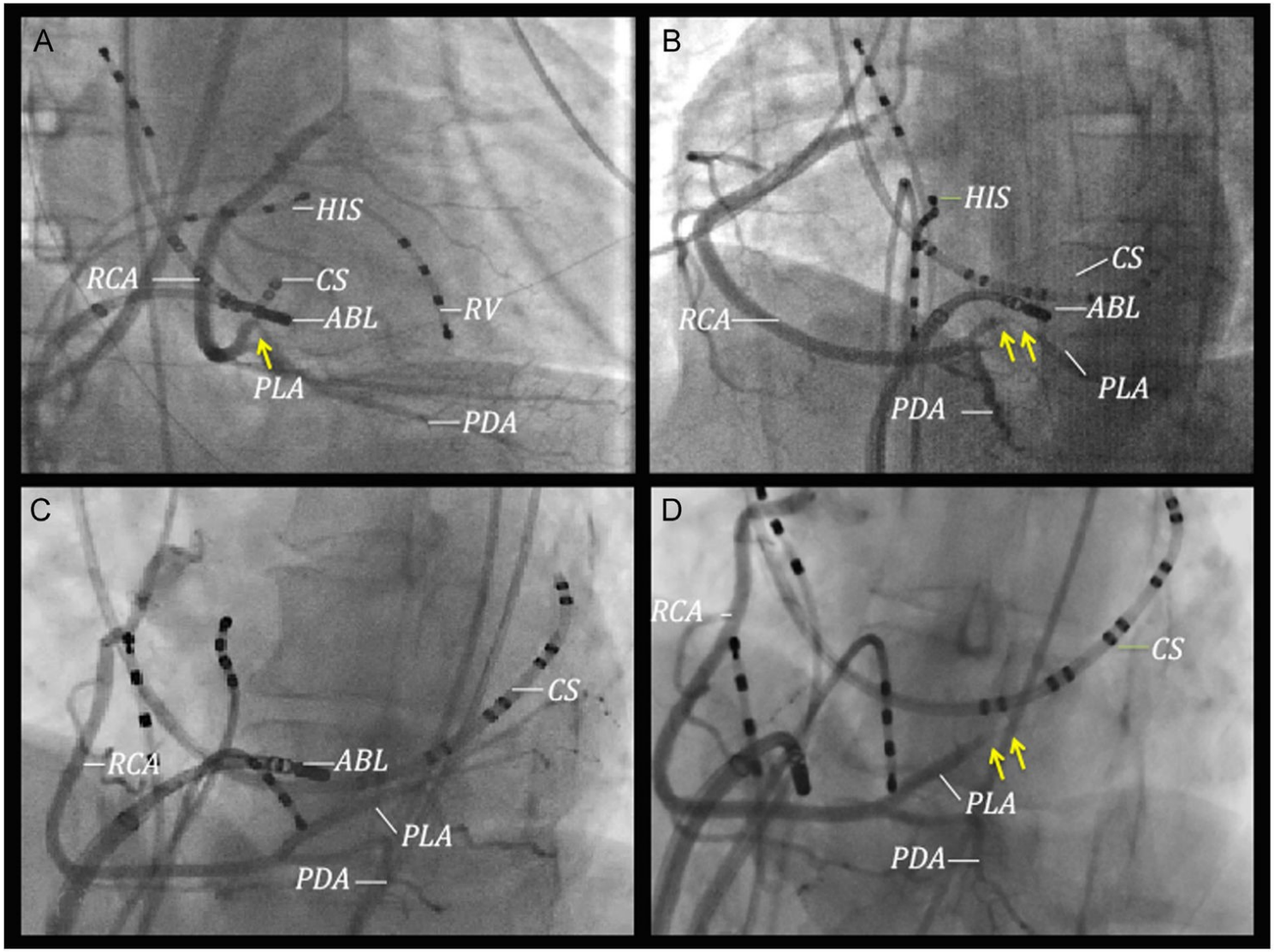
Mapping and Ablating CS pathways



1) Mao J, .. Shivkumar K, Vaseghi M. Catheter ablation of accessory pathways near the coronary sinus: value of defining coronary arterial anatomy. Heart Rhythm. 2015;12(3):508–514.

Mapping and Ablating CS pathways

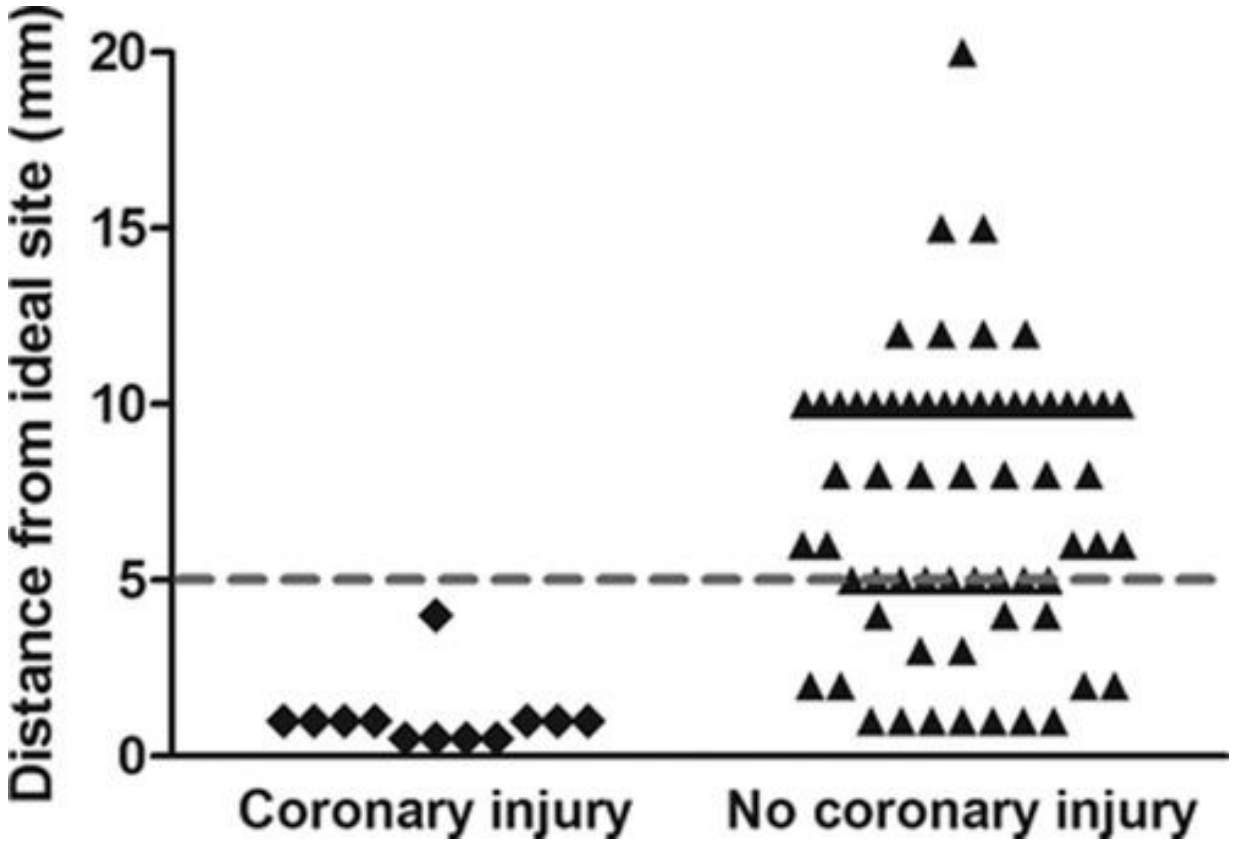
Arterial injury



1) Mao J, .. Shivkumar K, Vaseghi M. Catheter ablation of accessory pathways near the coronary sinus: value of defining coronary arterial anatomy. Heart Rhythm. 2015;12(3):508–514.

Mapping and Ablating CS pathways

Avoiding arterial injury



1) Stavrakis S, Jackman WM, Nakagawa H et al. Risk of coronary artery injury with radiofrequency ablation and cryoablation of epicardial posteroseptal accessory pathways within the coronary venous system. Circ Arrhythm Electrophysiol. 2014 Feb;7(1):113-9

Mapping and Ablating CS pathways

Summary

- Important to be aware and suspect
- CS venogram
- Map along neck of diverticulum / along branches
- CSE potential
- Arterial injury to be avoided