CORONARY IMAGING & PHYSIOLOGY

INNOVATION IN TRANSCATHETER INTERVENTIONS

CUORE E NON SOLO INTERVENTIONAL CARDIOLOGY

UPO UNIVERSITÀ DEL PIEMONTE ORIENTALE

Paziente con “bridge miocardico”

Domenico D'Amario MD PhD FHFA
Associate Professor of Cardiology
Università del Piemonte Orientale, Novara, ITALY

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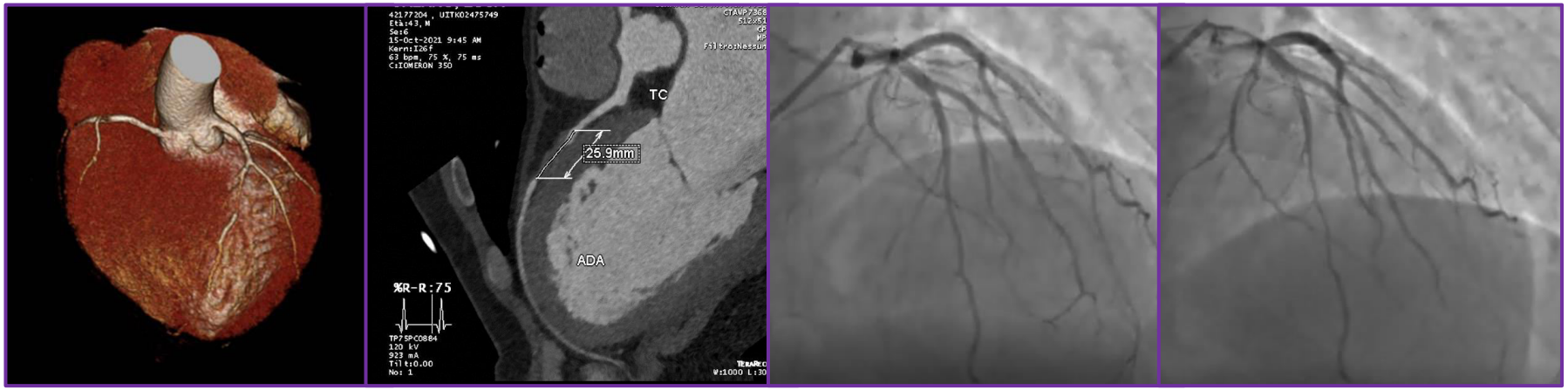
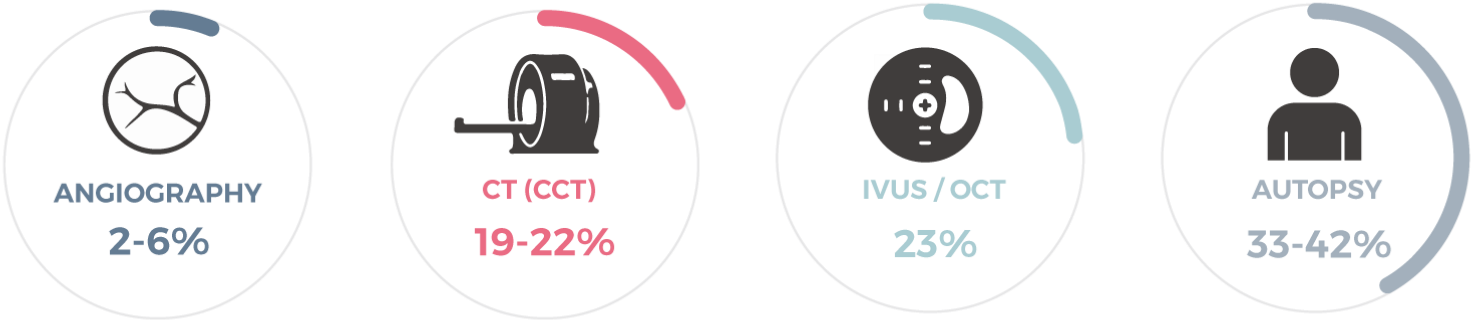
Background

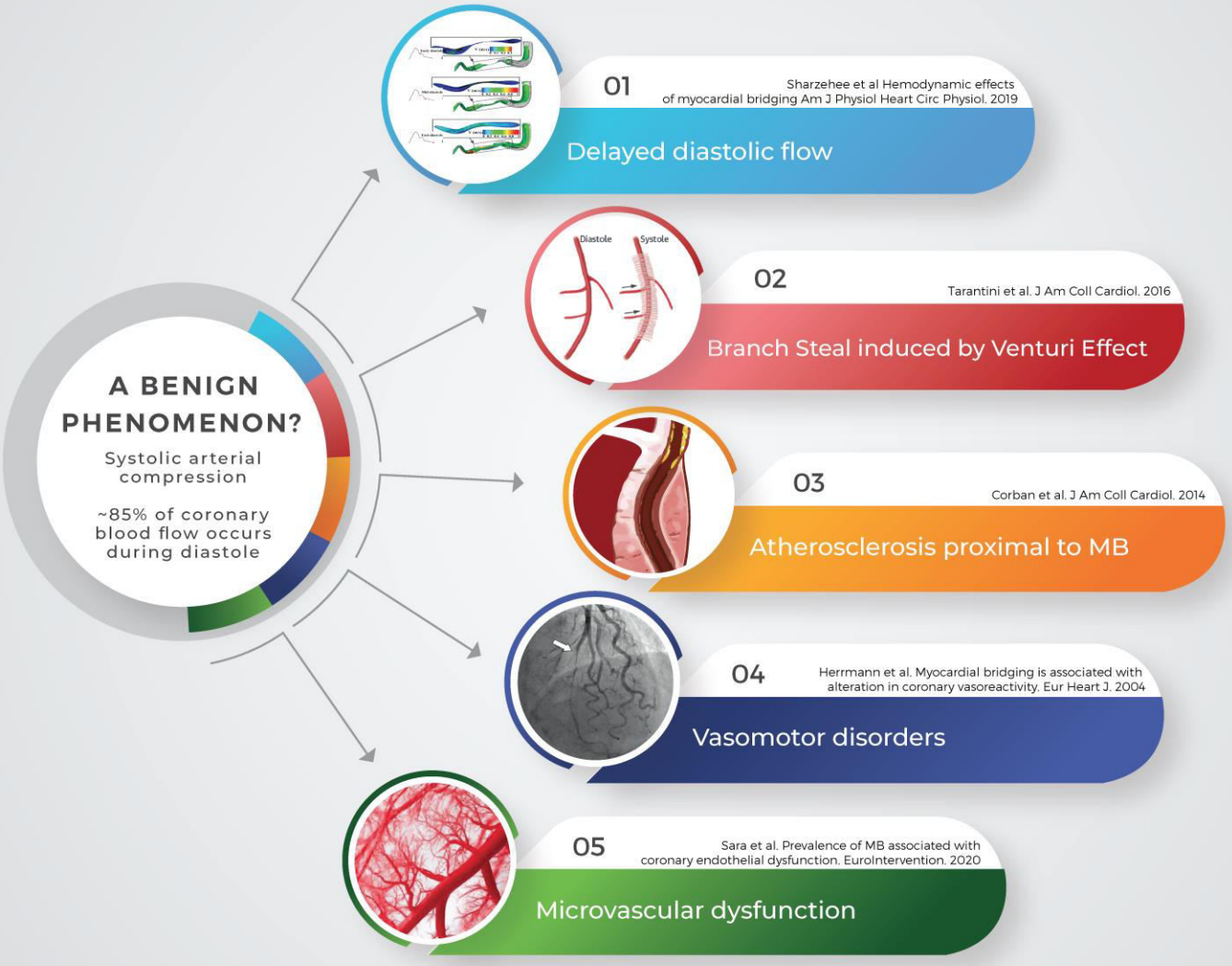
Myocardial bridge is the most common congenital coronary anomaly in which a segment of the epicardial coronary artery takes a tunneled course under a bridge of myocardium and is squeezed during ventricular systole



The incidence of MB depends on the modality used to identify the tunneled segment:

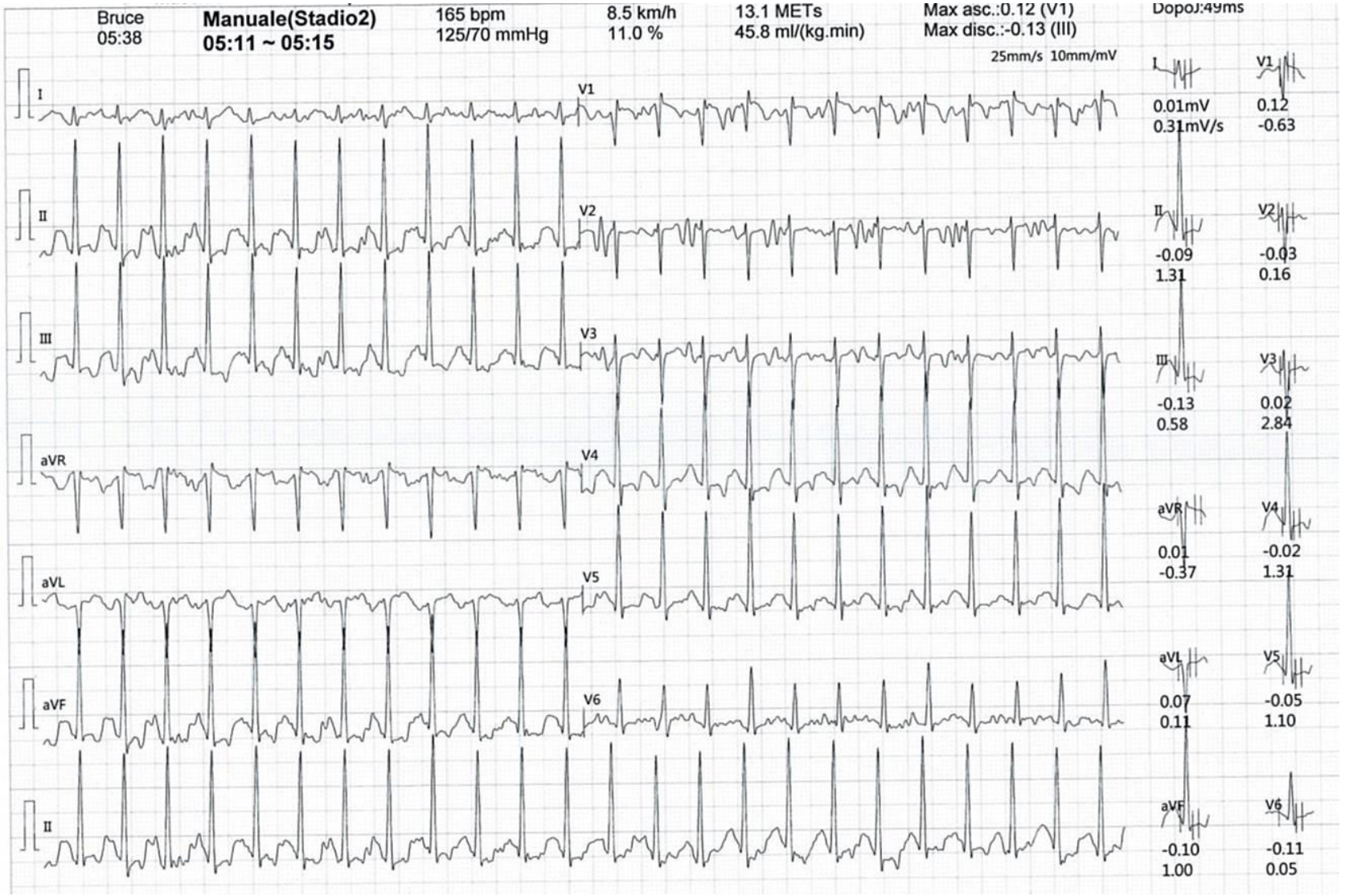


Myocardial bridge-related ischemia



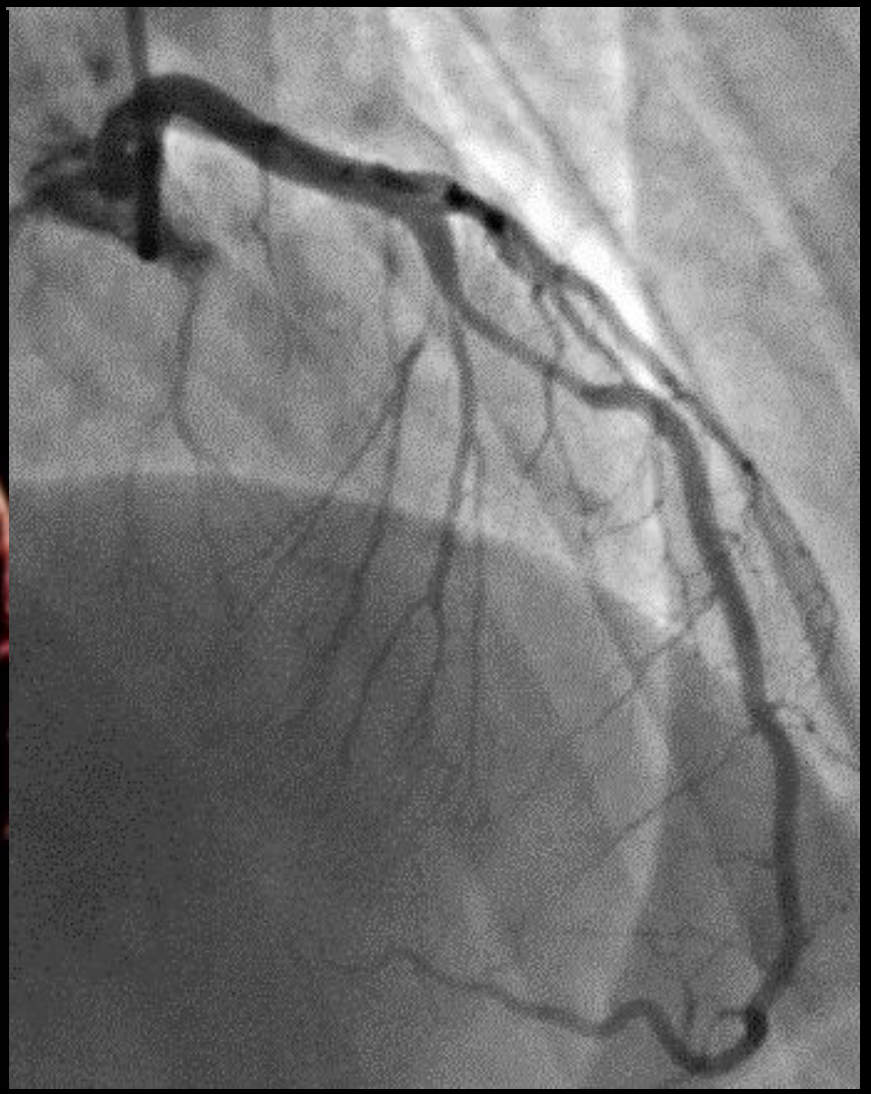
20 anni, calciatore professionistico italiano, paucisintomatico

Visita d'idoneità



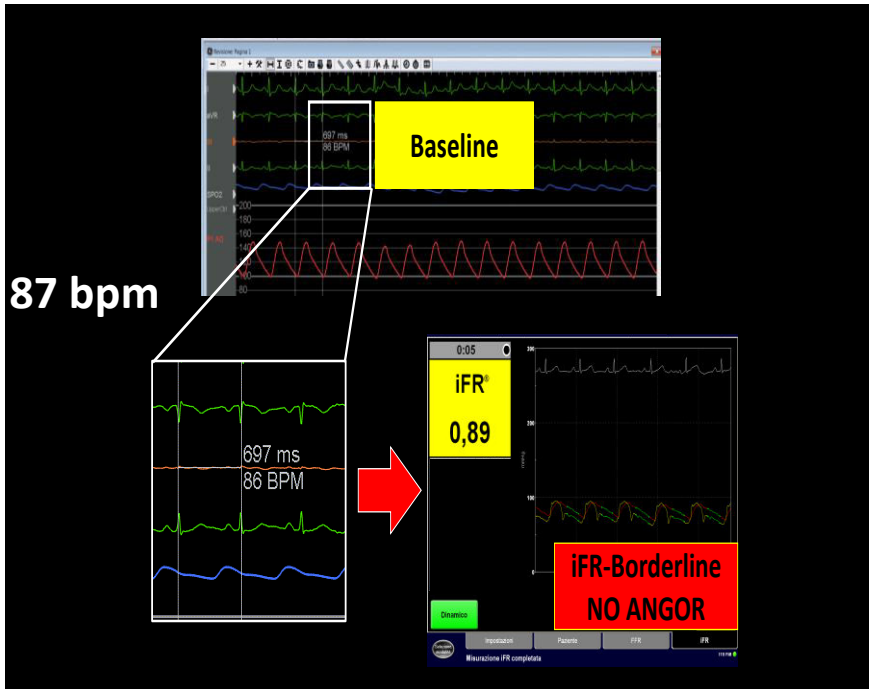
Cortesia Prof. Paolo Zeppilli

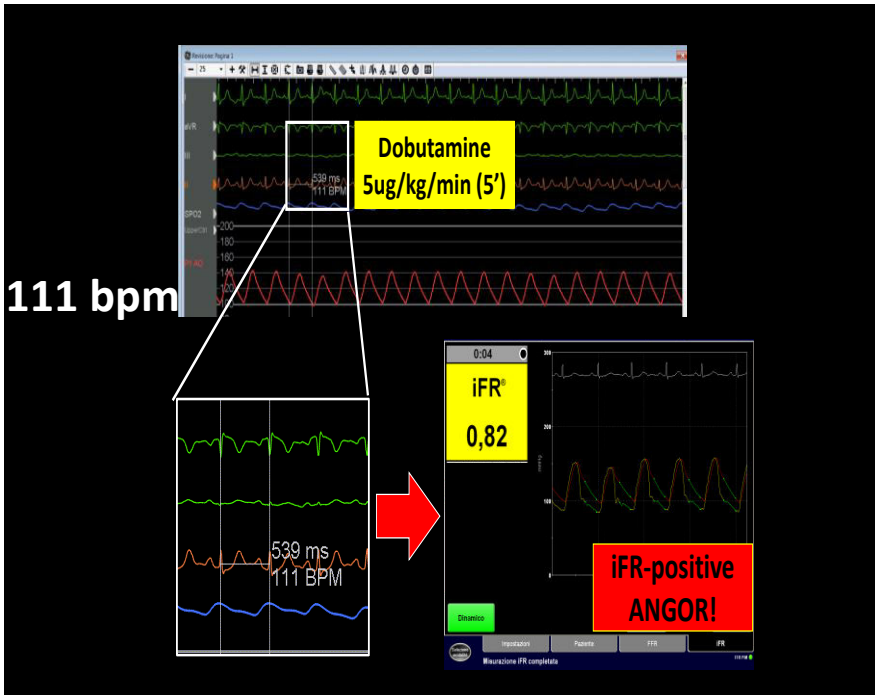
20 anni, calciatore professionista, ECG sforzo «falso-positivo»

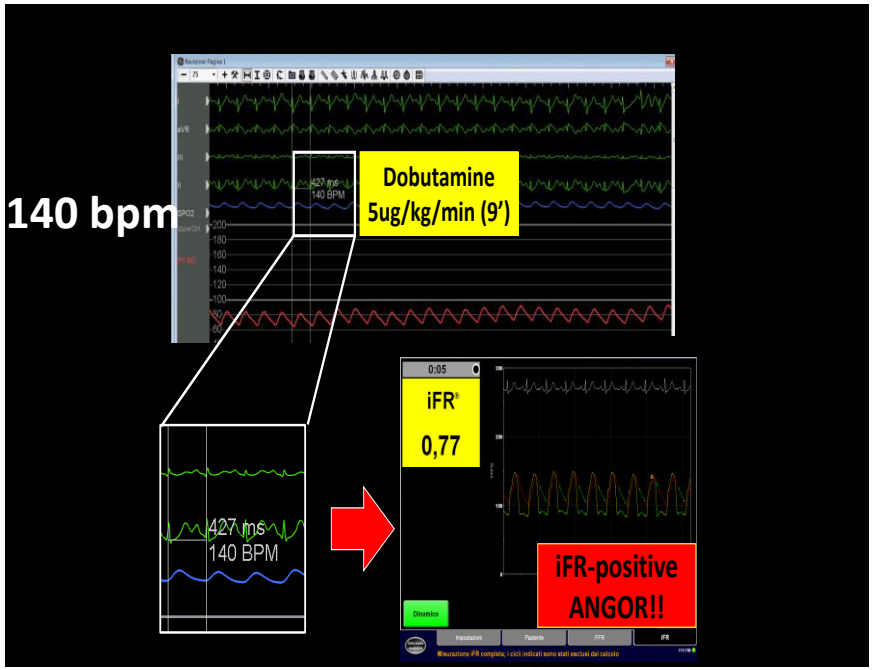


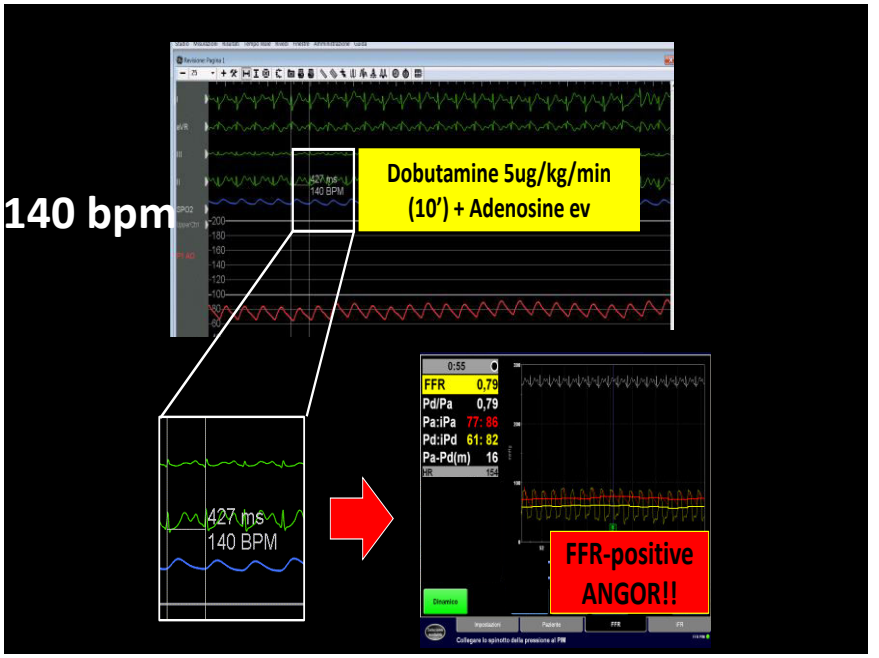
Cortesia Prof. Daniele Andreini

Cortesia Prof. Domenico D'Amario


87 bpm
Baseline
697 ms
86 BPM
0:05
iFR
0,89
iFR-Borderline
NO ANGOR


111 bpm
Dobutamine
5ug/kg/min (5')
539 ms
111 BPM
0:04
iFR
0,82
iFR-positive
ANGOR!


140 bpm
Dobutamine
5ug/kg/min (9')
427 ms
140 BPM
0:05
iFR
0,77
iFR-positive
ANGOR!!

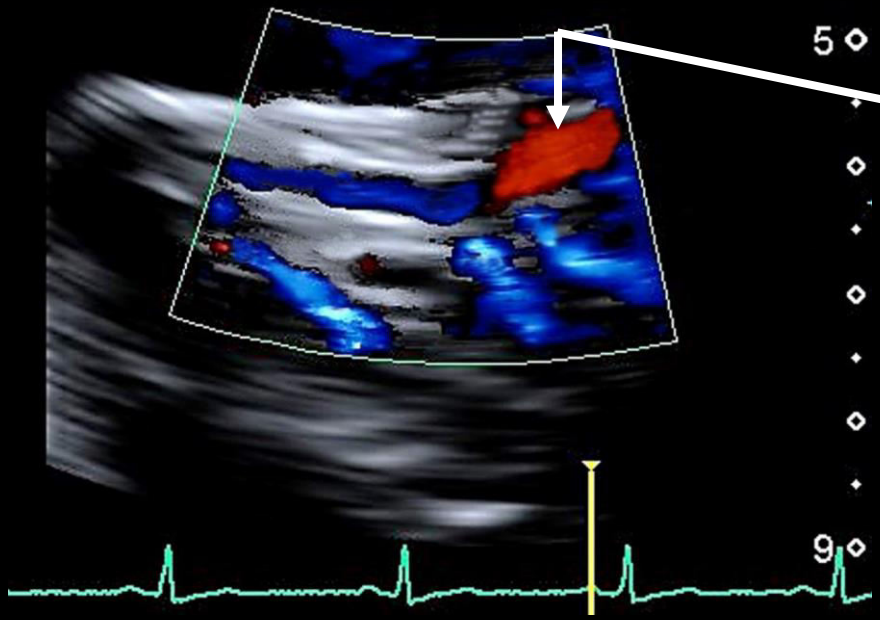

140 bpm
Dobutamine 5ug/kg/min
(10') + Adenosine ev
427 ms
140 BPM
0:55
FFR 0,79
Pd/Pa 0,79
Pa:iPa 77: 86
Pd:iPd 61: 82
Pa-Pd(m) 16
FFR-positive
ANGOR!!

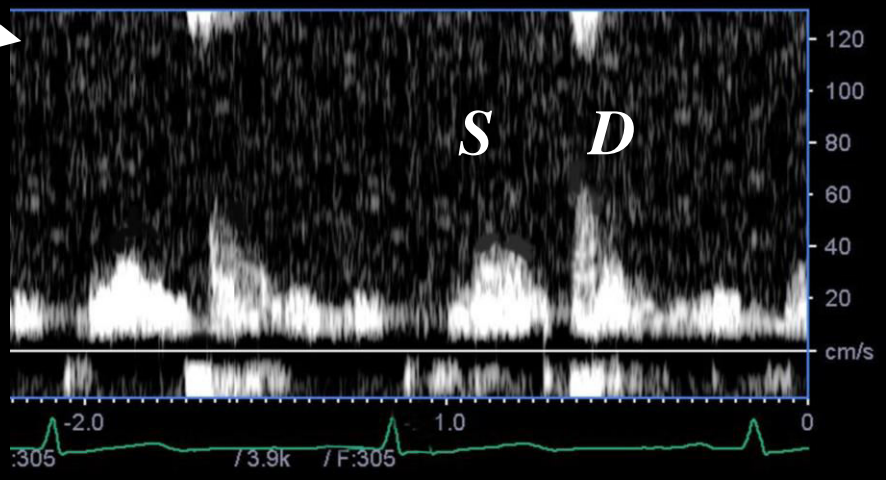
6 mesi dopo Debridging a cuore battente

Cortesia Prof. Daniele Andreini

PRE

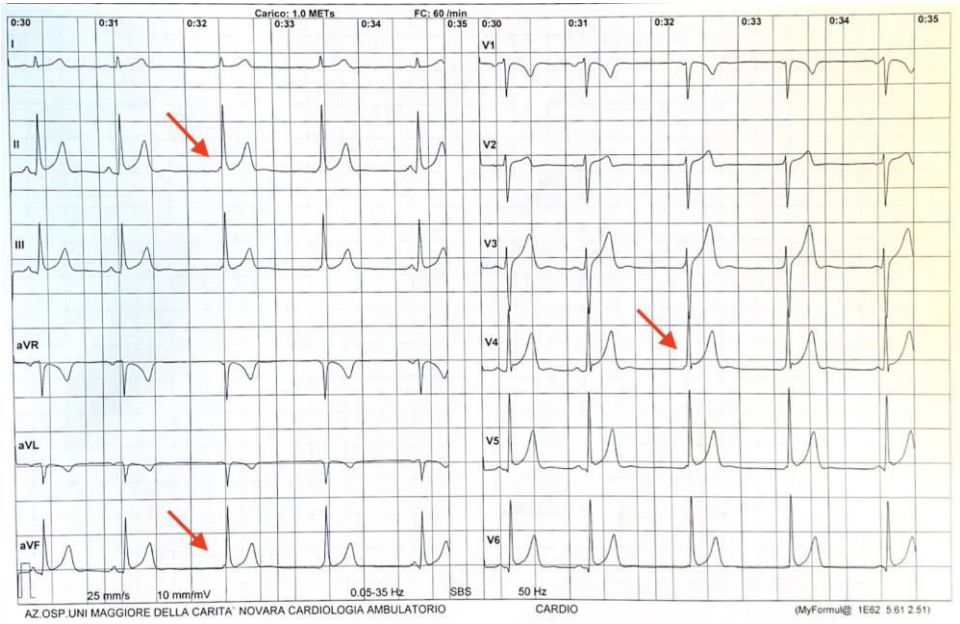
POST-Debridging

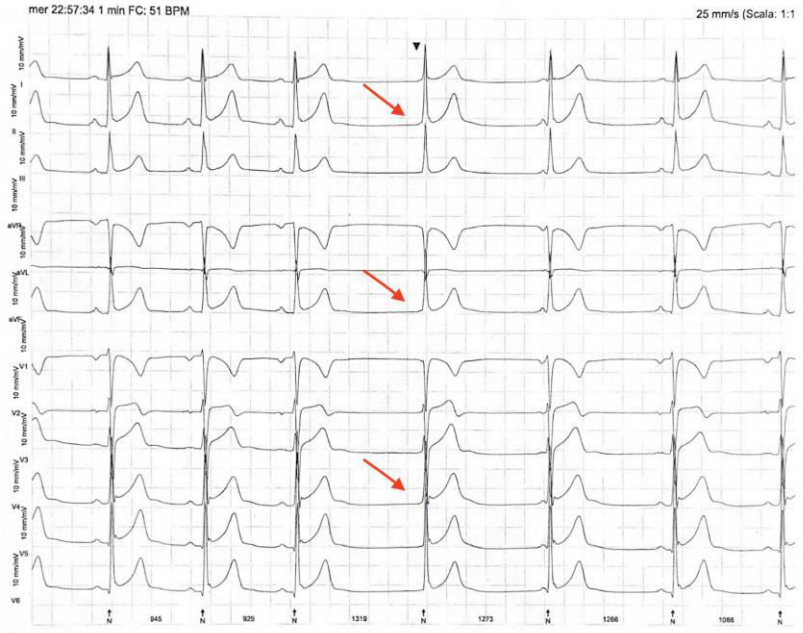




Cortesia Prof. Paolo Zeppilli

15 anni, calciatore, dissociazione AV «isoritmica» e angor





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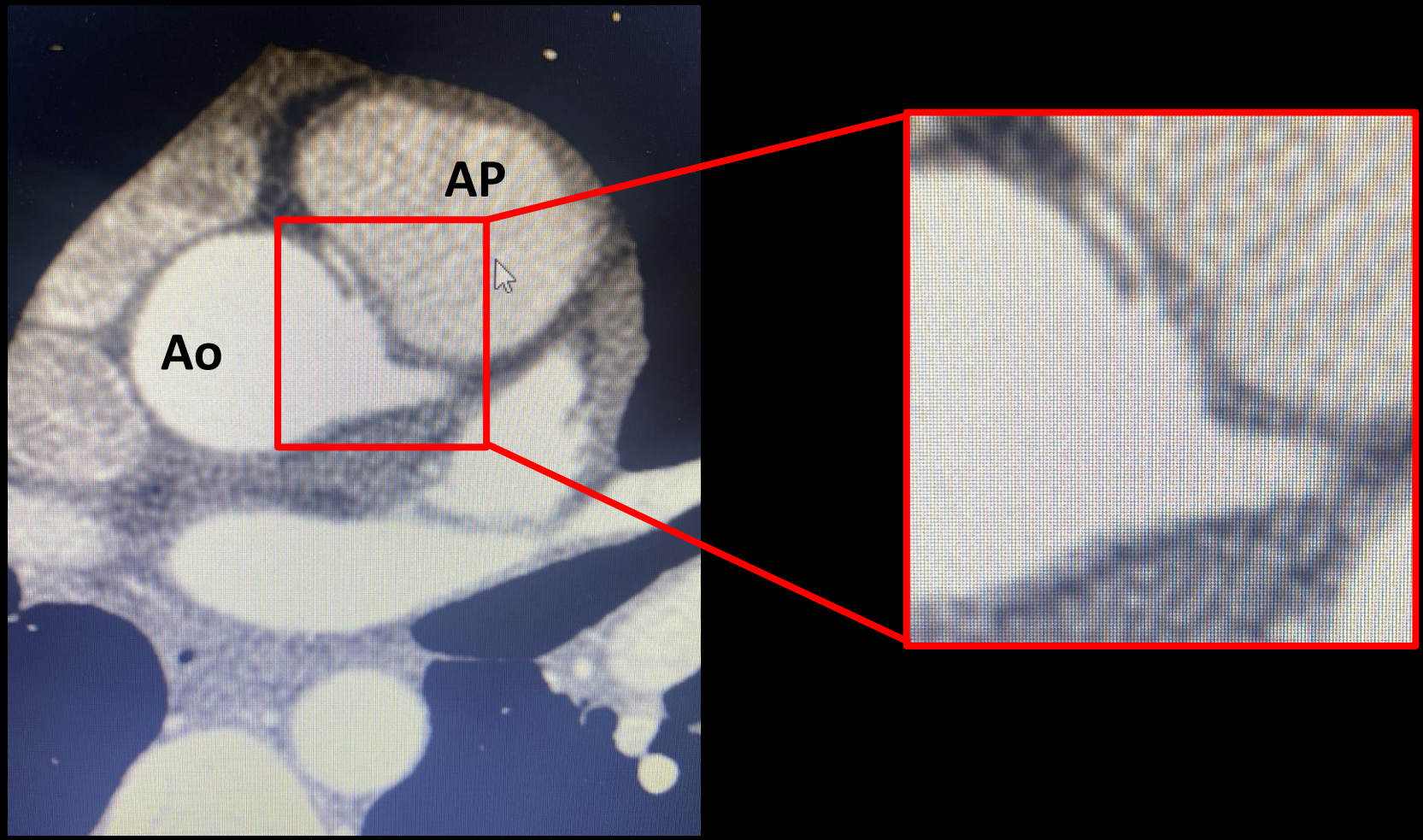
HOSPITALIS MAIORIS CHARITATIS NOVARIAE CIVITATIS

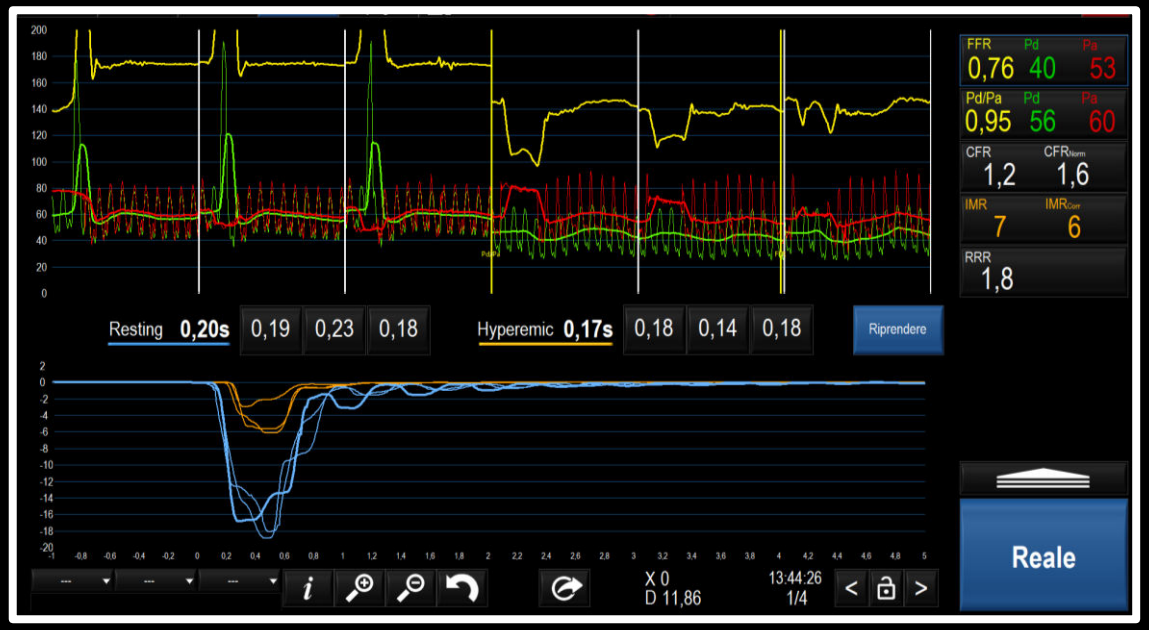
Coronaria destra che origina dal seno coronarico di Sx con decorso anomalo fra l'aorta e la polmonare intramurale con take off alto



MLA al tratto medio 14.3 mm2

MLA al tratto prossimale con decorso anomalo 5.40 mm2

«Area stenosis» a riposo = 72%



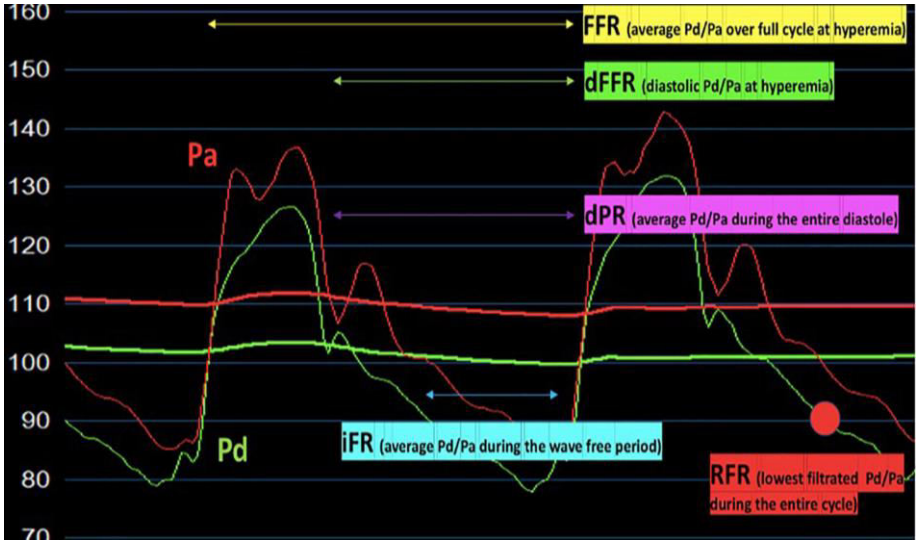
Valutazione eseguita di base con infusione di adenosina e.v. FC 90 bpm

- Pd/Pa 0.95
- FFR = 0. 76
- CFR = 1.2
- IMR = 7

Valutazione eseguita con infusione di adenosina e.v. + dobutamina e atropina FC 130 bpm (max)

- Pd/Pa 0.83 (aumenta gradiente di base)
- FFR = 0. 74
- CFR = 1.9
- IMR = 9

Functional assessement of Myocardial Bridging



Functional indices	Diagnostic cut-off	Limitations	Advantages
FFR	≤0.80	- Underestimation of the hemodynamic significance of MB due to distal pressure overshooting - Pharmacological side effects (adenosine)	- Functional gold standard for CAD - Routinely performed in clinical practice
iFR	≤0,89	- Possible need for inotropic or chronotropic stimulation to unmask the hemodynamic significance of MB	- Diastolic specific-index - No need for pharmacological agents
RFR	≤0,89 ?	- Cut-off values not available for patients with MB - Not routinely performed in clinical practice	- Diastolic specific-index - No need for pharmacological agents
dPR	≤0,89 ?	- Cut-off values not available for patients with MB - Not routinely performed in clinical practice	- Diastolic specific-index - No need for pharmacological agents

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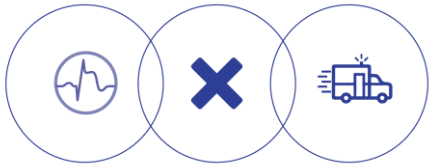
Aims

PRIMARY ENDPOINT

Incidence of MACE
(Myocardial infarction, cardiac death and cardiac hospitalization)
in patients with Myocardial bridge referred to coronary angiography



SECONDARY ENDPOINTS

Rate of patients with significant angina
(SAQ < 70)

Impact of invasive intracoronary assessment on outcomes
(MACE and SAQ)

- Functional test (FFR/cFFR)
- Provocative test (acetylcholine)
- Imaging (OCT-IVUS)

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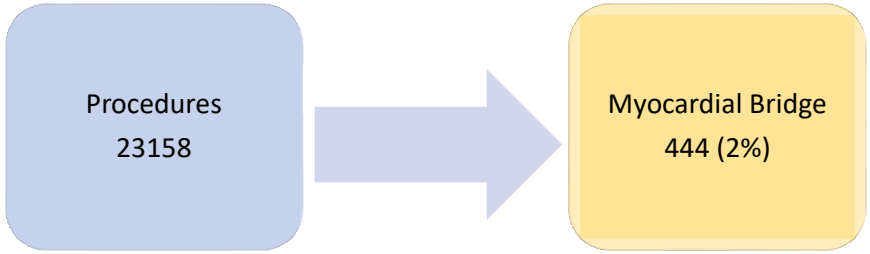
Study population



Left anterior descending 96,8 %

Circumflex artery 1,5 %

Right coronary artery 0,5 %

Posterior interventricular artery 0,5 %

First diagonal branch 0,5 %

First septal branch 0,2 %

Number of patients	444
Male sex (%)	71,8 %
Age (Mean ± SD)	59 ± 11,2
Body mass index (Mean ± SD)	24,6 ± 2,7
Risk factors	
Hypertension (%)	62,8 %
Diabetes, (%)	13,5 %
Dyslipidemia (%)	52,7 %
Former smoker (%)	26,4 %
Active smoker (%)	16,9 %
Stroke histoty (%)	2,3 %
Previous myocardial infarction (%)	8,3 %
Previous CABG (%)	0,5 %
Previous PCI (%)	14,2 %

MACE	n° of patients at follow-up	n°	(%)
6 months	266	31	11,6 %
12 months	247	16	6,5 %
24 months	193	26	13,5 %

SAQ < 70	n° of patients at follow up	n°	(%)
6 months	266	50	18,8 %
12 months	247	51	20,6 %
24 months	193	42	21,8 %

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Personalised Medicine in:

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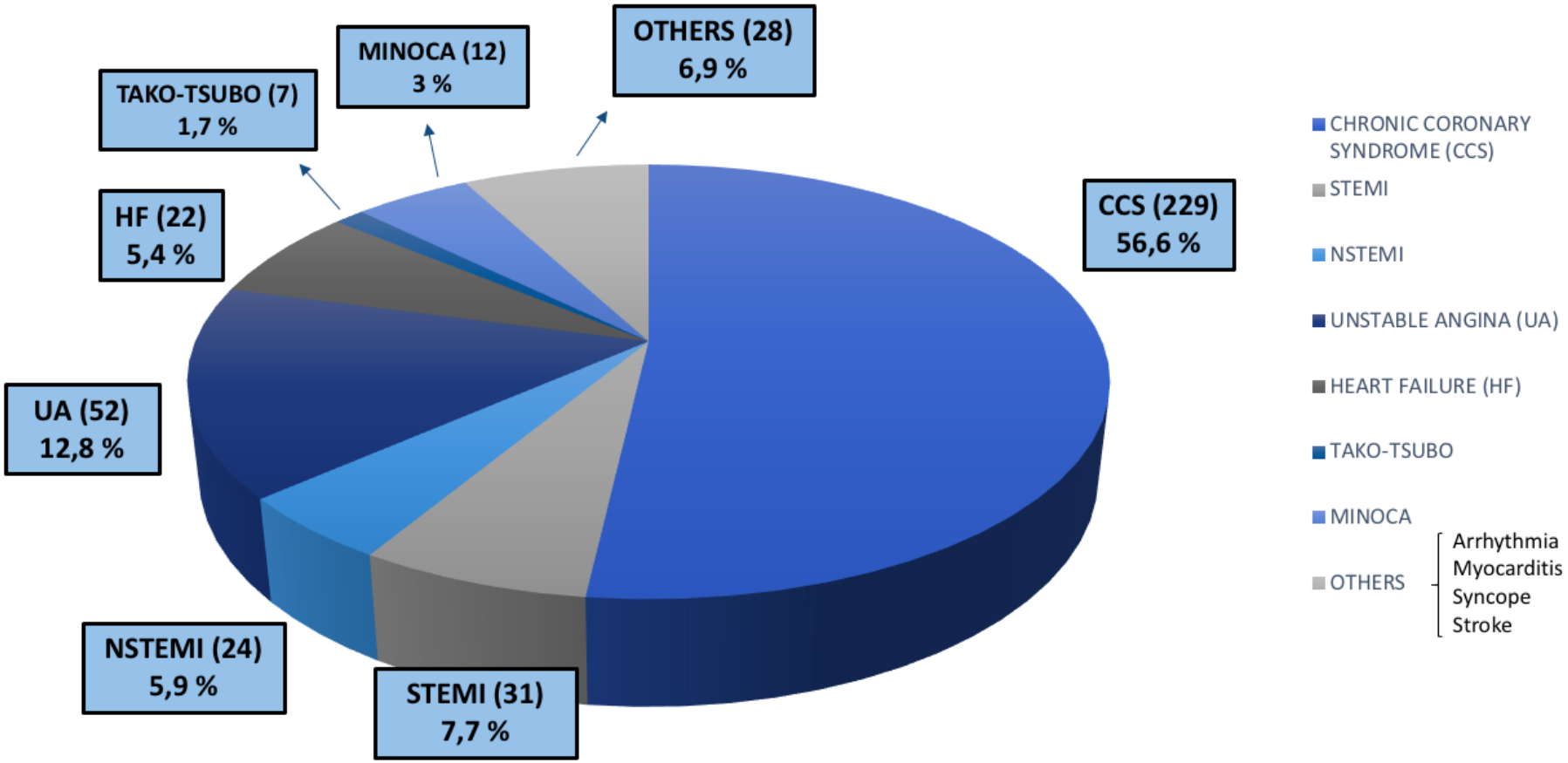
Clinical Presentation: not all bridges are born equal!

Acute (38%) vs Chronic (62%) Coronary Syndromes



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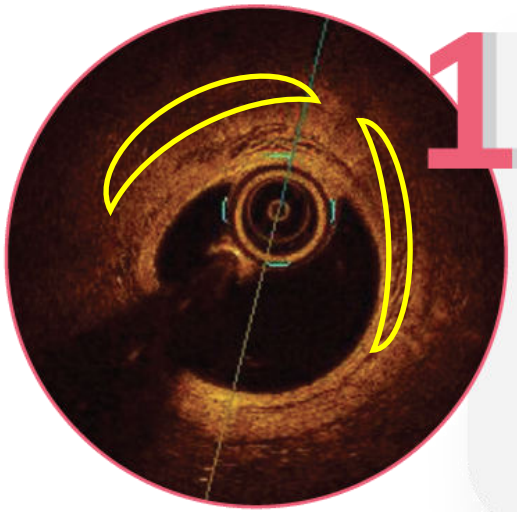
Intracoronary imaging

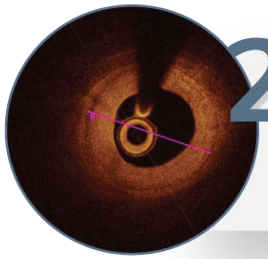


1

To limit underdiagnosis of MB

- Systolic compression of the vessell
- Heterogeneous fusiform band with intermediate-intensity signal, similar to tunica media
- Perivascular "half-moon" surrounding the vessel adventitia
- Sharp borders
- No discontinuity between the fusiform area and the adventitia

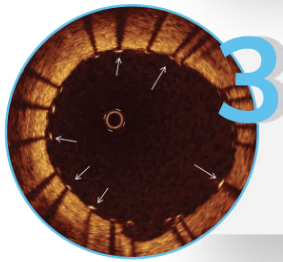
Vergallo R, D'Amario D et al under submission



2

To assess MB-associated CAD

Evaluation of atherosclerosis proximal to Myocardial Bridge



3

To guide stenting

PCI with DES in patients with Myocardial Bridge is related to risks:

very late stent thrombosis, stent malapposition, perforation

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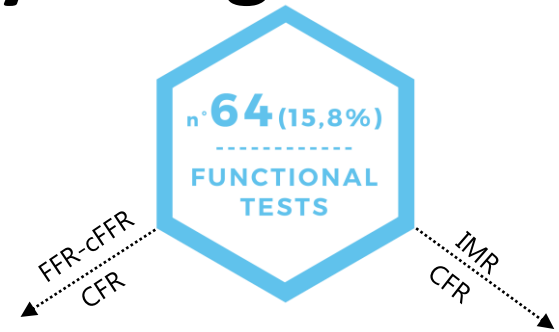
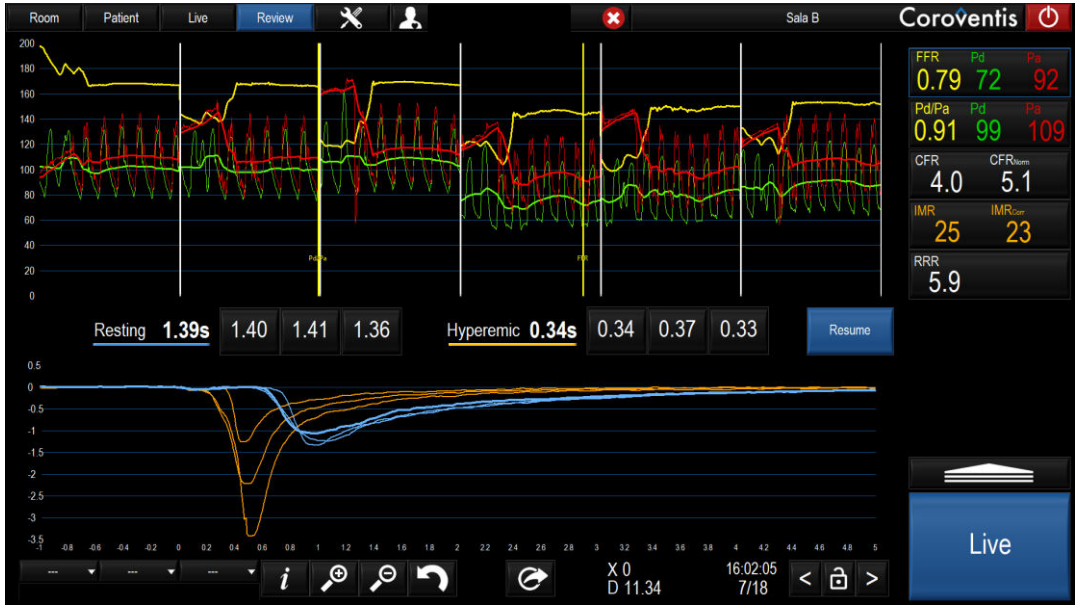
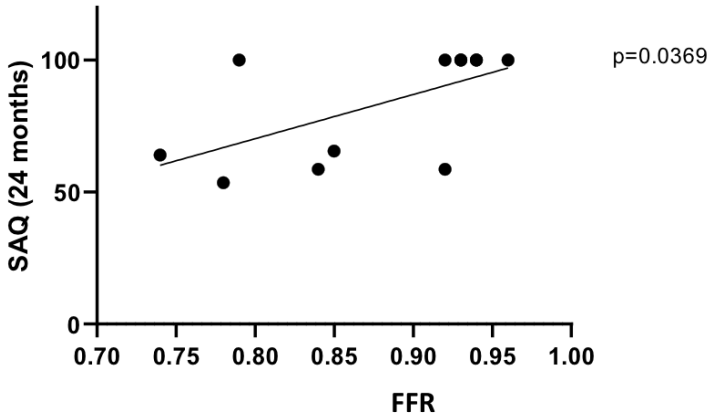
Full-physiological evaluation



To evaluate the hemodynamic significance both of MB and plaques proximal to MB

To evaluate microvascular Dysfunction





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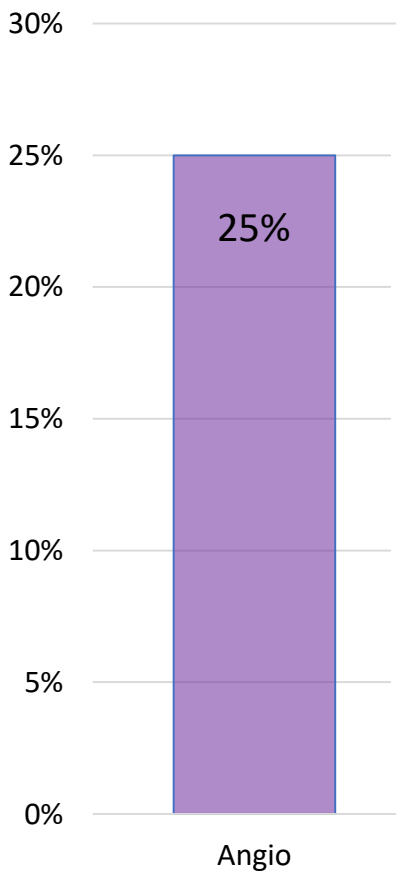
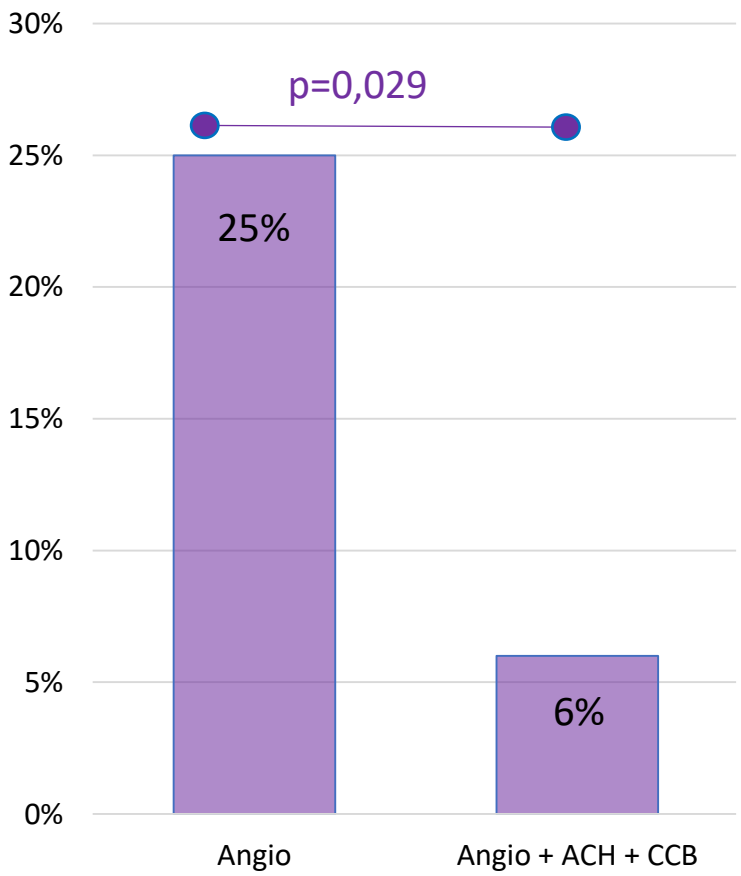
Personalised therapy

Therapy At Discharge	Angio	Angio + ACH	Angio + FFR	P value
Beta Blockers	65,7%	34%	63,6%	<0,001
Calcium Channel Blockers	20,6%	63,8%	20,5%	<0,001

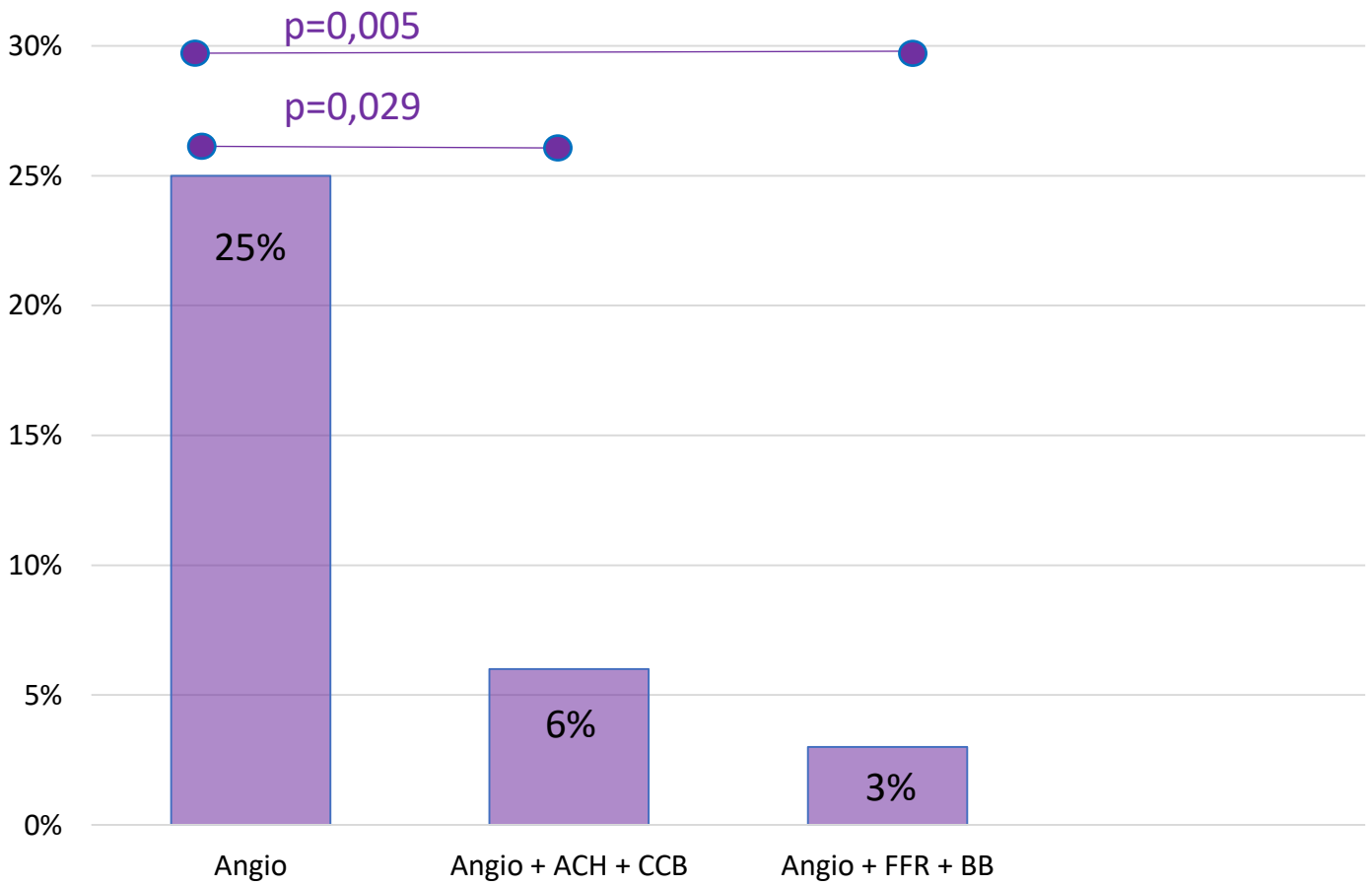
Personalised therapy: incidence of MACE @ 24 months



Personalised therapy: incidence of MACE @ 24 months



Personalised therapy: incidence of MACE @ 24 months



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- The early results of the study demonstrate that myocardial bridge is a challenging cause of ischemia in symptomatic patients referred for coronary angiography.

- A remarkable proportion of patients were found to have a myocardial bridge during the occurrence of an acute or chronic coronary syndrome, highlighting that different mechanisms of ischemia may coexist.

- Stratified medical therapy, guided by invasive functional assessment, has a significant impact on cardiovascular outcomes.

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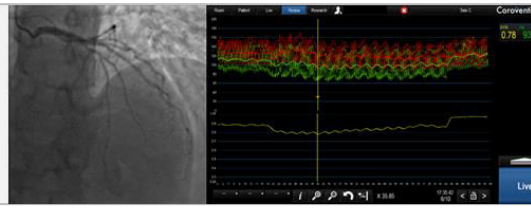
Future perspectives: the RIALTO-PRO

1

Epicardial disease assessment

- NHPR (≤0.89)
- cFFR (≤0.83)
- FFR (≤0.83)



2

Microvascular disease assessment

- IMR (>25)
- CFR (< 2.0)
- RRR (<2.0)*

*Resistive resistance ratio= $\frac{Trm*Pdr}{Thm*Pdh}$

3

Vasomotor testing

- Ach

Set the new standard for the diagnosis and treatment of patients with MB optimizing the care pathway according to specific endotype

Thank you!