INVESTIGACIÓN: ANGOR CON CORONARIAS SIN LESIONES SIGNIFICATIVAS

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16-NOV -2023

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DE QUÉBEC

Faculté de médecine
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Conflictos de interés

- Ningún conflicto económico
- Consultante: Abbott, Jamp Pharma, Servier
- Becas para research / transferencia de conocimientos: Abbott, Biotronik, Boston, Medtronic, Opsens, Amgen, Sanofi, HLS, Novartis

- Software no aprobado en Canadá. Obtenido con permiso especial de Santé Canada.

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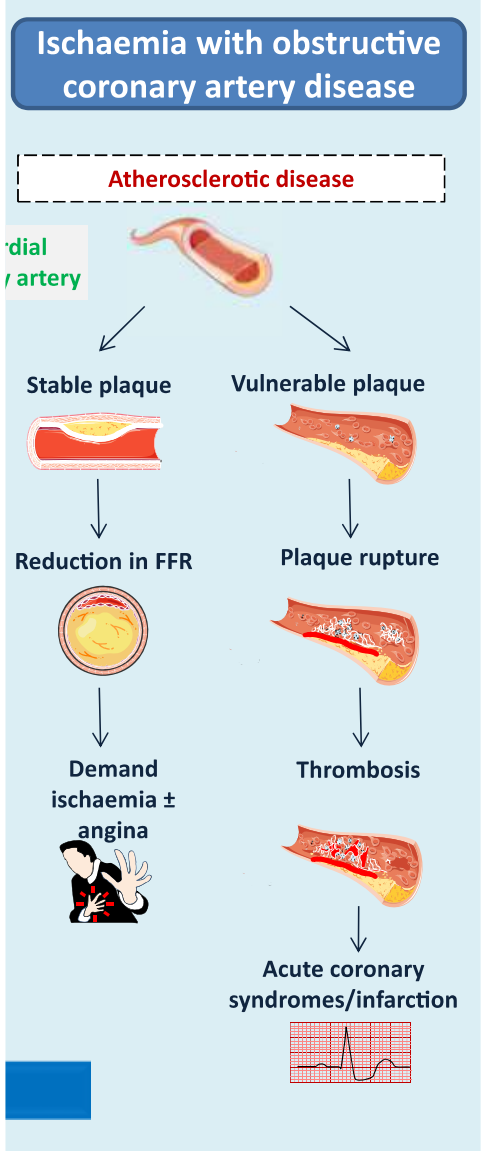
Objectivos

- Entender los mecanismos de angina en pacientes con coronarias normales.
- Discutir fisiología coronaria mas allá de FFR y NHPR



Acrónimos a retenir

- **INOCA =** Ischaemia with non-obstructive coronary arteries
- **ANOCA=** Angor with non-obstructive coronary arteries
- **MINOCA=** Miocardial infacrtion…..
- **CMD =** Coronary microvascular dysfunction
- **VSA=** Vasospastic angina
- **CFR =** Coronary flow reserve
- **IMR =** Index of microcirculatory resistance

Introducción

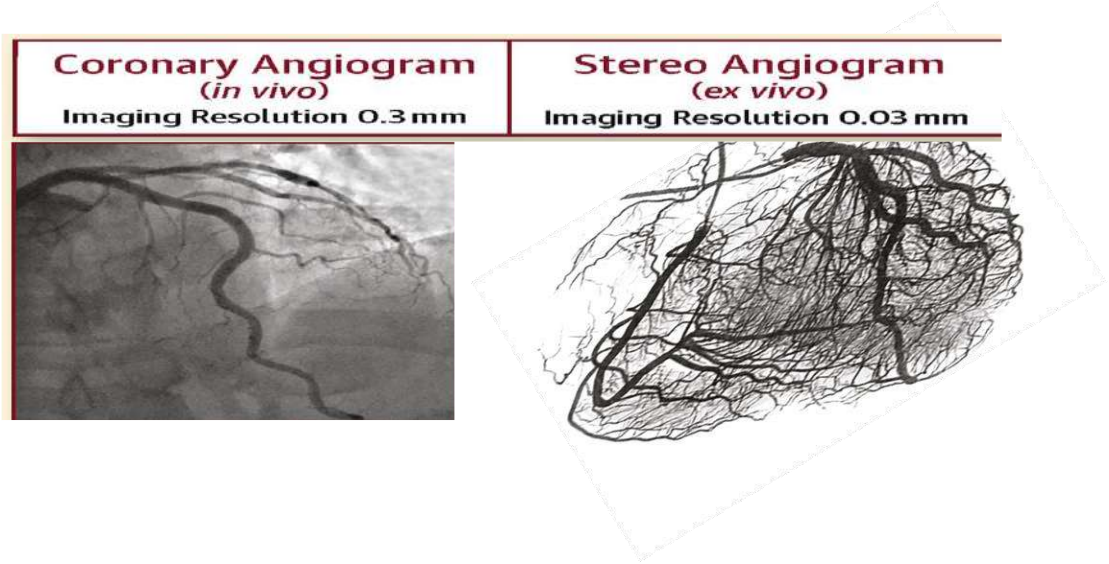
- Se estima que al menos de 2 de cada 5 pacientes que son referidos para una coronariografía electiva tendrán arterias sin lesiones significativas, con tasas más elevadas en las pacientes sexo femenino.
  N. Engl. J. Med. 362 (2010) 886–895.

- La mayoría de pacientes. Con INOCA sufren durante años antes de obtener un diagnóstico, dado que a veces hay falta de sensibilidad y sobre todo por una disponibilidad limitada a los test y experticia en INOCA Heart. 104 (2018) 284–292.

Definición

- INOCA implica une discordancia entre la oferta y la demanda de oxigeno miocárdico, sin lesiones significativas a nivel de las arterias epicárdicas

- Dos mecanismos mayores:
  1. disfunción microvascular
  2. problemas vasoespásticos



Ischaemia with non obstructive coronary arteries (INOCA)

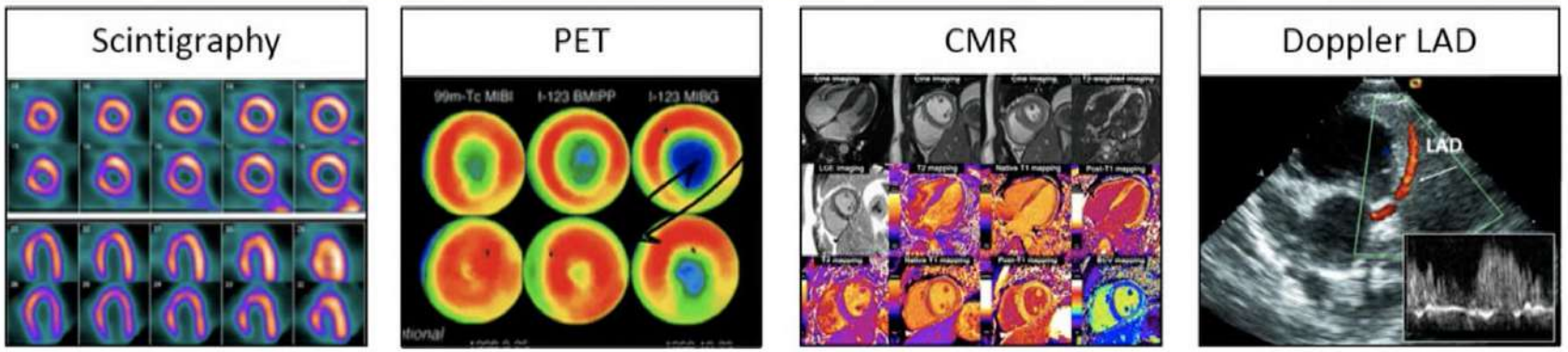
Coronary Microvascular dysfunction (CMD)/Vasospastic angina (VSA)

Non-invasive evaluation

Step 1: Patient evaluation

Step 2: Non-invasive evaluation
Functional Imaging
± Coronary CT Angiography

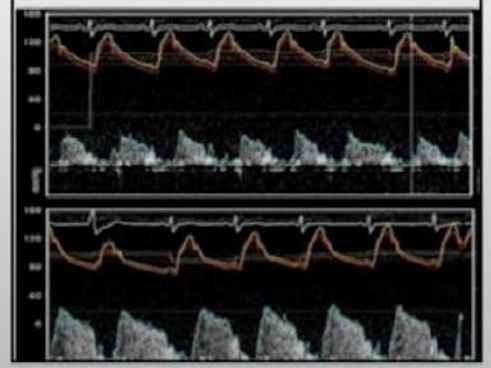
Non-invasive methods



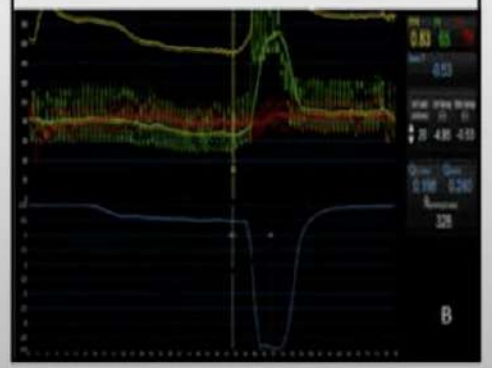
2020 Kunadian EAPCI document INOCA EHJ 2020

Invasive methods

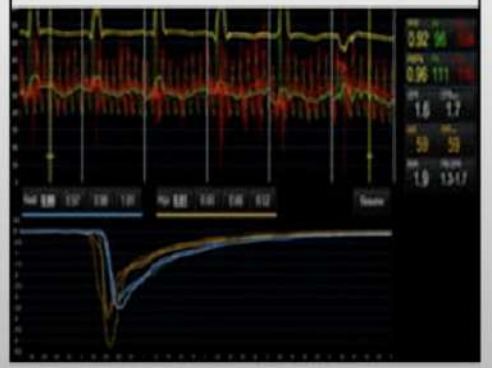
Doppler



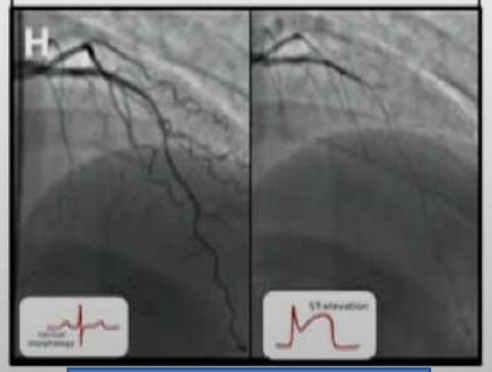
Cont Thermodilution



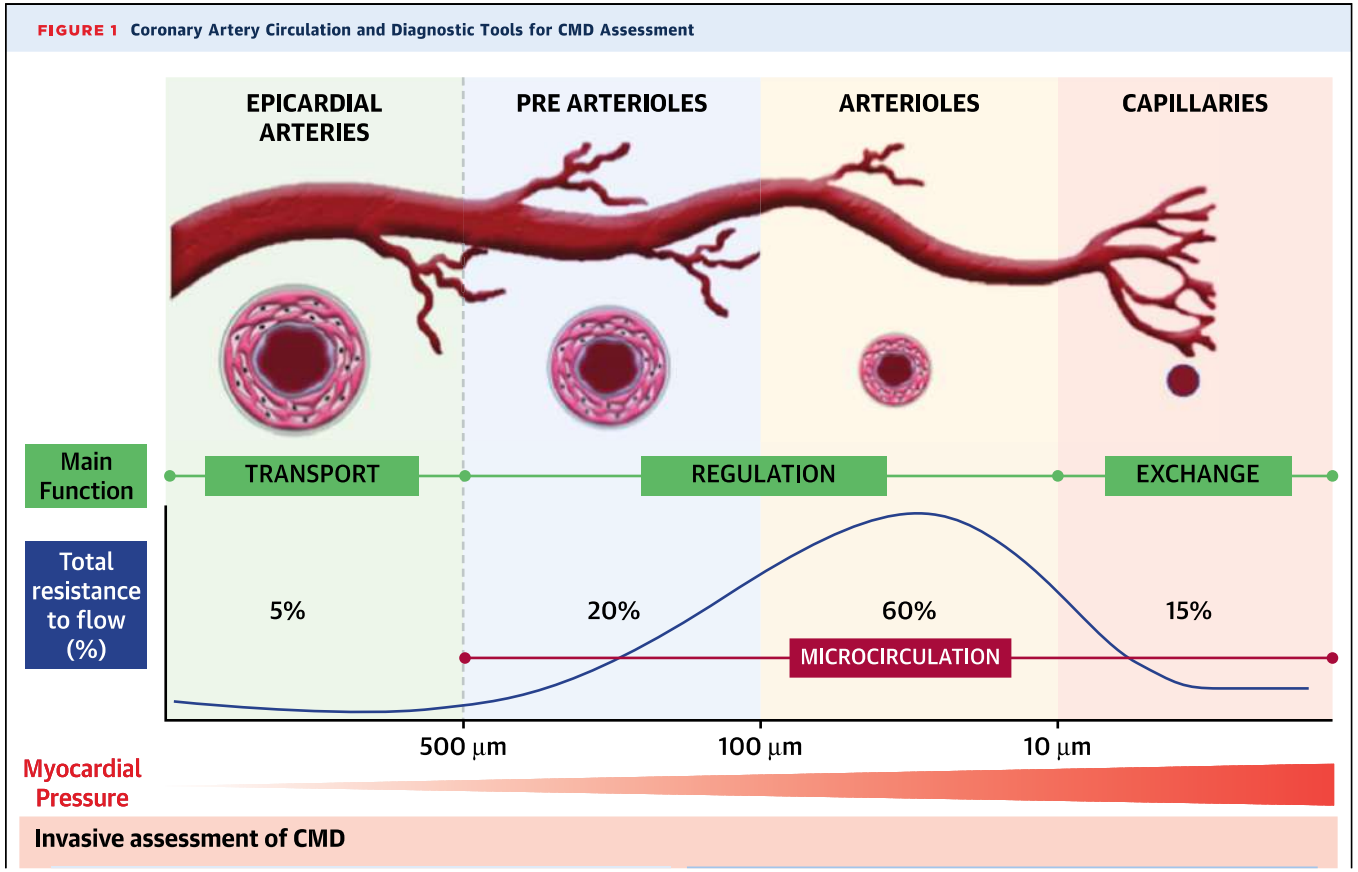
Bolus Thermodilution



Acetylcholine



ergonovine



IMR/HMR

CFR

Ach / ergonovine

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2021 CMD state of the art Del Bueno et al JACC 2021;78,1352-1371.pdf

Vasospasme: ergonovine/ Ach

Definition of Spasm during Acetylcholine Provocation Test

	Recognizable symptoms	ECG changes	>90% diameter reduction
Epicardial Spasm	Yes	Yes	Yes
Microvascular Spasm	Yes	Yes	No
No Spasm	No	No	No
Inconclusive	All other combinations		

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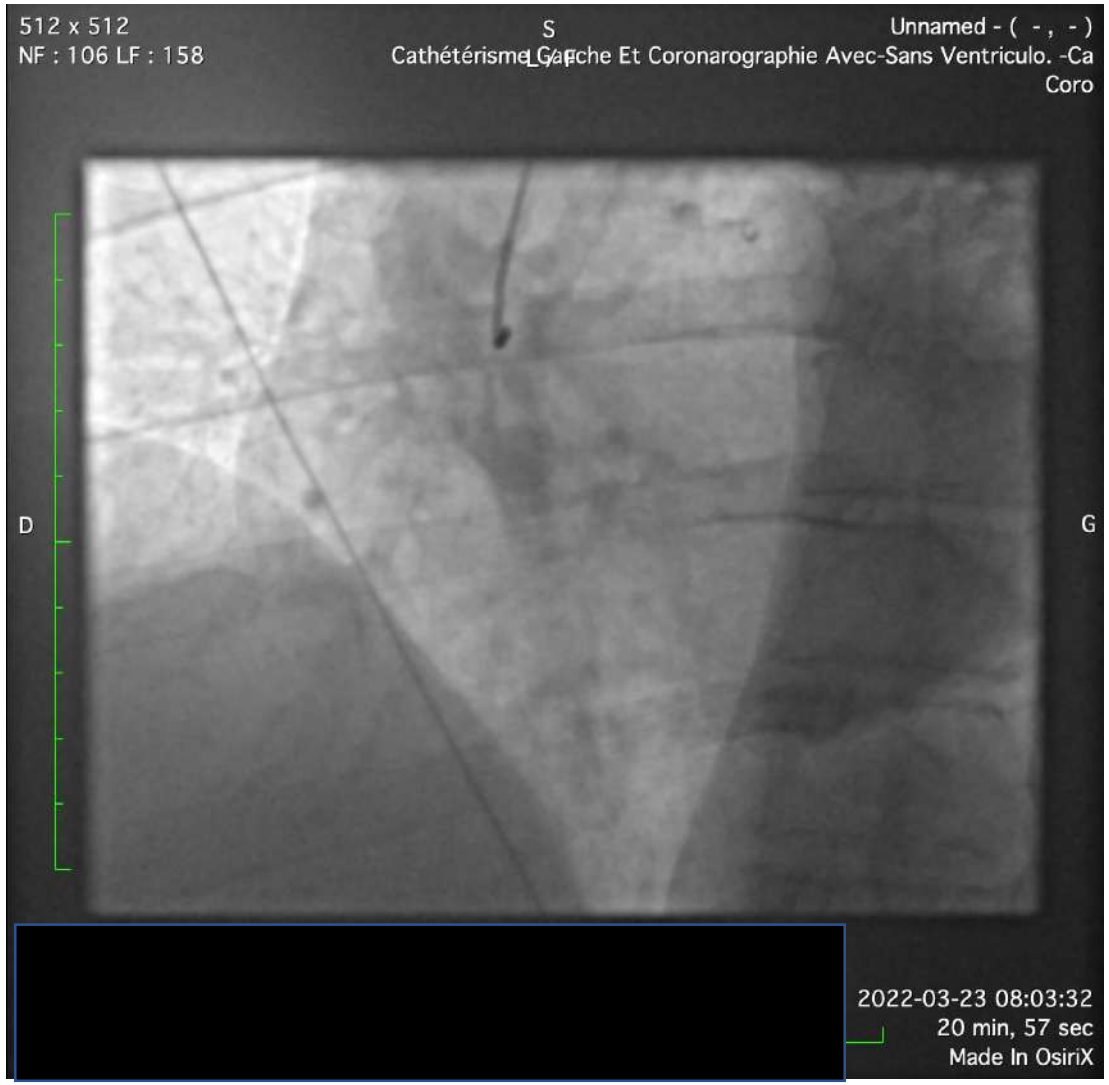
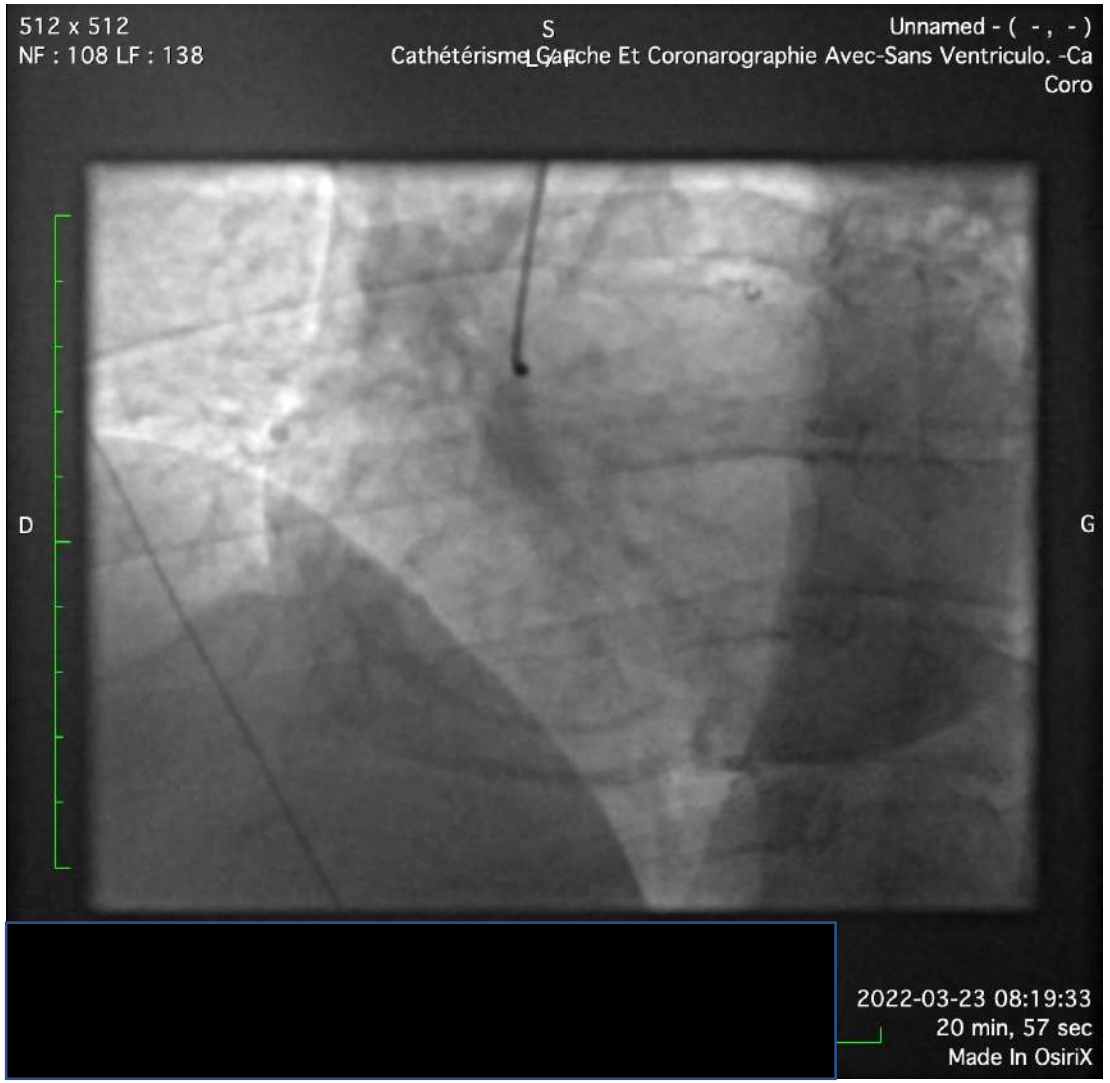
Caso 1: espasmo epicárdico





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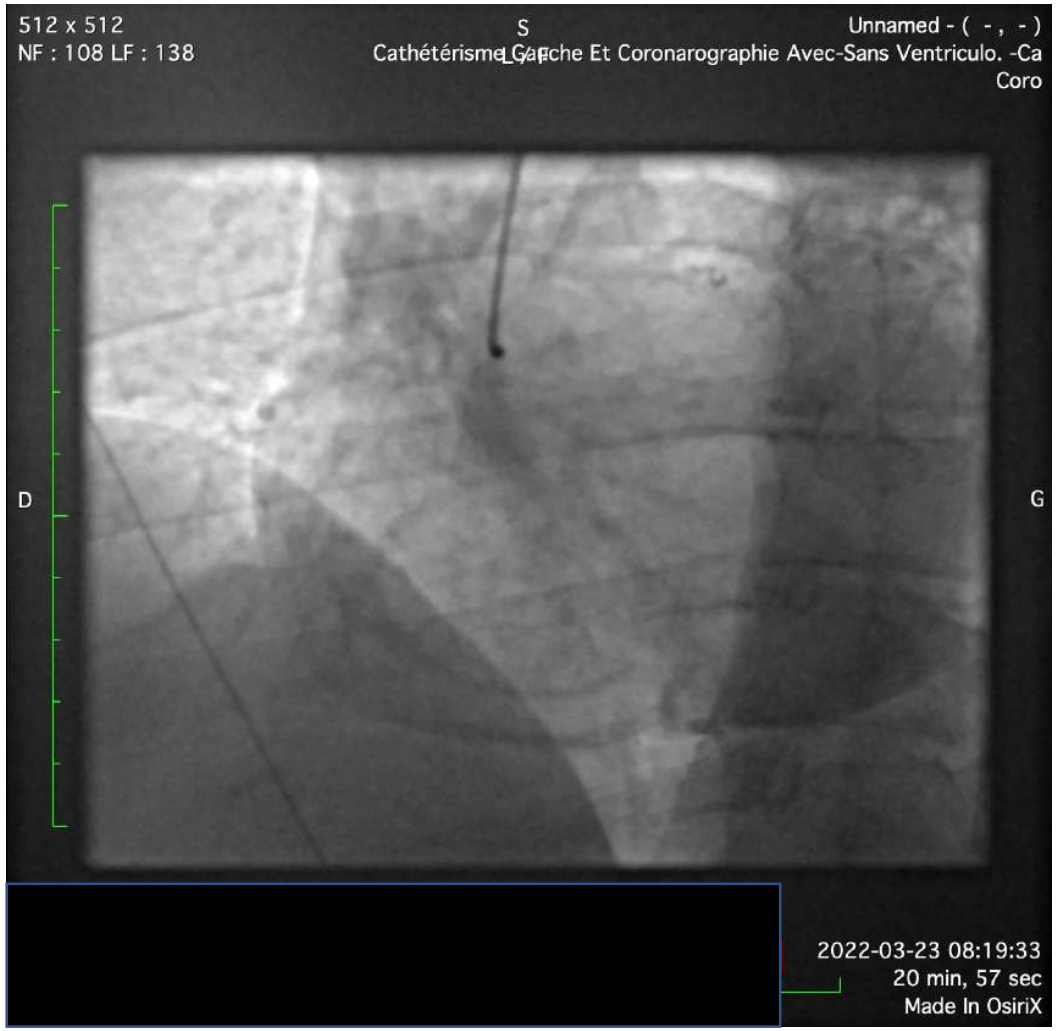
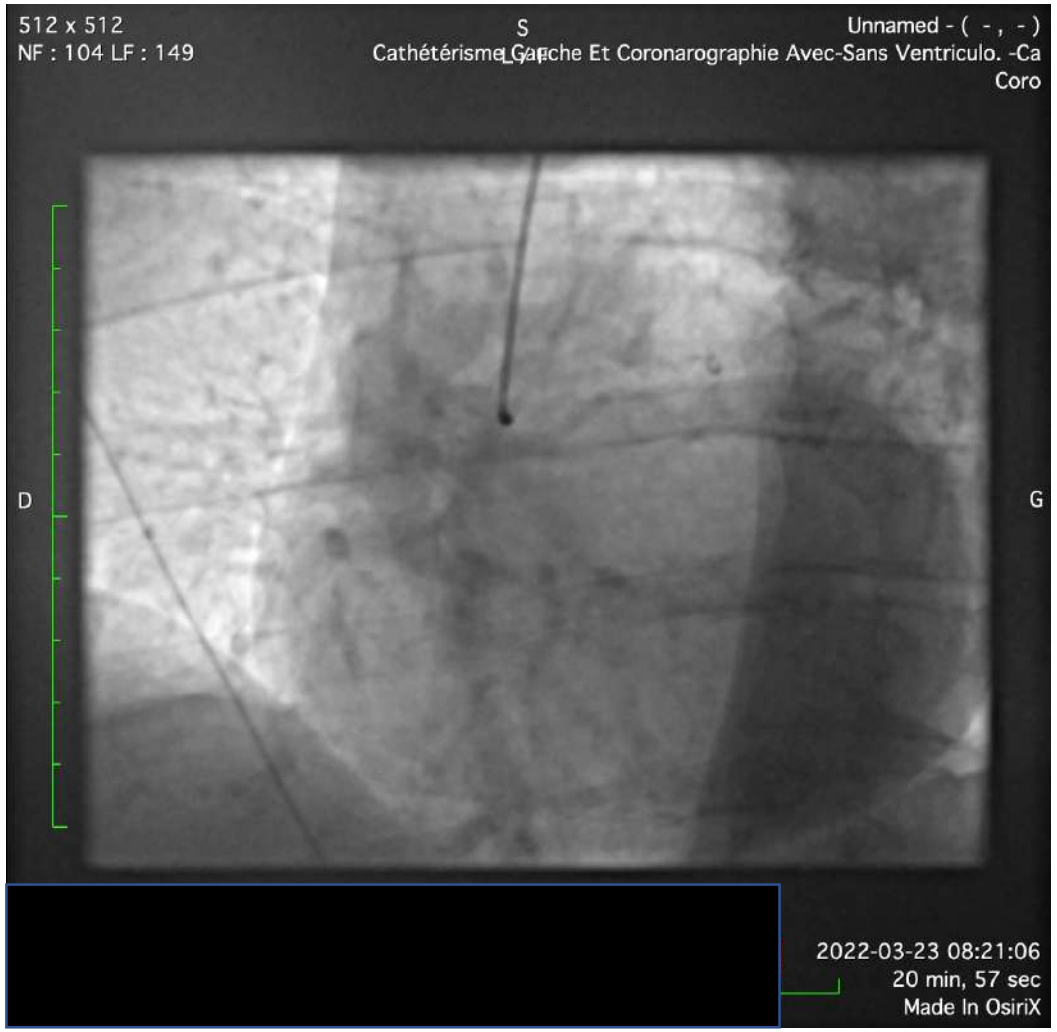
Caso 1





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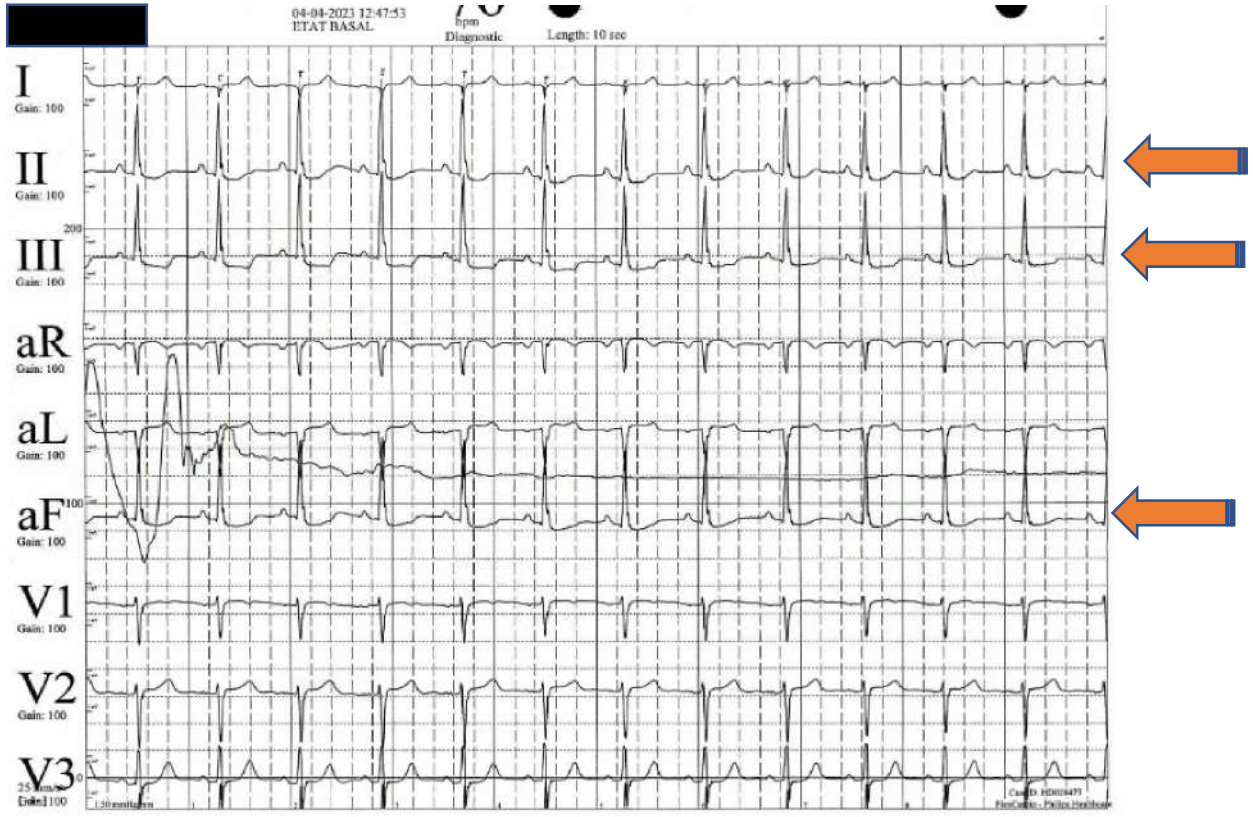
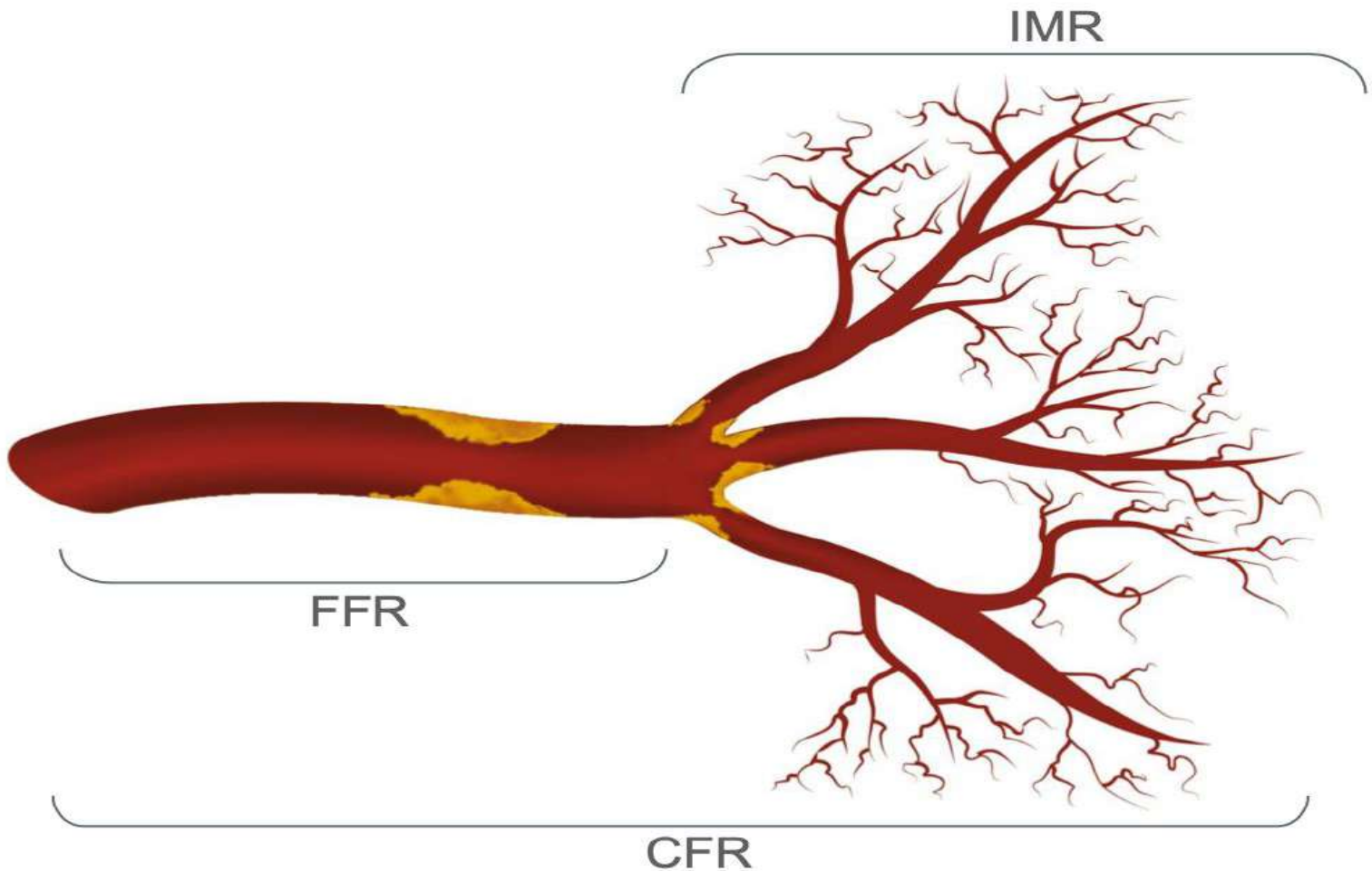
Caso 2: espasmo microvascular



Fisiología microvascular

- La reserva de flujo coronario (CFR) es el aumento máximo del flujo sanguíneo en las arterias coronarias por encima del volumen normal en reposo.

- El IMR (índice de resistencia micro circulatoria) se mide durante el pico de hiperemia y es una representación de la resistencia microvascular mínima alcanzable y un reflejo del estado funcional de la microcirculación.



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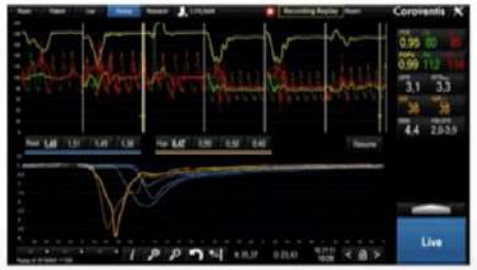
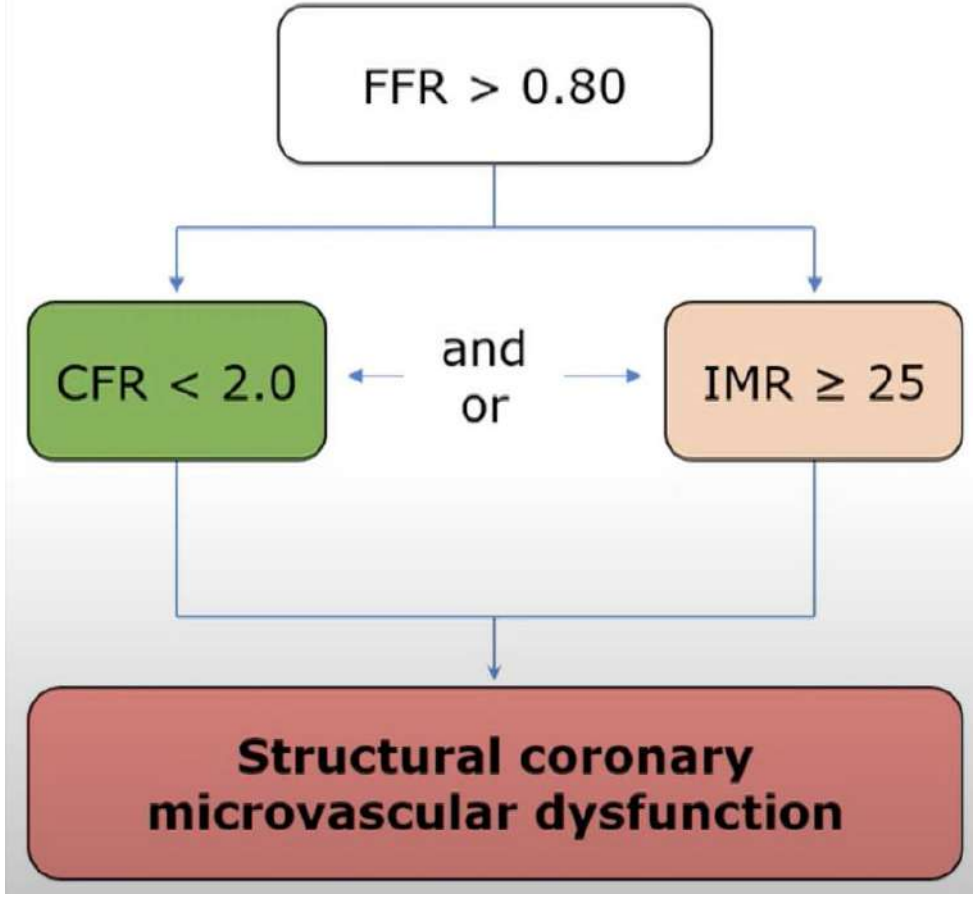
Matériel nécessaire

Pressure and Temperature wire	Hyperemic Agent	Dedicated Console
		

Evaluación invasiva de la microcirculación.

Assessment of non-endothelium-dependent vasodilation with



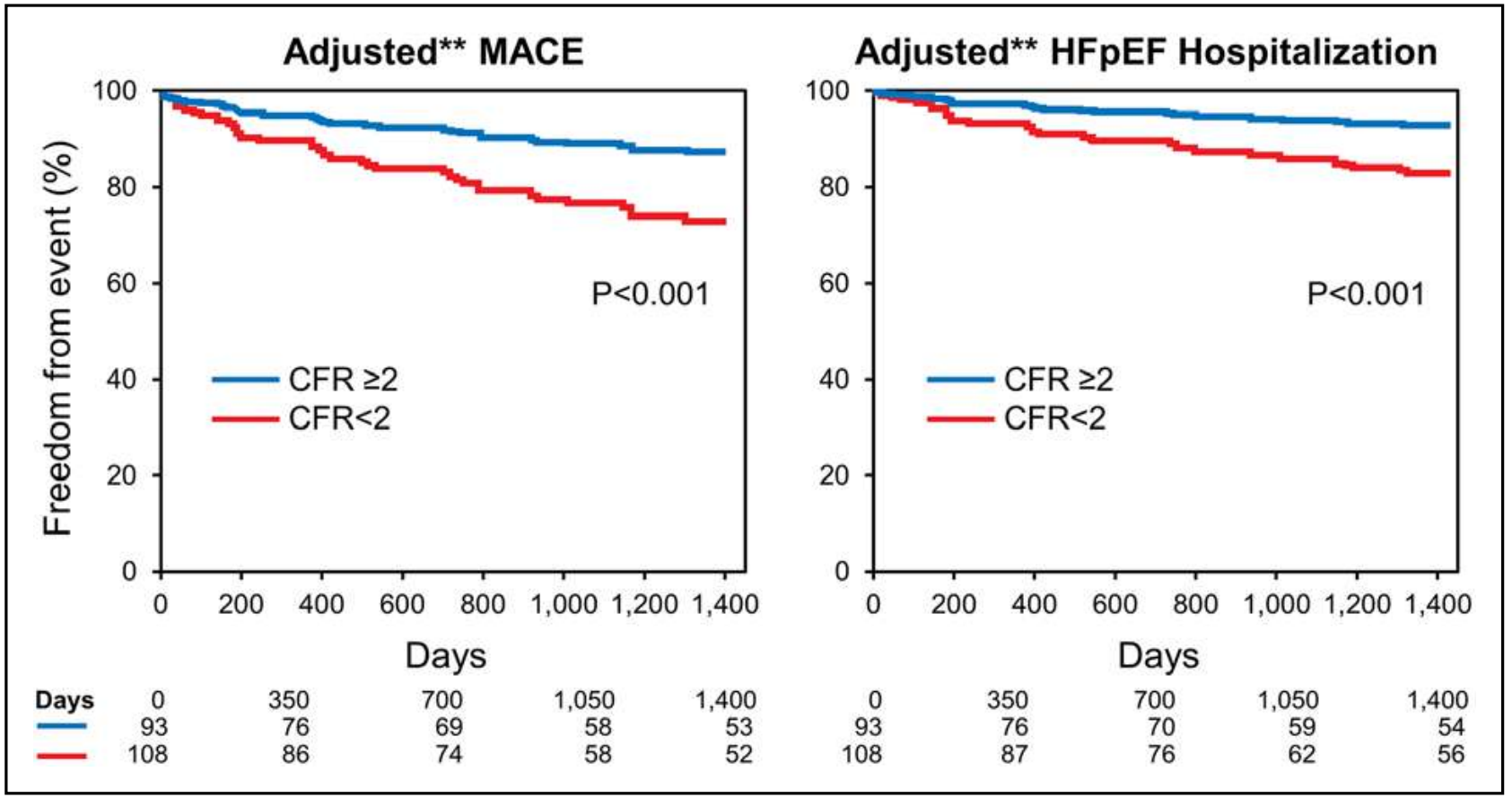
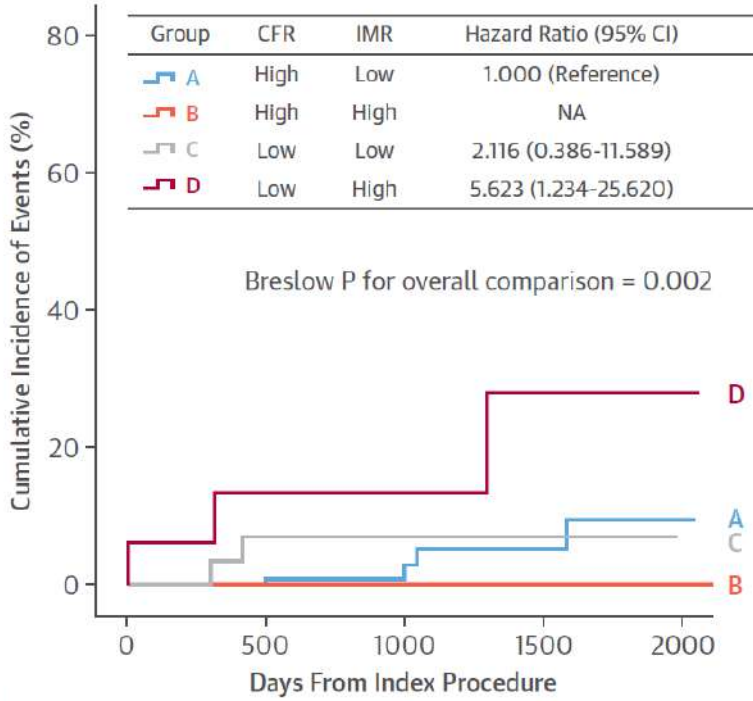


Figure 4. Coronary microvascular dysfunction leading to reduced coronary flow reserve is associated with heart failure with preserved ejection fraction (HFpEF) and impaired clinical outcomes.

CFR - IMR et pronostique

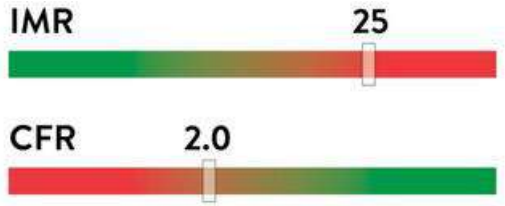
In 313 patients with FFR>0.80, those with low CFR and high IMR (microvascular dysfunction) had significantly higher rate of death, MI, or revascularization.

Group	CFR	IMR	Hazard Ratio (95% CI)	P value
A	High	Low	1.000 (Reference)	NA
B	High	High	NA	NA
C	Low	Low	2.116 (0.386-11.589)	0.388
D	Low	High	5.623 (1.234-25.620)	0.026



Lee JM, et al. J Am Coll Cardiol 2016;67:1158-69.

Caso 3: Imágenes de fisiología



Caso 3: Imágenes de fisiología

CFR

Rest / hyper

1.10/055= 1,8

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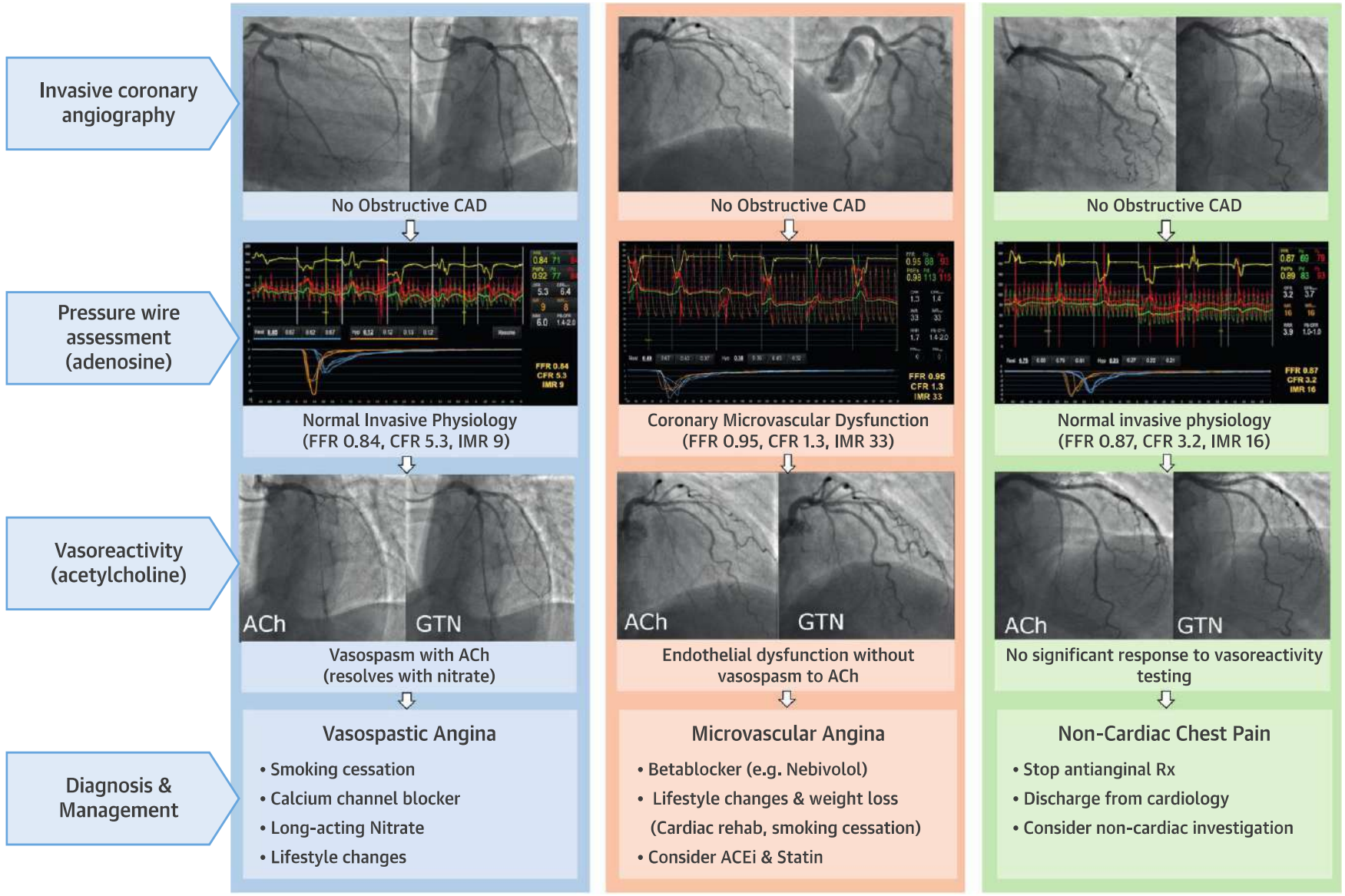
Caso 3: Imágenes de fisiología

IMR

Pd / CFR

59 / 1,8 = 33

FIGURE 1 Stratified Medical Therapy Guided by an IDP in Patients With Angina but No Obstructive CAD



JACC 2018;72:2841-55

Table 1: Definition and Invasive Diagnostic Criteria for Disorders of Coronary Artery Function

Disorder	Symptoms	Clinical measurement
Microvascular angina	Abnormal microvascular resistance	• IMR ≥25[27] • Hyperaemic microvascular resistance ≥2.5 mmHg/cm/s[28]
	Impaired coronary vasorelaxation	• CFR by thermodilution <2.0[25]
	Microvascular spasm	Angina symptoms with ACh infusion AND: • ST-segment deviation on ECG • No significant epicardial coronary spasm (<90% diameter reduction)
Vasospastic angina	Epicardial spasm	Angina symptoms during ACh bolus (e.g. 100 g acetylcholine over 20 seconds) AND: • ST-segment deviation on ECG • >90% epicardial coronary constriction during ACh reduction[34]
Non-cardiac		• Exclusion of significant epicardial coronary disease (fractional flow reserve >0.8) without any of the following abnormalities of coronary function: CFR <2.0, IMR ≥25 or positive ACh response.

ACh = acetylcholine; CFR = coronary flow reserve; IMR = index of microvascular resistance.

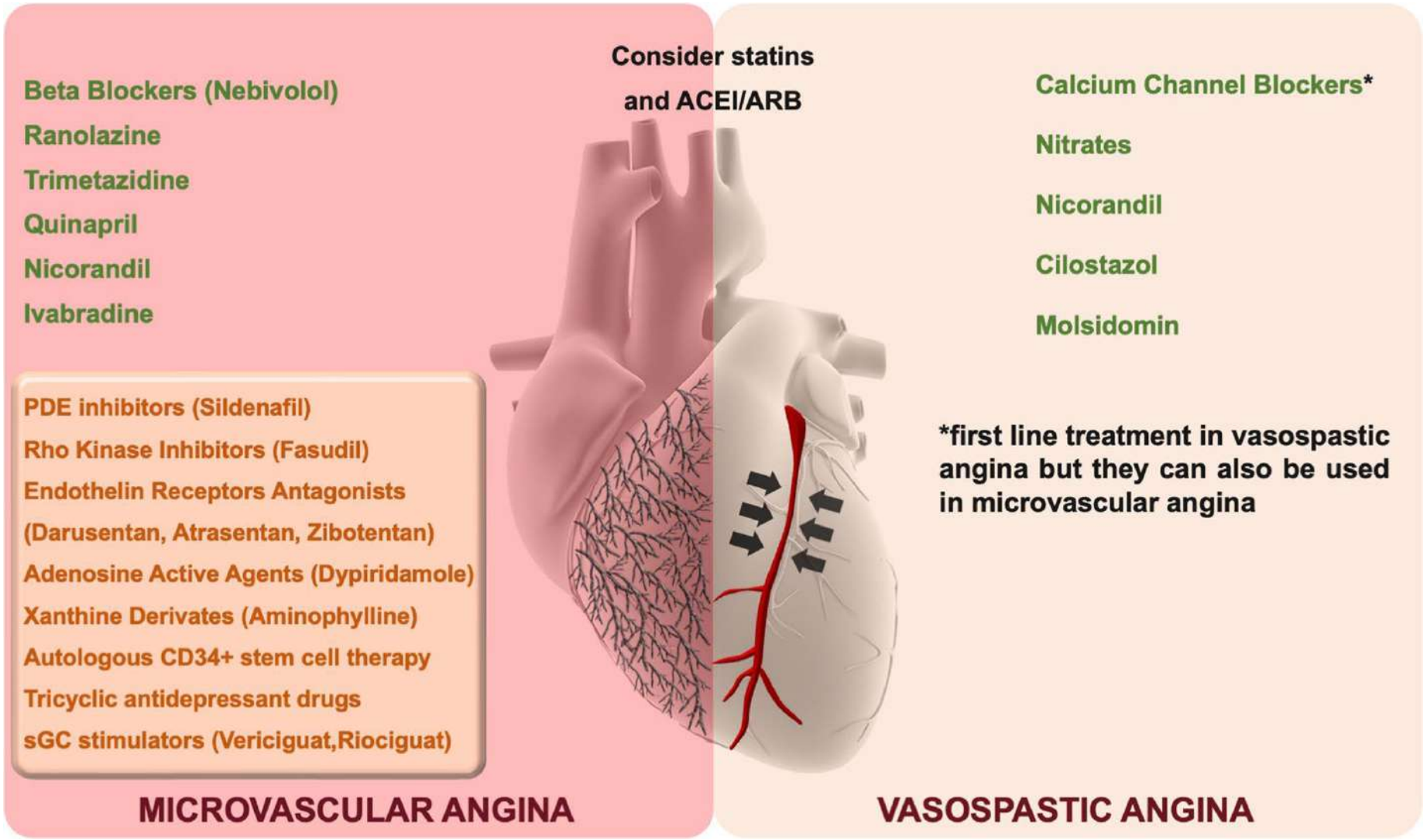


Fig. 1 Therapeutic management of vasomotor disorders. In green, currently available medications. In orange, the drugs under study

Muchas Gracias

Preguntas ?

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