Indice de calcio coronario, AngioTAC y CT FFR

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AGENDA

1. ACTUALIDAD
2. INDICE DE CALCIO CORONARIO
3. ANGIOTOMOGRAFÍA CORONARIA
4. CT FFR
5. PLANEACIÓN DE PROCEDIMIENTOS
6. MENSAJES PARA LLEVAR

1

INTRODUCCIÓN

Dr. Ponce Barahona
Cardiología e Imagen Cardiovascular Avanzada

- La imagenología cardiovascular es esencial para el diagnóstico y manejo de enfermedades del corazón y los vasos sanguíneos.

- Existen diversas modalidades de estudios de imagen, cada una con indicaciones específicas y características que las hacen adecuadas para diferentes situaciones clínicas.

- Debemos estar familiarizados con las limitaciones y ventajas de cada técnica para seleccionar el estudio más adecuado y proporcionar un diagnóstico preciso.

HISTORIA DE LA MEDICINA HONDUREÑA

Rev Med Hondur 2006; 74:56-58

Cardiología en Honduras

*Mauricio Varela Ramos**

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INDICE DE CALCIO CORONARIO

GUIDELINES · Volume 12, Issue 3, P185-191, May-June, 2018 Download Full Issue

CAC-DRS: Coronary Artery Calcium Data and Reporting System. An expert consensus document of the Society of Cardiovascular Computed Tomography (SCCT)

Harvey S. Hecht [a] · Michael J. Blaha [b] · Ella A. Kazerooni [c] · ... · Matt Budoff [e] · Jonathon Leipsic [f] · Leslee Shaw [g] ...
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Affiliations & Notes · Article Info

a. Agatston Score

	CAC Score	Risk	Treatment Recommendation
CAC-DRS 0	0	very low	statin generally not recommended*
CAC-DRS 1	1–99	mildly increased	moderate intensity statin
CAC-DRS 2	100–299	moderately increased	moderate to high intensity statin + ASA 81mg
CAC-DRS 3	>300	moderately to severely increased	high intensity statin + ASA 81mg

Agatston scoring = A	Number of vessels = N
Case	**CAC-DRS Category**
i. CAC 0	**CAC-DRS A0**
ii. CAC 1–99 in LM, LAD and LCx	**CAC-DRS A1/N3**
iii. CAC 100–299 in LAD, LCX and RCA	**CAC-DRS A2/N3**
iv. CAC >300 in LM, LAD, LCx and RCA	**CAC-DRS A3/N4**

JACC: CARDIOVASCULAR IMAGING VOL. ■, NO. ■, 2025

ORIGINAL RESEARCH

Guideline-Directed Application of Coronary Artery Calcium Scores for Primary Prevention of Atherosclerotic Cardiovascular Disease

Jelena Pavlović, MD, MSc,[a] Daniel Bos, MD, PhD,[a,b,c,d] M. Kamran Ikram, MD, PhD,[a,e] M. Arfan Ikram, MD, PhD,[a,e] Maryam Kavousi, MD, PhD,[a] Maarten J.G. Leening, MD, PhD[a,b,f]

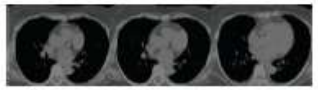
CENTRAL ILLUSTRATION Treatment Reclassification Among CAC-Eligible Men and Women by ACC/AHA and ESC/EAS Guidelines

ACC/AHA 2018 (PCE or PREVENT)

CAC eligible individuals at intermediate risk.

Derisked if CAC = 0, no smoking and no family history of ASCVD.

Uprisked if CAC 1-100 and age ≥55y; or CAC ≥100; or ≥75th percentile.

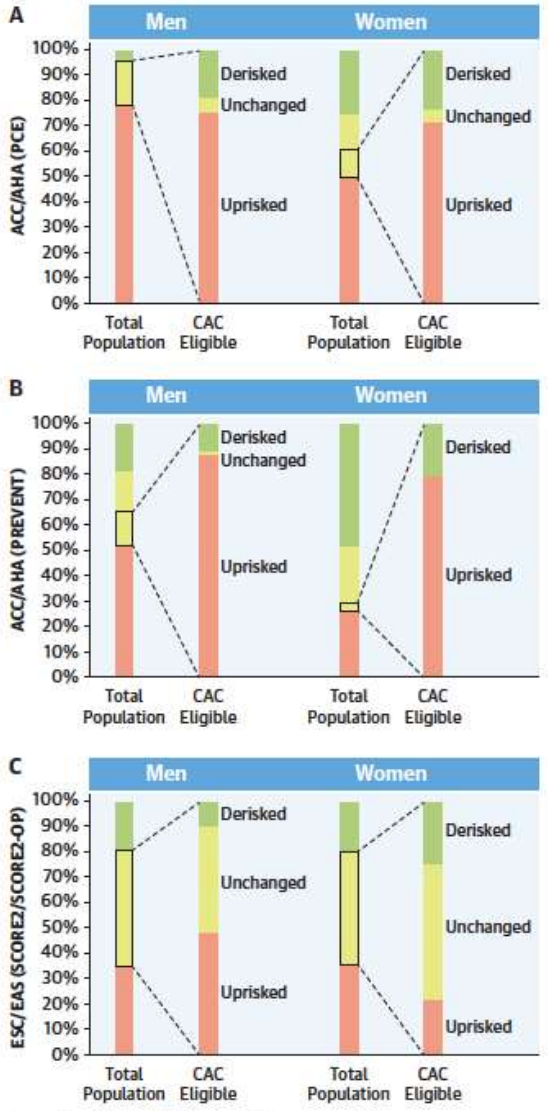


ESC/EAS 2021 (SCORE2/SCORE2-OP)

CAC eligible individuals who should or may be considered for statin.

Derisked if CAC = 0.

Uprisked if CAC >100.



Pavlović J, et al. JACC Cardiovasc Imaging. 2025;■(■):■–■.

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ANGIOTOMOGRAFÍA CORONARIA

JACC: CARDIOVASCULAR IMAGING
VOL. 18, NO. 6, 2025

PUBLISHED BY ELSEVIER

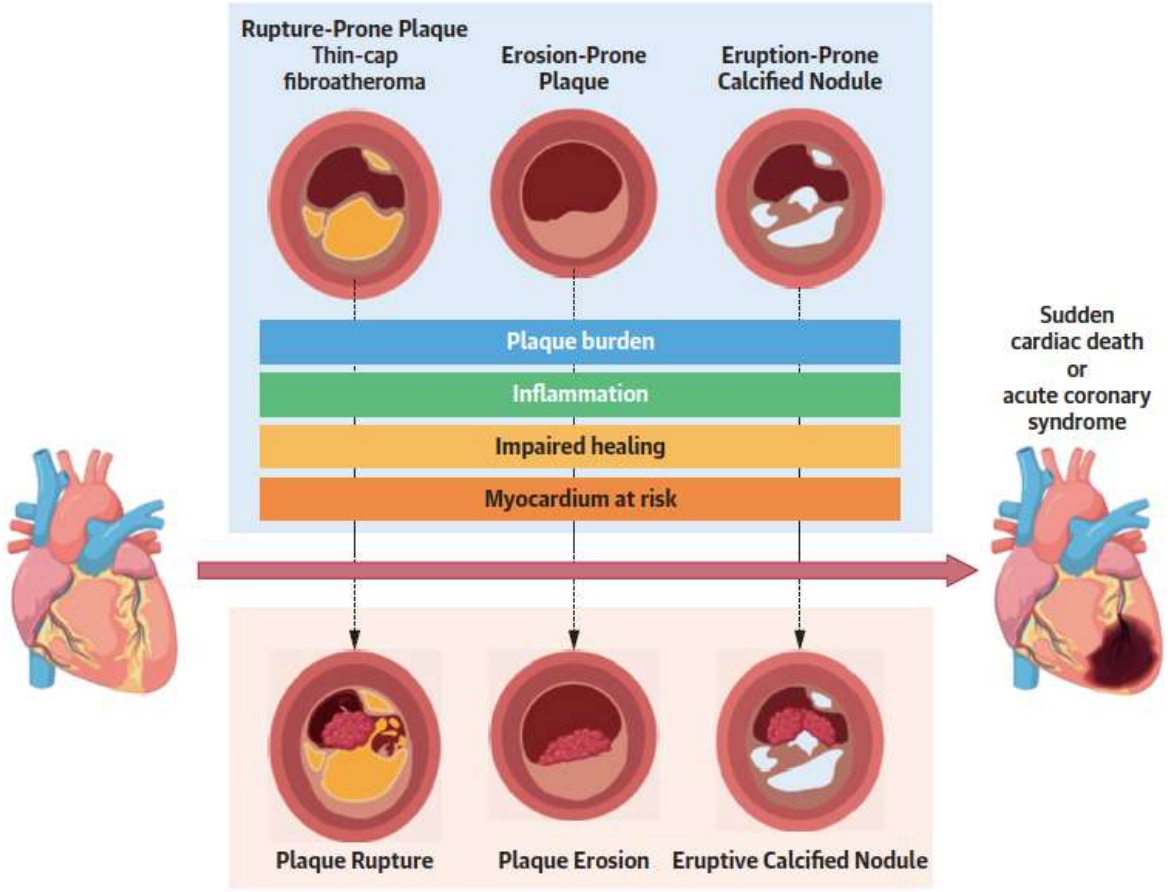
STATE-OF-THE-ART REVIEW

Vulnerable or High-Risk Plaque

A *JACC: Cardiovascular Imaging* Position Statement

Rocco Vergallo, MD, PhD,[a,b] Seung-Jung Park, MD, PhD,[c] Gregg W. Stone, MD,[d] David Erlinge, MD, PhD,[e] Italo Porto, MD, PhD,[a,b] Ron Waksman, MD,[f] Gary S. Mintz, MD,[g] Fabrizio D'Ascenzo, MD, PhD,[h] Sara Seitun, MD,[a] Luca Saba, MD,[i] Rozemarijn Vliegenthart, MD, PhD,[j] Fernando Alfonso, MD,[k] Armin Arbab-Zadeh, MD, PhD, MPH,[l] Peter Libby, MD,[m] Marcelo F. Di Carli, MD,[m] James E. Muller, MD,[m] Gerald Maurer, MD,[n] Robert J. Gropler, MD,[o] Y.S. Chandrashekhar, MD,[p] Eugene Braunwald, MD,[m] Valentin Fuster, MD, PhD,[d] Ik-Kyung Jang, MD, PhD[q]

CENTRAL ILLUSTRATION The Concept of the High-Risk Plaque and Patient



Vergallo R, et al. JACC Cardiovasc Imaging. 2025;18(6):709-740.

The "high-risk plaque" is an atherosclerotic lesion at increased risk for evolving into a clinically relevant occlusive thrombosis. This term should be used to encompass the precursor lesions of all 3 major substrates of luminal thrombosis (ie, plaque rupture, plaque erosion, and calcified culprit plaque). Additional lesion and patient-related factors relevant in determining high risk include plaque burden, inflammation (plaque "activity"), impaired healing capacity (prothrombotic milieu vs endogenous antithrombotic mechanism), altered local hemodynamic pattern (eg, endothelial shear stress), and the amount of myocardium at risk subtended by the lesion.

TABLE 1 Major and Minor Criteria for the Definition of High-Risk Plaque

Major criteria
Thin fibrous cap
Large lipid/necrotic core
Large plaque burden
Active plaque inflammation (macrophage)[a]
Endothelial damage/denudation[a]
Minor criteria
Superficial protruding calcified nodule
Intraplaque hemorrhage[a]
Neovascularization
Cholesterol crystals
Positive remodeling
Absence of healed plaque
Disturbed local hemodynamics (eg, shear stress, shear stress gradient)[a]
Location in a proximal or mid coronary artery (large area at risk)[b]

[a]Reliable noninvasive or invasive imaging modalities for their detection are not yet available. [b]This criterion increases the likelihood that a plaque thrombosis will manifest clinically but has not been shown to be an independent risk factor for plaque instability or thrombosis.

TABLE 2 Major Challenges to the Traditional "Vulnerable Plaque" Paradigm

Atherosclerosis is a panvascular disease.
Plaque erosion is responsible for 30%-40% of ACS, and imaging detection of its precursor lesion is not yet available.
First acute events are often catastrophic (ie, presenting as STEMI or SCD), but their prediction and prevention remain challenging.
Plaque phenotype may dynamically change over time, but it is often assessed at a single time point.
Plaques may regress with intensive medical therapy.
The majority of plaque ruptures and erosions may be clinically silent and contribute to plaque progression.

ACS = acute coronary syndrome; SCD = sudden cardiac death; STEMI = ST-segment elevation myocardial infarction; TCFA = thin-cap fibroatheroma.

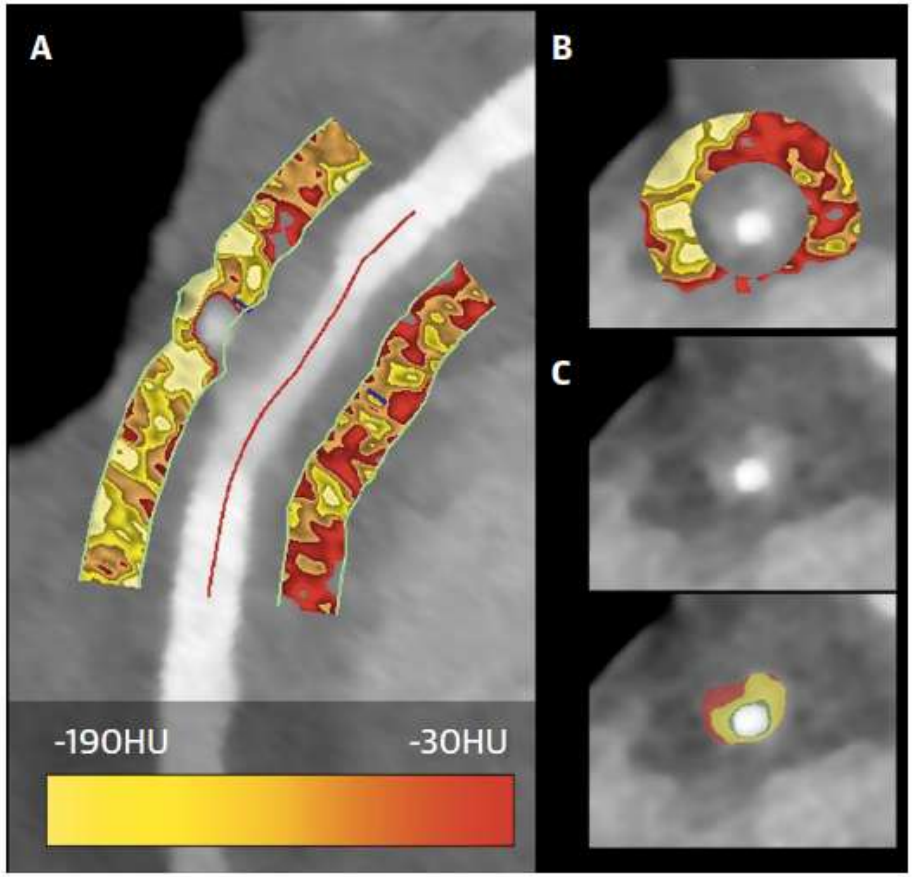
TABLE 3 Noninvasive Imaging Modalities Currently Available for Characterization of Atherosclerotic Plaques

	CTA	MRI	PET/CT[a]
Technical features			
Energy source	X-rays	Magnetic field + RF	Positrons (β+ particles)
Radiation exposure	+	–	++
Spatial resolution	0.11 × 0.11 mm[b] – 0.3 × 0.3 mm (in plane)	0.5-1 mm^3	~4 mm
Temporal resolution	66-150 ms	20-60 ms	5-10 s (acquisition time frame)
Contrast agent/tracer	Iodinated-based contrast	Gadolinium-based contrast	Radiotracer
Cost	+	++	+++
Method of plaque analysis	Attenuation density (HU) analysis	Tissue component analysis	Molecular imaging analysis
Plaque features			
Lipid/necrotic core	++	+++	–
Intraplaque hemorrhage	+[c,d]	+++	–
Macroscopic calcification (including spotty calcification)	+++	+	++
Microcalcification/active calcification	–	–	+++[c,e]
Luminal thrombus	+[c,d]	+[c]	++[c,f]
Fibrous cap	–	++[c]	–
Napkin-ring sign	CTA specific	–	–
Lesion-specific plaque burden	+++	+++	–
Overall atherosclerotic plaque burden	+++	+	–
Plaque remodeling	+++	+++	–
Plaque neovascularization	+[c,d]	+[c]	–
Luminal dimensions	+++	++	–
Luminal surface morphology	+++[d]	++	–
Plaque inflammation	–	+[c,g]	+++[c,h]
Perivascular fat inflammation	+++[c]	+[c]	++[c,h]
FFR/shear stress	++[c,i]	–	–

[a]Hybrid PET/CT imaging needs co-registration to better localize arterial wall signals and adequate imaging delay for atherosclerosis imaging; for the coronary analysis, PET/CT requires cardiac and/or respiratory gating, partial volume correction, attenuation correction, and patient preparation for ^{18}F-flurodeoxyglucose studies. In a hybrid PET/MRI system, data are acquired simultaneously on PET and MRI (in contrast to sequential PET/CT), and benefit may derive from the combined information on plaque activity detected by PET with the multiparametric tissue characterization obtained by MRI (PET/MRI has been applied predominantly in research settings for the imaging of large noncoronary arteries). [b]With photon-counting technology. [c]In the research setting. [d]In carotid plaque. [e]Using ^{18}F sodium fluoride. [f]Using ^{18}F glycoprotein 1. [g]Using ultrasmall superparamagnetic iron oxide contrast-labelled macrophages. [h]Using ^{18}F-flurodeoxyglucose or ^{68}Ga-DOTATATE. [i]Using computational fluid dynamics.

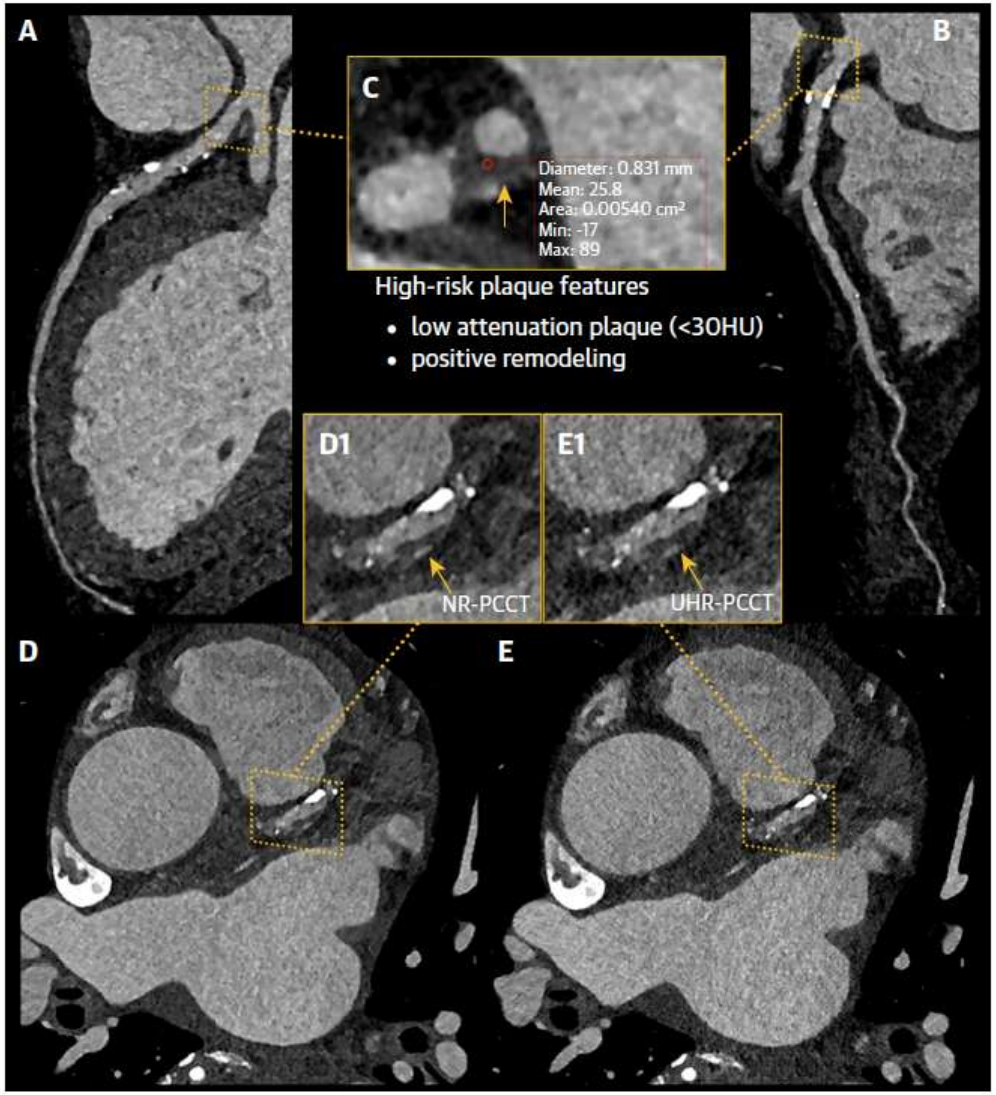
CT = computed tomography; CTA = computed tomography angiography; FFR = fractional flow reserve; MRI = magnetic resonance imaging; PET = positron emission tomography; RF = radiofrequency pulses.

FIGURE 8 Evaluation of Pericoronary Adipose Tissue Attenuation on CTA



Long-axis reconstruction of the mid segment of a right coronary artery (A) and the corresponding cross-sectional image (B) show the changes in perivascular fat composition (3-mm width applying 1-mm gap from the outer coronary artery wall) for all voxels in the range of −190 HU (yellow) to −30 HU (red). (C) Corresponding cross-sectional CTA images show high-risk plaque burden of the vessel with a predominantly fibrofatty composition and positive remodeling (grayscale, top; color overlay based on HU [for further explanation, see Figure 6], bottom). Abbreviation as in Figure 6.

FIGURE 9 Coronary PCCT Example of a High Risk Coronary Plaque in a 66-Year-Old Woman With Chest Pain During Exercise



Journal of
Cardiovascular Development and Disease

MDPI

Review

Clinical Applications of Cardiac Computed Tomography: A Focused Review for the Clinical Cardiologists

Christian Giovanni Camacho-Mondragon [1,2], Juan Carlos Ibarrola-Peña [1,2], Daniel Lira-Lozano [1,2], Carlos Jerjes-Sanchez [1,2], Erasmo De la Pena-Almaguer [1,2] and Jose Gildardo Paredes-Vazquez [1,2,*]

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Table 1. CAD-RADS Categories (Adapted from Cury et al., 2022) [25].

Category	Degree of Coronary Stenosis	Further Investigations	Management Considerations
0	0%—No CAD	None needed	Assess non-atheroesclerotic causes of symptoms. General preventive measures
1	1–24%—Minimal non-obstructive CAD	None needed	Assess non-atheroesclerotic causes of symptoms. Risk factor modification, consider preventive pharmacotherapy
2	25–49%—Mild non-obstructive CAD	None needed	Assess non-atheroesclerotic causes of symptoms. Risk factor modification, consider preventive pharmacotherapy
3	50–69%—Moderate stenosis	Functional assessment is recommended	Prior recommendations + other treatments, including antianginals per guideline-directed care
4A	70–99% single vessel stenosis	Invasive coronary angiography or functional assessment are recommended	Prior recommendations + other treatments, including antianginals per guideline-directed care
4B	Left main 50% or 3-vessel obstructive (70%) disease	Invasive coronary angiography is recommended	Revascularization should be considered + other treatments, including antianginals per guideline-directed care
5	100%—Total occlusion	Consider ICA, functional and/ or viability assessment	Revascularization should be considered after viability/individual assessment + other treatments, including antianginals per guideline-directed care
N	Non-diagnostic study	Additional/alternative evaluation may be needed	Additional/alternative evaluation may be needed

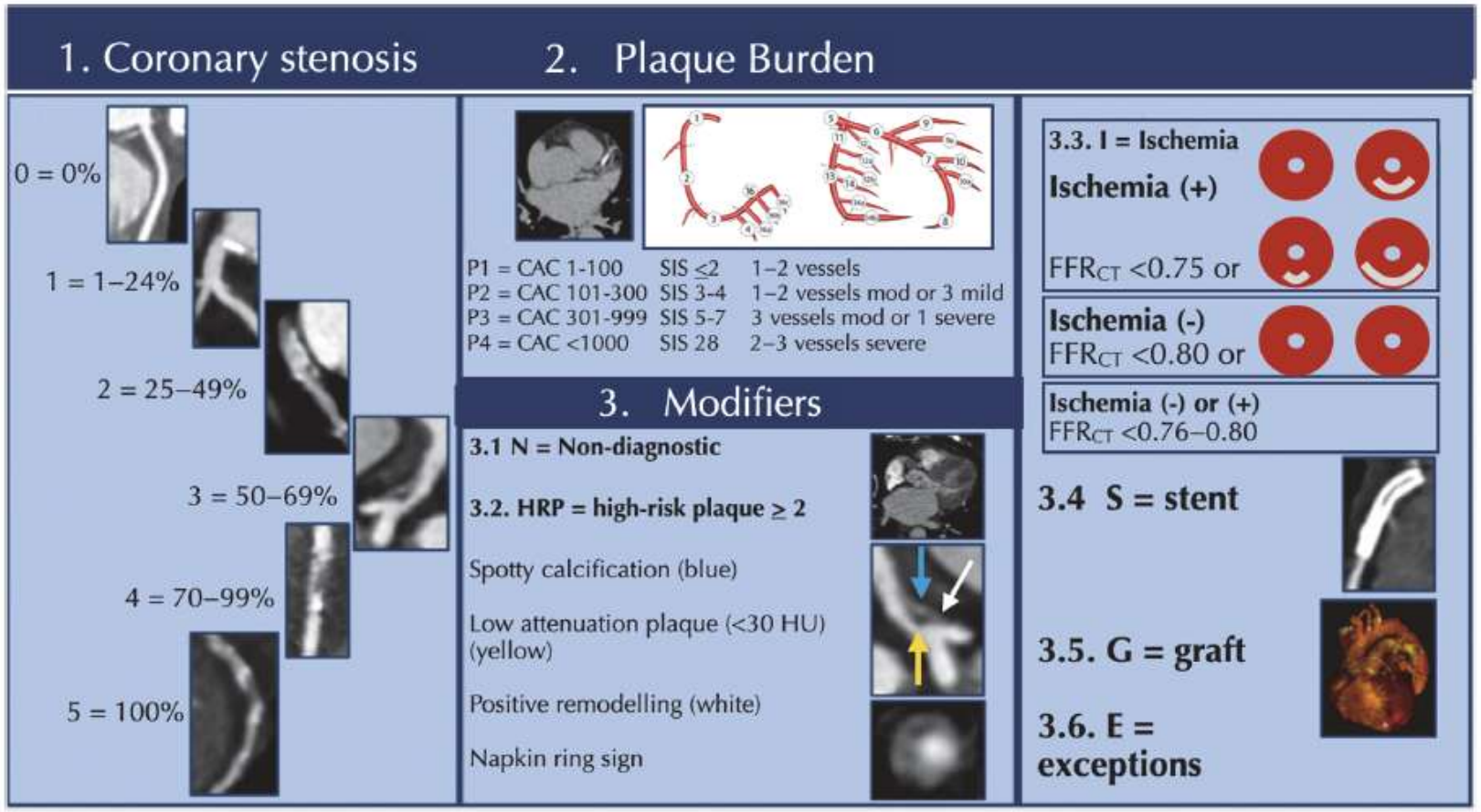
1. Coronary stenosis
2. Plaque Burden
0 = 0%
1 = 1–24%
2 = 25–49%
3 = 50–69%
4 = 70–99%
5 = 100%
P1 = CAC 1-100 SIS ≤2 1–2 vessels
P2 = CAC 101-300 SIS 3-4 1–2 vessels mod or 3 mild
P3 = CAC 301-999 SIS 5-7 3 vessels mod or 1 severe
P4 = CAC <1000 SIS 28 2–3 vessels severe
3. Modifiers
3.1 N = Non-diagnostic
3.2. HRP = high-risk plaque ≥ 2
Spotty calcification (blue)
Low attenuation plaque (<30 HU) (yellow)
Positive remodelling (white)
Napkin ring sign
3.3. I = Ischemia
Ischemia (+)
FFRCT <0.75 or
Ischemia (-)
FFRCT <0.80 or
Ischemia (-) or (+)
FFRCT <0.76–0.80
3.4 S = stent
3.5. G = graft
3.6. E = exceptions

Table 2. Guideline recommendations of CCTA in acute and chronic coronary syndromes.

Clinical Scenario	American Heart Association/American College of Cardiology	European Society of Cardiology
Acute Coronary Syndromes	**Class I**: CCTA may be considered for patients with lower risk NSTE-ACS as a non-invasive risk stratification, as part of a selective invasive strategy (1).	**Class IIA**: Incorporating CCTA or a non-invasive stress imaging test as part of the initial workup in patients with suspected ACS, non-elevated (or uncertain) hs-cTn, no ECG changes, and no recurrence of pain should be considered. **Class IIIB**: Routine, early CCTA in patients with suspected ACS is not recommended.
Chronic Coronary Syndromes	**Class IIA:** For patients with CCD and a change in symptoms or functional capacity that persists despite GDMT, and who have had previous coronary revascularization, CCTA is reasonable to evaluate bypass graft or stent patency (for stents $\geq$ 3 mm). **Class IIA**: For selected patients with suspected non-ischemic cardiomyopathy, CCTA may be considered as an initial diagnostic strategy.	**Class I, Level B**: CCTA is recommended as a first-line test for patients with low to intermediate pre-test probability of CAD.

Table 3. Comparison between echocardiography and cardiac CT in the assessment of pericardial pathology.

Pericardial Feature/Condition	Echocardiogram	Cardiac CT
Pericardial Thickness	Limited for precise measurement; may suggest thickening indirectly	High spatial resolution; precise measurement of pericardial thickness
Pericardial Calcifications	Poor sensitivity; typically, not visualized	Excellent for detecting and quantifying calcifications
Pericardial Inflammation	Can suggest inflammation (e.g., fibrin strands, increased echogenicity)	Limited unless contrast enhancement shows indirect signs
Pericardial Adhesions	Indirect signs (e.g., septal bounce), but not definitive	Can identify adhesions through restricted motion in multiphasic imaging
Pericardial Effusion Detection	High sensitivity; excellent for real-time detection	Good sensitivity, especially for loculated effusions
Pericardial Masses	Can detect large masses, but limited soft-tissue characterization	Superior soft-tissue contrast; good for mass localization and extent

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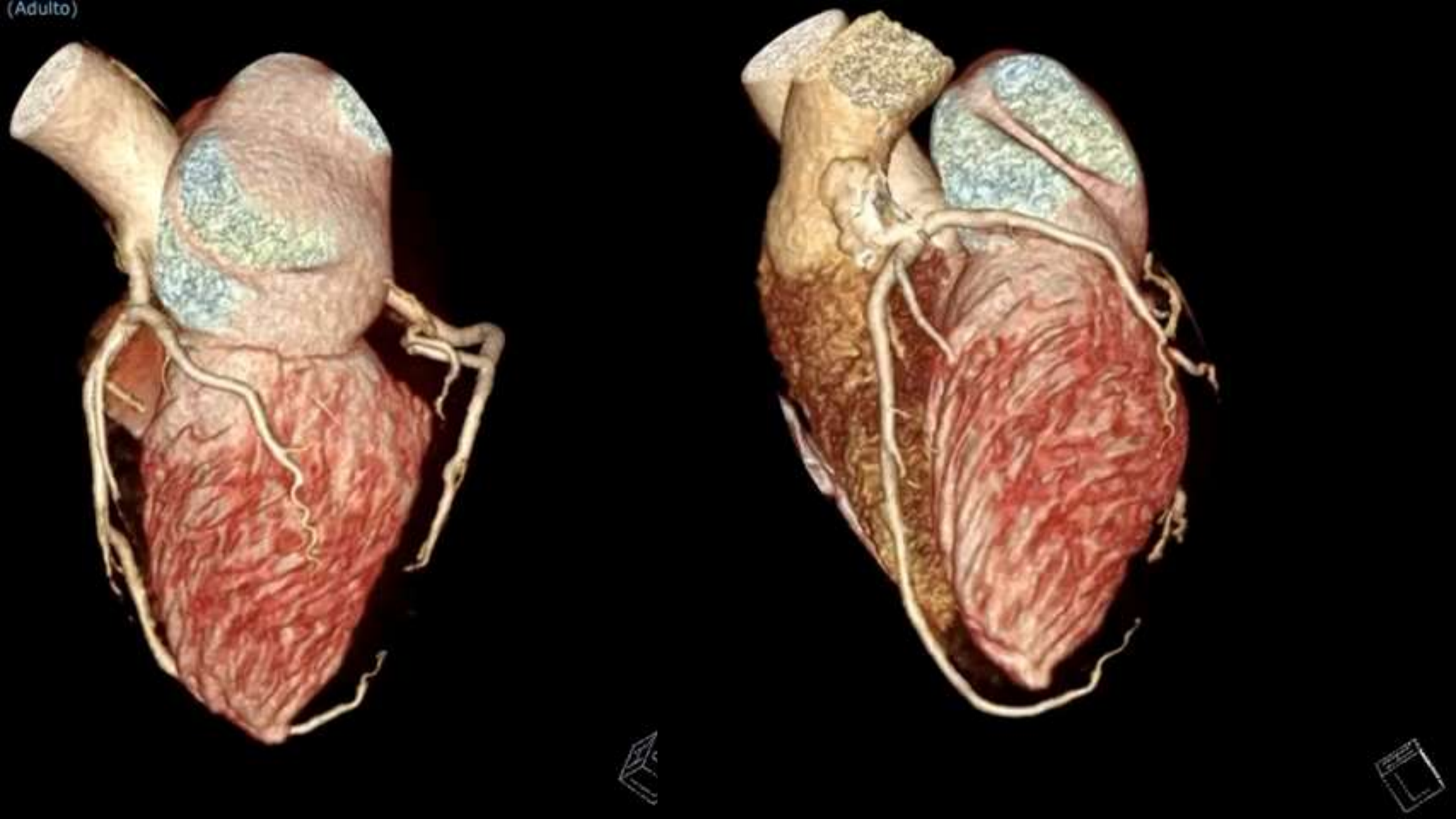
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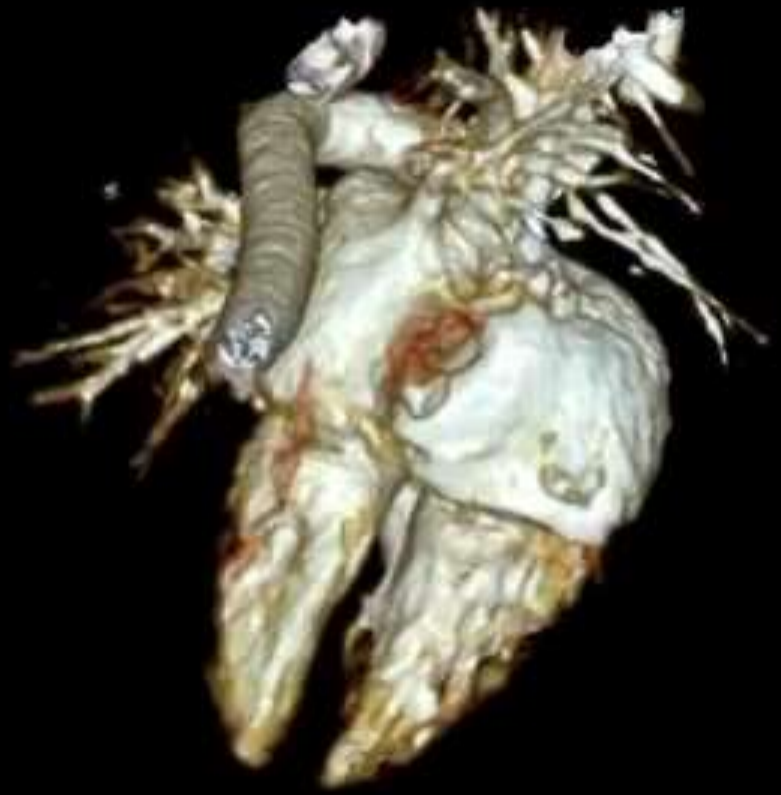

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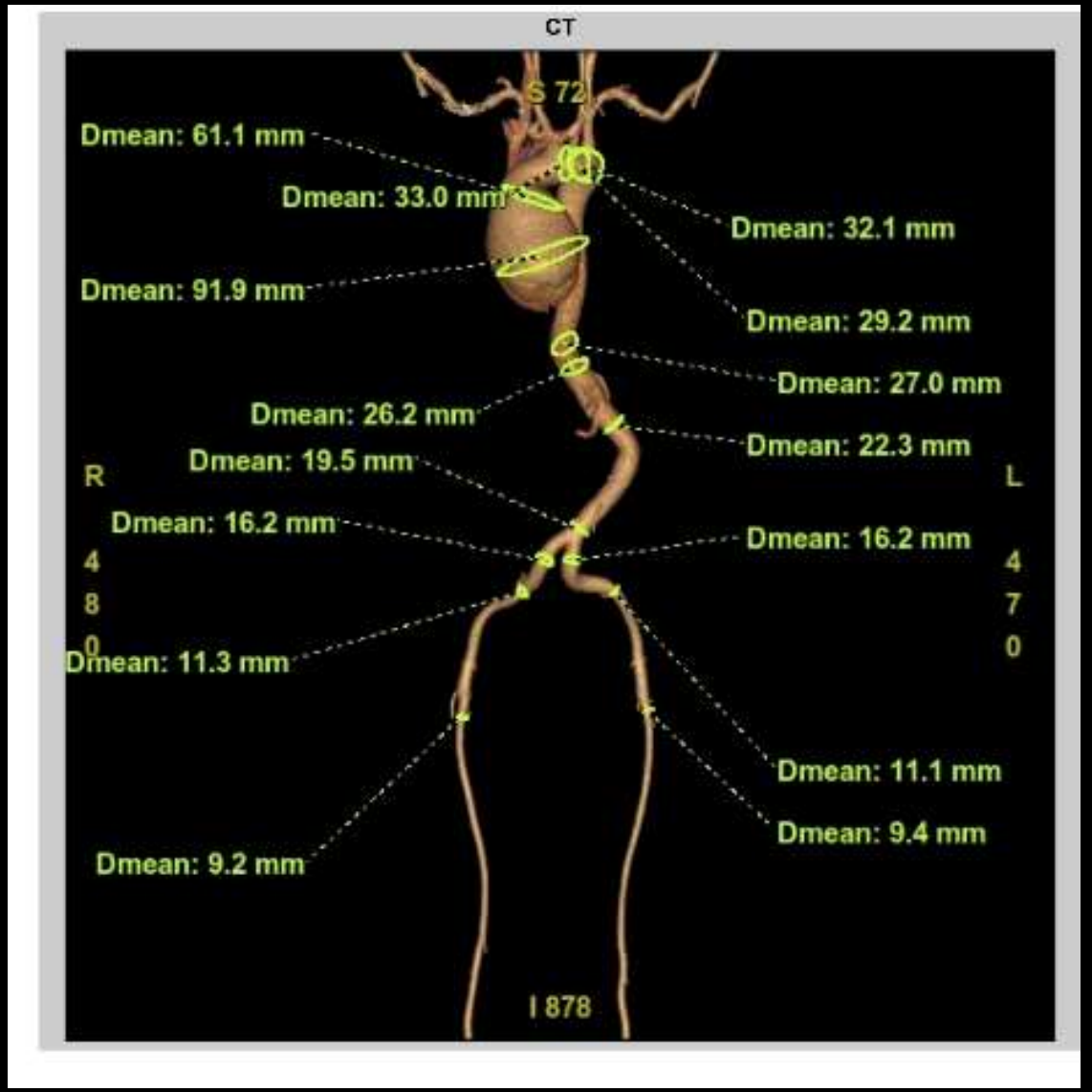

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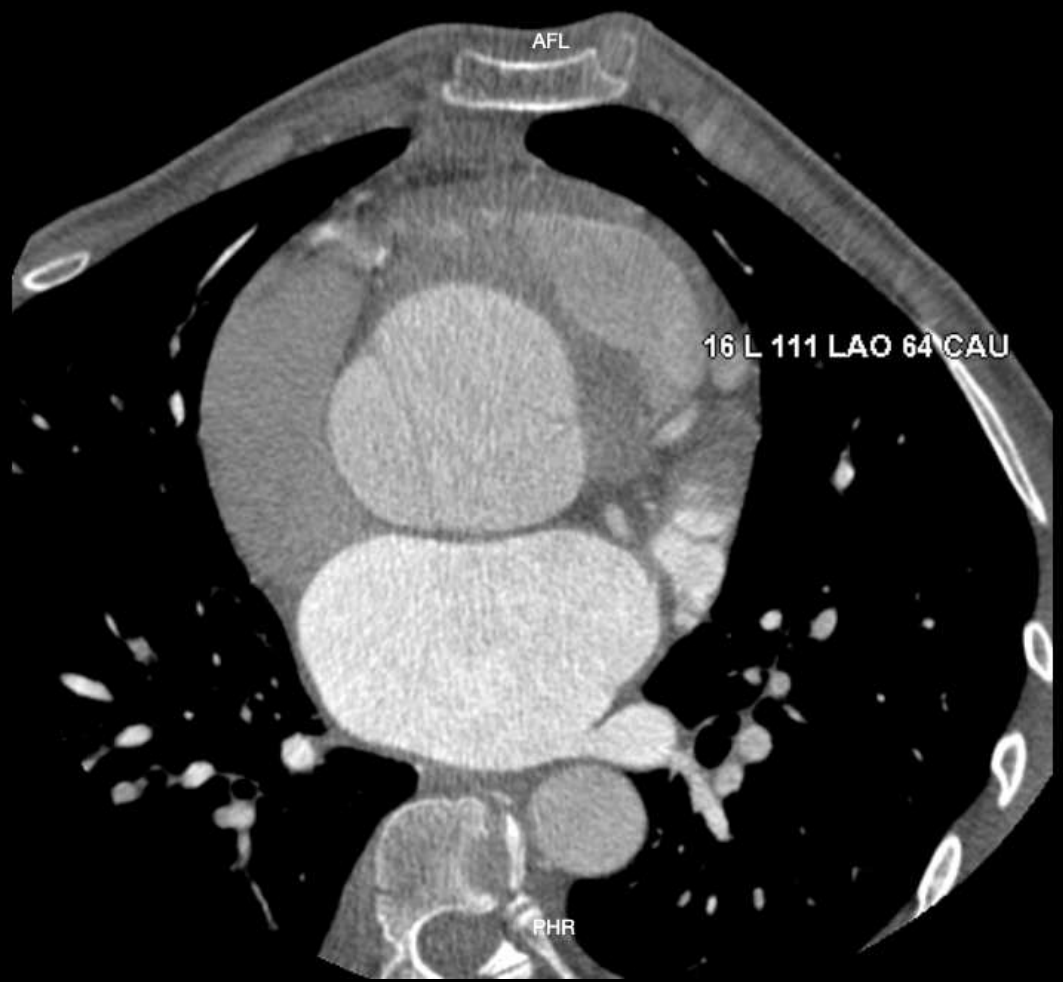

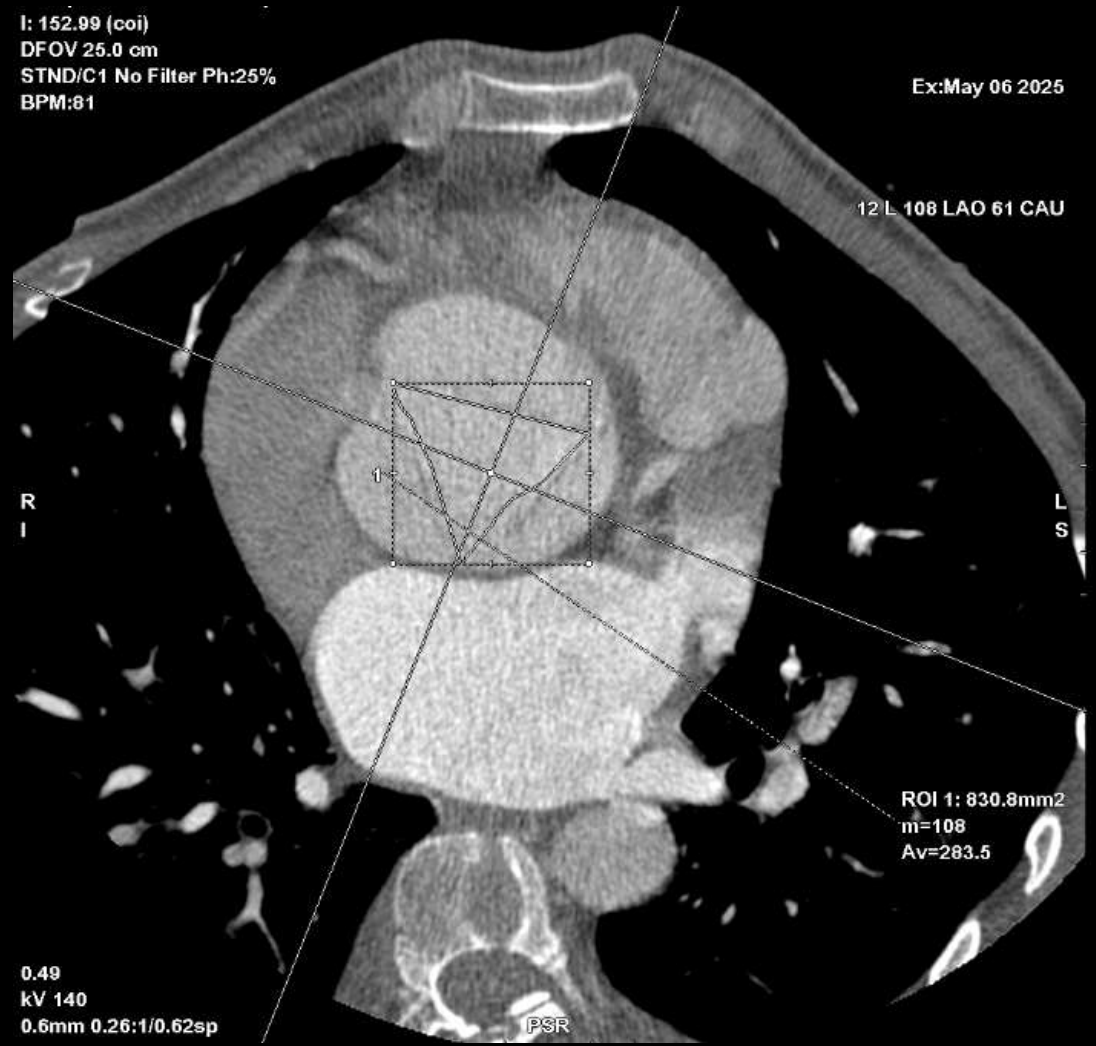

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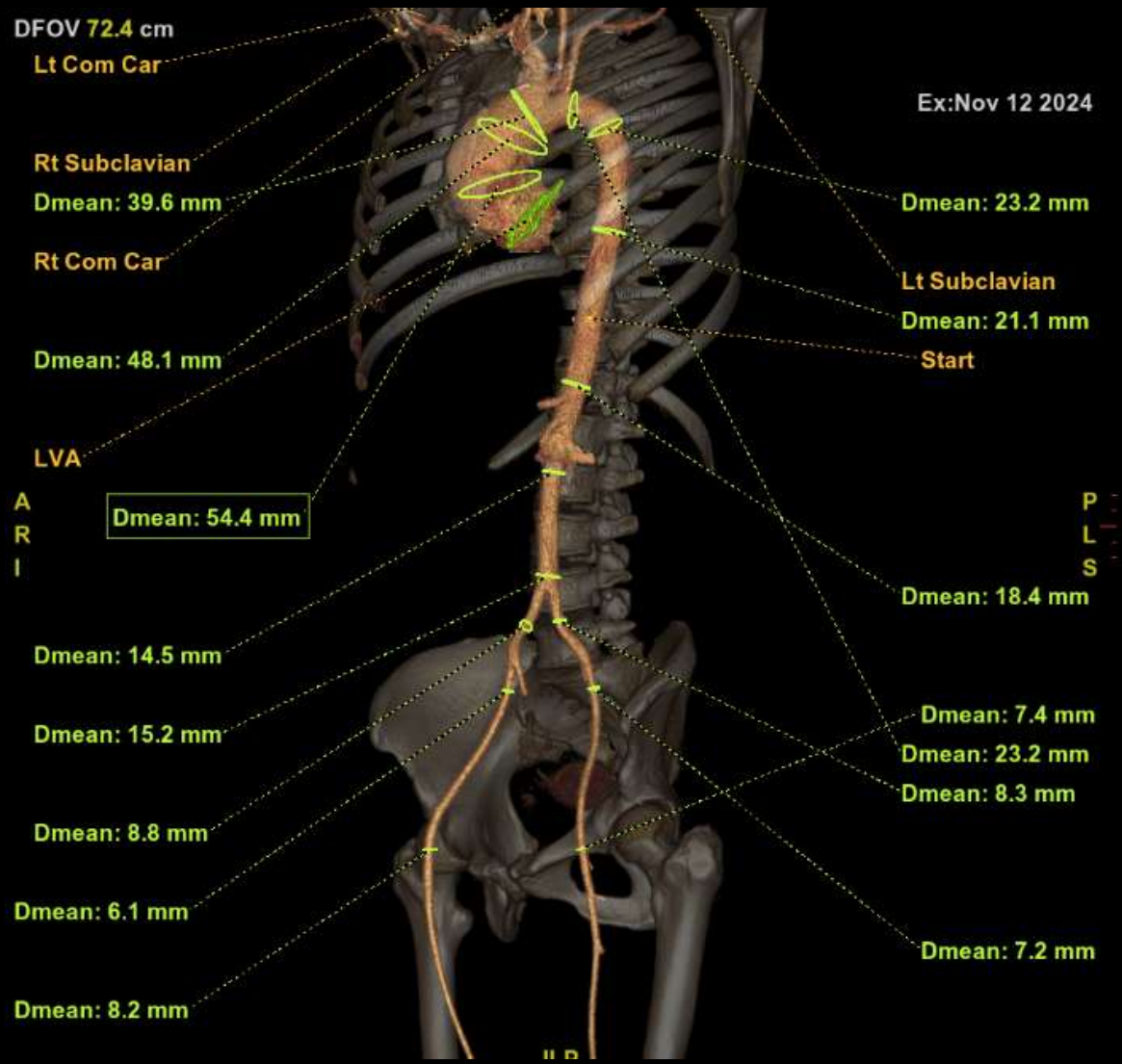

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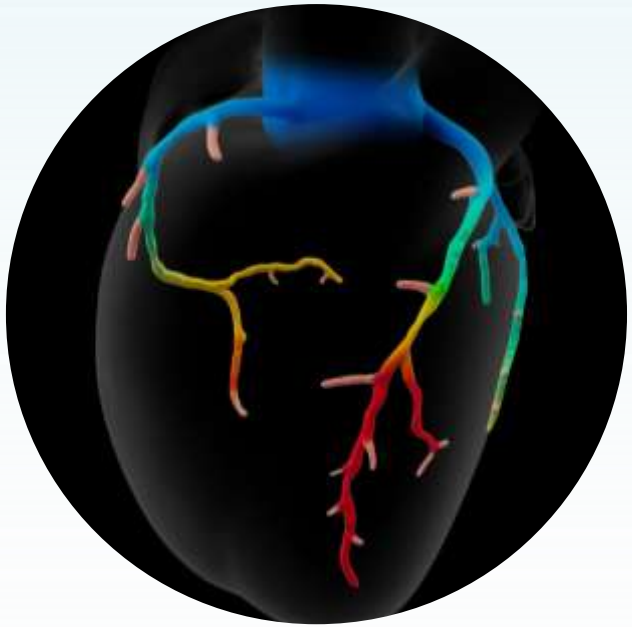

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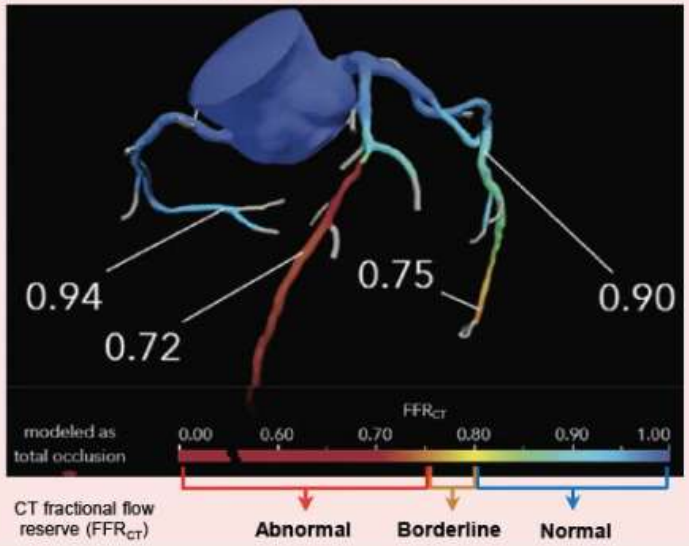
CT FFR

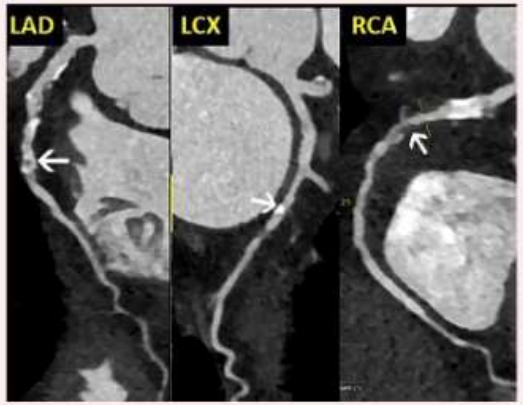
CT Fractional Flow Reserve: A Practical Guide to Application, Interpretation, and Problem Solving

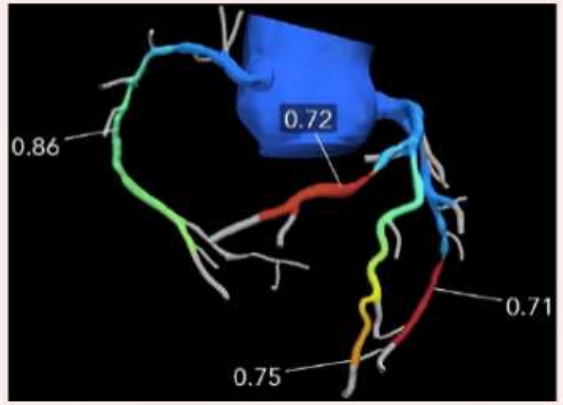
Basics

Physiologic simulation technique utilizing routine CTA data to mathematically model coronary flow, pressure, resistance



Utility in preprocedural planning





CTA FFR$_{CT}$	Left anterior descending artery	Left circumflex artery	Right coronary artery
	Severe stenosis	Severe stenosis	Moderate stenosis
	0.72	0.71	0.86

Patient underwent revascularization of the LAD and LCX

Rajiah P et al. Published online: February 4, 2022
https://doi.org/10.1148/rg.210097

RadioGraphics

Table 1: Key Features of FFR_{CT}

FFR_{CT} Feature	Interpretation	Comment
Value >0.8	Normal	Can safely defer ICA and revascularization
Value ≤0.75	Abnormal	May benefit from ICA and revascularization Correlate with clinical and anatomic features
Value 0.76–0.8	Borderline	Management not clearly established Can be determined on the basis of other features, including vascular territory, location, number, ΔFFR_{CT}, plaque burden, and high-risk plaque features; no additional risk factors: OMT; with additional risk factors: further functional testing, ICA, revascularization Some authors recommend OMT for 3 months and follow-up; no symptoms: continue OMT; persistent symptoms: ICA, revascularization
Lesion-specific ischemia	2 cm distal to stenosis	The lowest value from a vessel should not be used If there is no 2 cm distal to the stenosis, measure at the distal-most evaluable segment
ΔFFR_{CT}	Difference of FFR_{CT} values proximal and distal to stenosis	>0.12 indicates lesion-specific ischemia
Calcium and FFR_{CT}	Superior to CTA	Improves reader diagnostic confidence

Table 2: Pitfalls of FFR_{CT}

FFR_{CT} Pitfall	Comment	Management
Gradual decrease in FFR_{CT} value	Normal, atherosclerosis, serial stenosis, or myocardial hypertrophy	Correlate with anatomic features Provide medical management if there is no target for revascularization May be significant if there is a proximal lesion without immediate pressure drop if this lesion is supplying a large myocardial territory
Low value in distal-most vessel without focal lesion	Diffuse atherosclerosis	Correlate with anatomic features Provide medical management if there is no target for revascularization May be significant if there is a proximal lesion without immediate pressure drop, if this lesion is supplying a large myocardial territory
Multivessel disease	Measure FFR_{CT} distal to each lesion	Helps with selection for revascularization Helps with procedure planning
Serial stenosis	Inaccurate measurement owing to complex physiology	Virtual PCI planner can be used to model interventions Performing ΔFFR_{CT} may help
Discordant FFR_{CT} and invasive FFR values	Higher at values between 0.7 and 0.8 Different locations of measurement for CT and invasive FFR	Correlate with clinical and anatomic features
Discordant FFR_{CT} values and coronary CTA findings	Mild stenosis with positive FFR_{CT} Severe stenosis with negative FFR_{CT} Abnormal FFR with normal CTA	Correlate with anatomic and clinical features
Modeling errors	Inaccurate segmentation and modeling Noninclusion of area of interest Noninclusion of small branches	Correlate with anatomic features

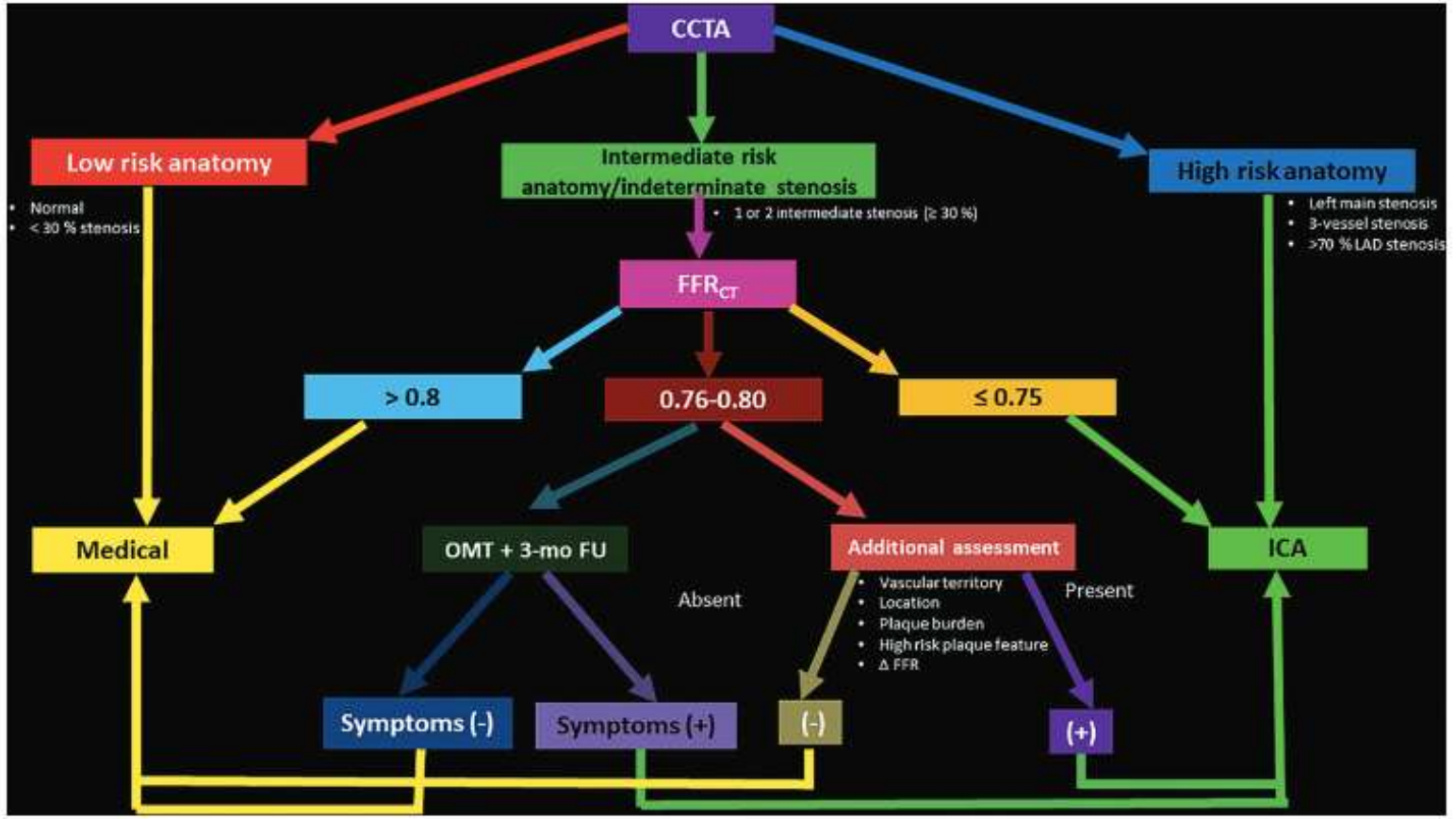


Figure 7. Flowchart shows management of atypical chest pain and the integration of FFR_{CT}. A patient with low-risk anatomy at coronary CTA is referred for OMT, whereas a patient with high-risk anatomy at CTA is directly referred for ICA. Patients with intermediate-risk anatomy or indeterminate stenosis grade are referred for FFR_{CT}. If the FFR_{CT} is abnormal, the patient undergoes ICA; if the FFR_{CT} is normal, the patient receives OMT. If the FFR_{CT} is borderline, some groups advocate OMT with a 3-month follow-up *(3-mo FU)*. If symptoms persist at 3 months, the patient is then sent for ICA, but if symptoms resolve in 3 months, OMT is continued. Another option for borderline FFR_{CT} values is to evaluate for additional risk factors such as vessel territory, location, number of lesions, ΔFFR_{CT}, plaque burden, and high-risk plaque features. ICA is recommended only for patients with additional high-risk features, whereas OMT is suitable for the other risk categories.

Dr. Ponce Barahona

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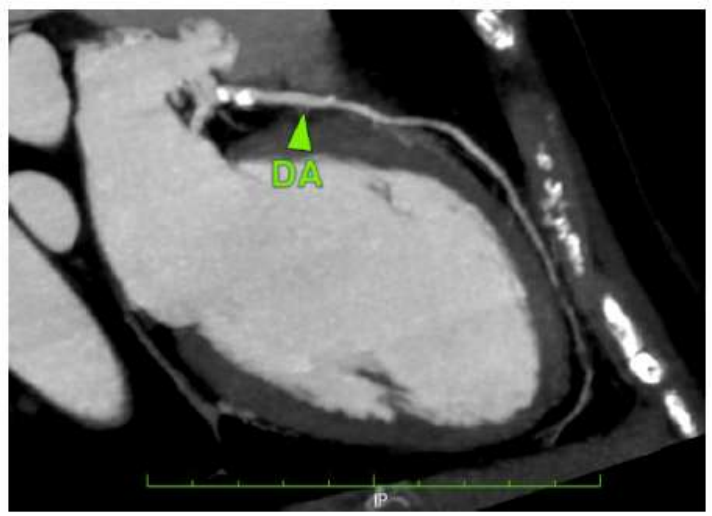

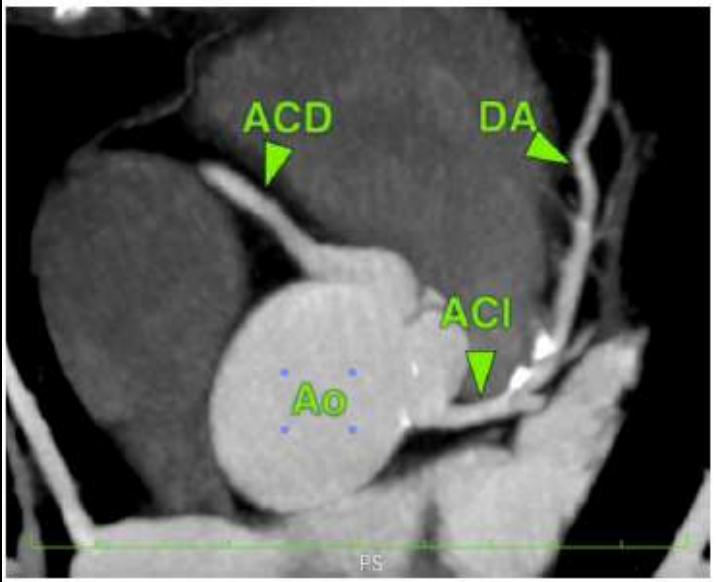

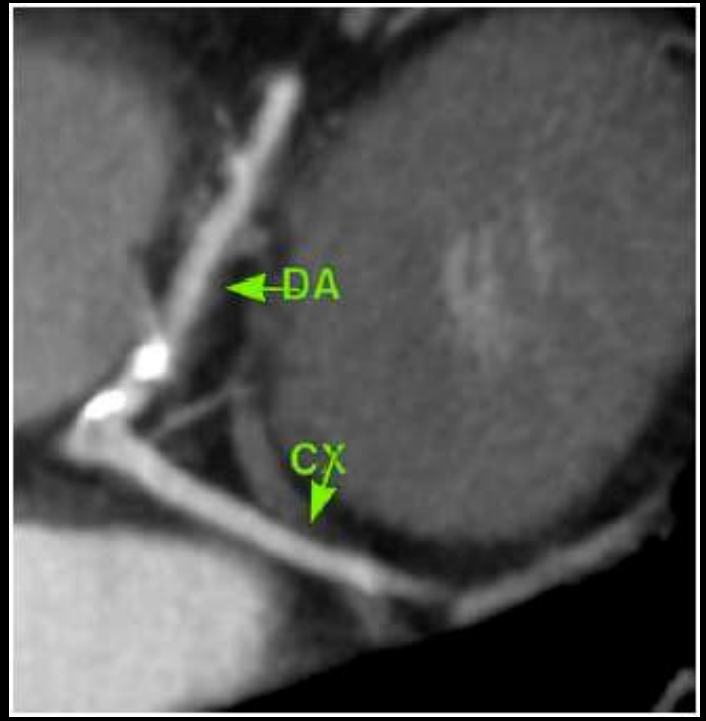

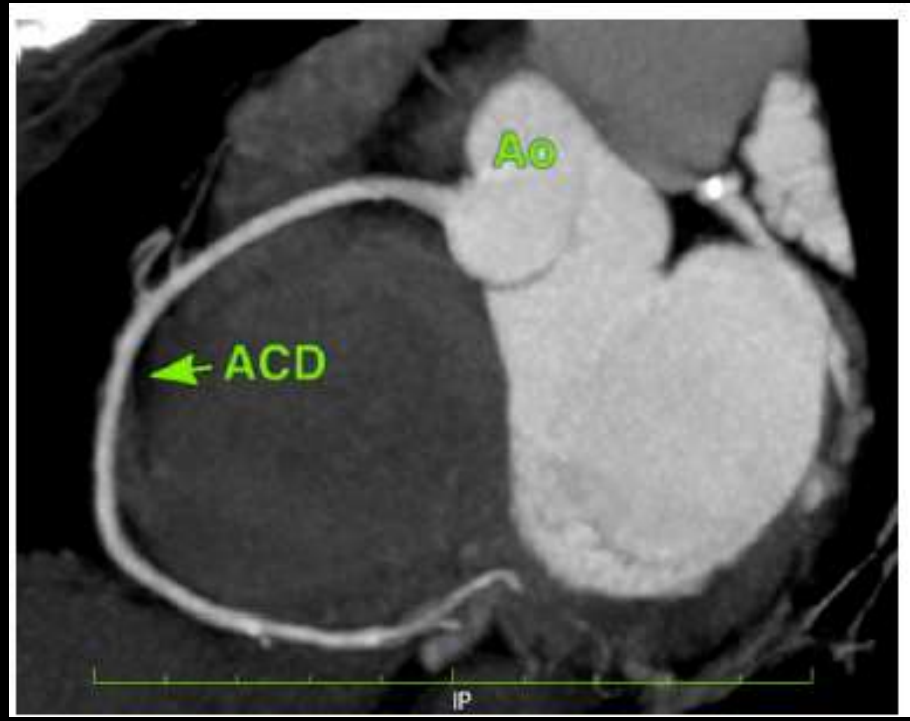

IMPRESIÓN DIAGNÓSTICA:

1. Calcio score de 109 UA. Moderadamente alto riesgo para enfermedad coronaria.
2. Enfermedad coronaria ateromatosa, manifestada por placa calcificada en el segmento proximal de la arteria descendente anterior que condiciona estenosis moderada..
3. Sin defectos de perfusión.
4. Cambios ateromatosos mínimos de la aorta ascendente.

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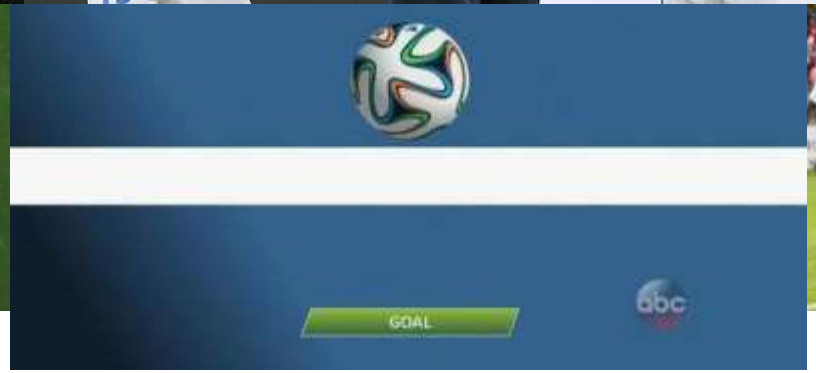

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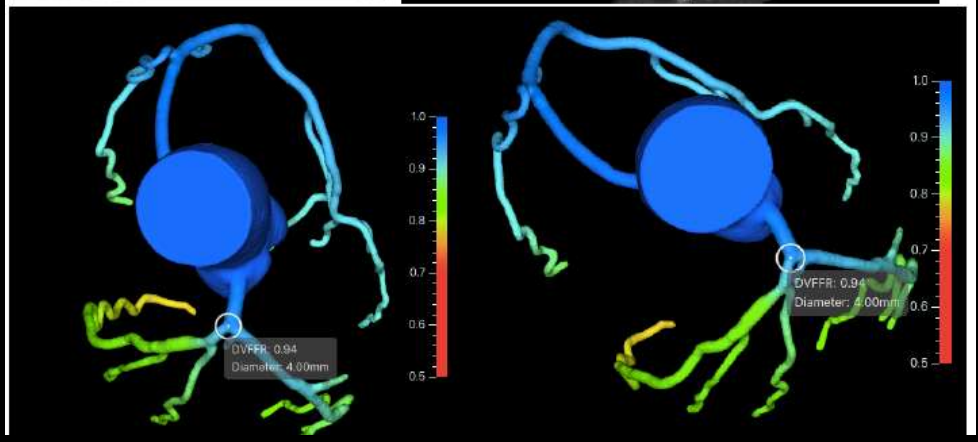
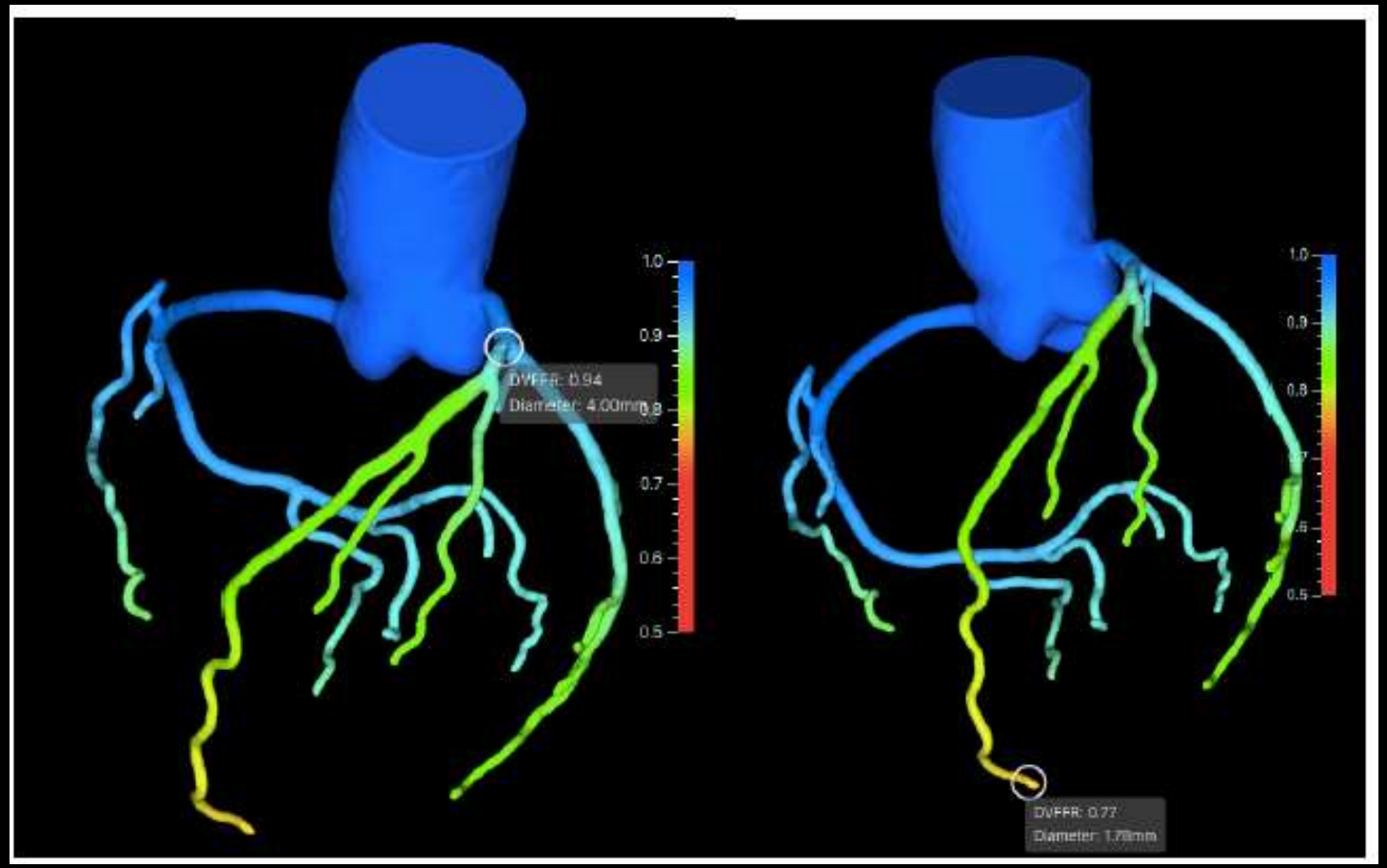
REGIÓN DE INTERÉS (ARTERIA DESCENDENTE ANTERIOR OSTIUM / PROXIMAL): 0.94





1565
JACC April 2, 2024
Volume 83, Issue 13, Suppl A

Multimodality Imaging

USE OF CCTA AND CT-FFR FOR EVALUATION OF CAD IN TAVR PATIENTS: A META-ANALYSIS

Poster Contributions
Hall B4-5
Monday, April 8, 2024, 11:45 a.m.-12:30 p.m.

Session Title: 1529: Multimodality Imaging: CT 17
Abstract Category: 26. Multimodality Imaging: CT
Presentation Number: 1529-184

Authors: Mariam S. Baig, Chaitanya Rojulpote, Deana Mikhalkova, Div Verma, SSM Health St. Louis University Hospital, St. Louis, MO, USA

Background: For patients undergoing transcatheter aortic valve replacement (TAVR) for severe aortic stenosis, coronary artery disease (CAD) often co-exists. Pre-TAVR evaluation routinely includes cardiac computed tomography to assess anatomy and invasive coronary angiography (ICA) to assess for significant CAD. Prior studies show cardiac computed tomography angiography (CCTA) has adequate negative predictive value but limited specificity for detecting significant CAD, which may improve with the addition of CT-fractional flow reserve (CT-FFR). The aim of this meta-analysis was to assess the performance of CCTA and CT-FFR compared with ICA for evaluating for CAD in pre-TAVR workup.

Methods: Search strategy included PubMed, Medline, Cochrane and Google Scholar.

Results: A total of 12 studies with 1810 patients looking at the diagnostic performance of CCTA and CT-FFR compared with ICA. Eight studies evaluated CCTA and 4 studies evaluated CT-FFR compared to ICA. Sensitivity of CCTA was 0.93 (95% 0.87-0.96, p=0.2). Sensitivity of CT-FFR was 0.91 (95% CI 0.80-0.96, p=0.2). Overall, specificity increased with the use of CT-FFR (0.77, 95% CI 0.67-0.84, p<0.01) over CCTA (0.62, 95% CI 0.52-0.71, p<0.01).

Conclusion: CT-FFR significantly improves specificity and diagnostic accuracy of CCTA for detecting significant CAD without the need for additional testing. The combined use of CCTA and CT-FFR can be utilized in the clinical work up for TAVR, thus avoiding invasive coronary angiography in certain cases.

Article | Open access | Published: 01 September 2025

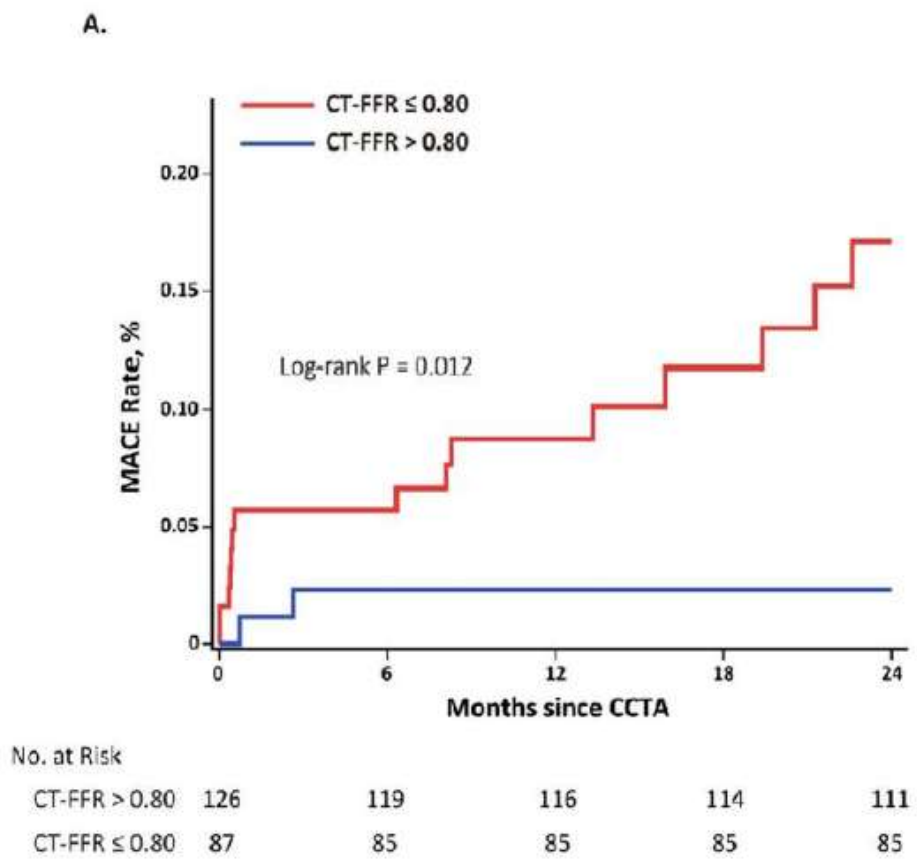
Computed tomography derived FFR and plaque features in prognosis of aortic stenosis combined with coronary artery disease after TAVR

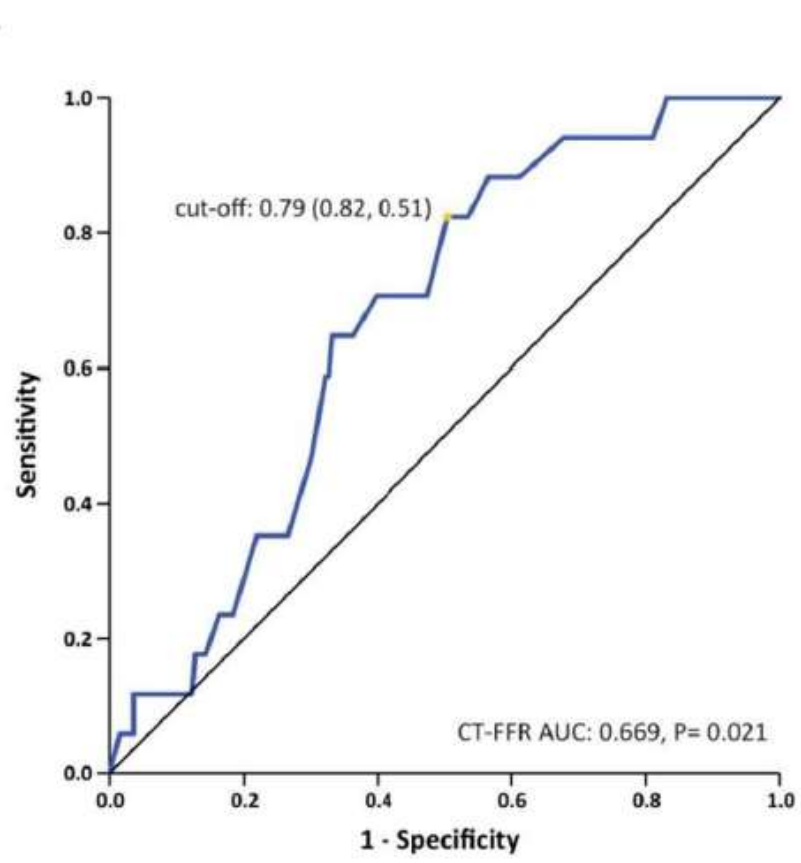
Yi Fang, Miaohan Qiu, Yu Sun, Ran Guo, Bo Yu, Bin Liu, Yingxian Sun, Qian Tong, Jihong Liu, Wenyue Pang, Bo Luan, Bin Wang, Geng Wang, Yang Li, Zhenyang Liang, Kai Xu ✉ & Yaling Han ✉

Scientific Reports **15**, Article number: 32234 (2025) | Cite this article

	Total cohort ($N=213$)	CT-FFR ≤ 0.80 ($N=126$)	CT-FFR > 0.80 ($N=87$)	P value
MACE	17(7.98%)	15(11.90%)	2(2.30%)	0.011*
Cardiac death	13(6.10%)	11(8.73%)	2(2.30%)	0.054
Nonfatal MI[$]	4(1.88%)	4(3.17%)	0(0.00%)	0.093
Ischemia-driven revascularization[#]	3(1.41%)	3(2.38%)	0(0.00%)	0.147
All-cause mortality or nonfatal MI	30(14.1%)	19(15.1%)	11(12.6%)	0.616
All-cause mortality	29(13.62%)	18(14.29%)	11(12.64%)	0.731
Angina symptoms	24(11.27%)	14(11.11%)	10(11.49%)	0.930

Table 2. Endpoints according to CT-FFR. MACE, major adverse cardiovascular events; MI, myocardial infarction. [$]Nonfatal MI did not include non-CT-FFR observed vascular myocardial infarction. [#]Ischemia-driven revascularization did not include non-CT-FFR observed vascular revascularization. **P* values less than 0.05 are marked.


A.
CT-FFR ≤ 0.80
CT-FFR > 0.80
MACE Rate, %
0.20
0.15
0.10
0.05
0
Log-rank P = 0.012
0
6
12
18
24
Months since CCTA
No. at Risk
CT-FFR > 0.80 126 119 116 114 111
CT-FFR ≤ 0.80 87 85 85 85 85


B.
Sensitivity
1.0
0.8
0.6
0.4
0.2
0.0
cut-off: 0.79 (0.82, 0.51)
CT-FFR AUC: 0.669, P= 0.021
0.0
0.2
0.4
0.6
0.8
1.0
1 - Specificity

5

PLANEACIÓN DE PROCEDIMIENTOS

Journal of Cardiovascular Computed Tomography 19 (2025) 366–386

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journal homepage: www.JournalofCardiovascularCT.com

Expert Consensus

Cardiac computed tomography for prosthetic heart valve assessment. An expert consensus document of the Society of Cardiovascular Computed Tomography (SCCT), the American College of Cardiology (ACC), the European Society of Cardiovascular Radiology (ESCR), the North American Society of Cardiovascular Imaging (NASCI), the Radiological Society of North America (RSNA), the Society for Cardiovascular Angiography & Interventions (SCAI) and Society of Thoracic Surgeons (STS)☆,☆☆

Ricardo P.J. Budde[a,*], Marguerite E. Faure[a], Suhny Abbara[b], Hatem Alkadhi[c], Paul C. Cremer[d], Gudrun M. Feuchtner[e], Holly M. Gonzales[f], Todd L. Kiefer[g], Jonathan Leipsic[h], Koen Nieman[i], Jonathan Revels[j], Dee Dee Wang[k], Eric Williamson[l], Moritz C. Wyler von Ballmoos[m], Brittany A. Zwischenberger[n], Rodrigo Salgado[o]

Consensus statement

Cardiac CT acquisition protocols for PHV assessment should include an arterial phase acquisition, preferably an additional (virtual) non-contrast enhanced acquisition and optionally a delayed phase.

Retrospective ECG-gated or prospective wide-window ECG-triggered arterial phase acquisition is required for the reconstructions of image datasets throughout the cardiac cycle to allow functional evaluation of leaflet motion.

Most contemporary PHV generate only limited artifacts. PHV-induced artifacts may be mitigated by using high kV acquisitions, high keV level monoenergetic reconstructions, iterative reconstruction and prospective ECG-triggering when possible.

Contrast injection should be tailored to the valve of interest with standard injection protocols used for coronary imaging often being well-suited for left sided valves.

Image analysis should be performed using dedicated viewing software that enables both static and dynamic imaging with multiplanar reconstructions in plane and perpendicular to the valve leaflets.

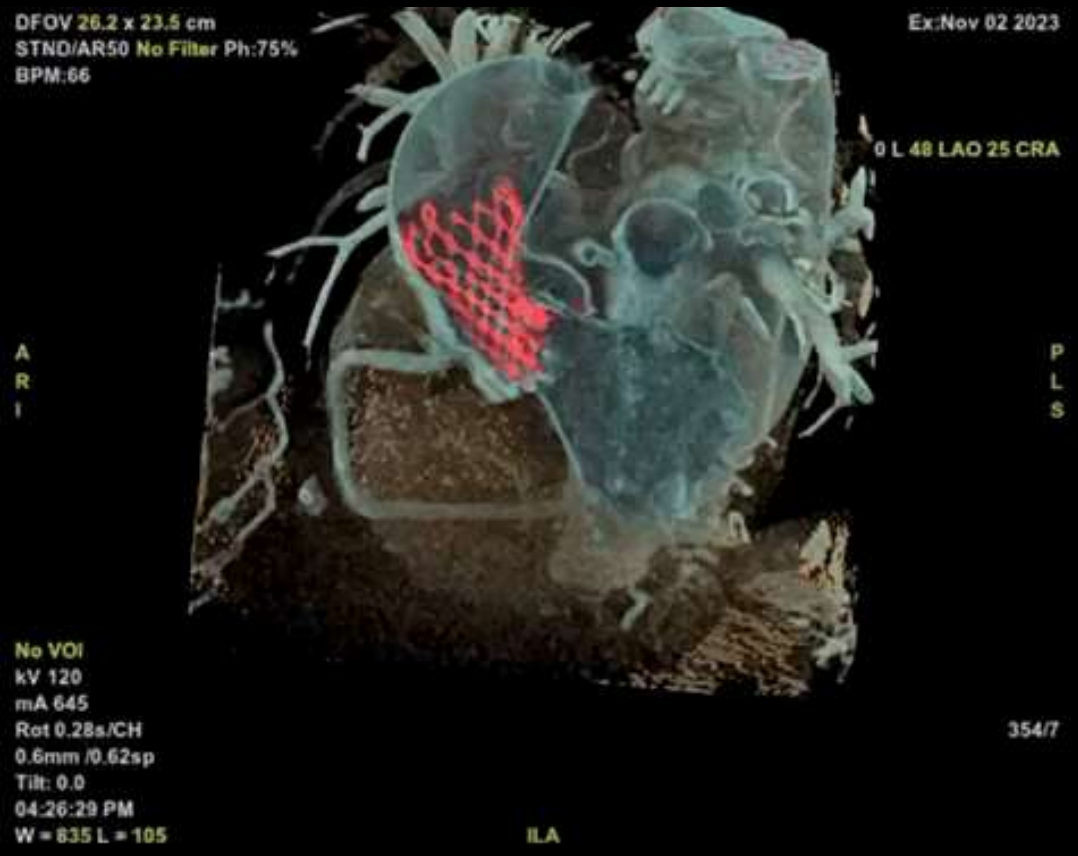
Consensus statement

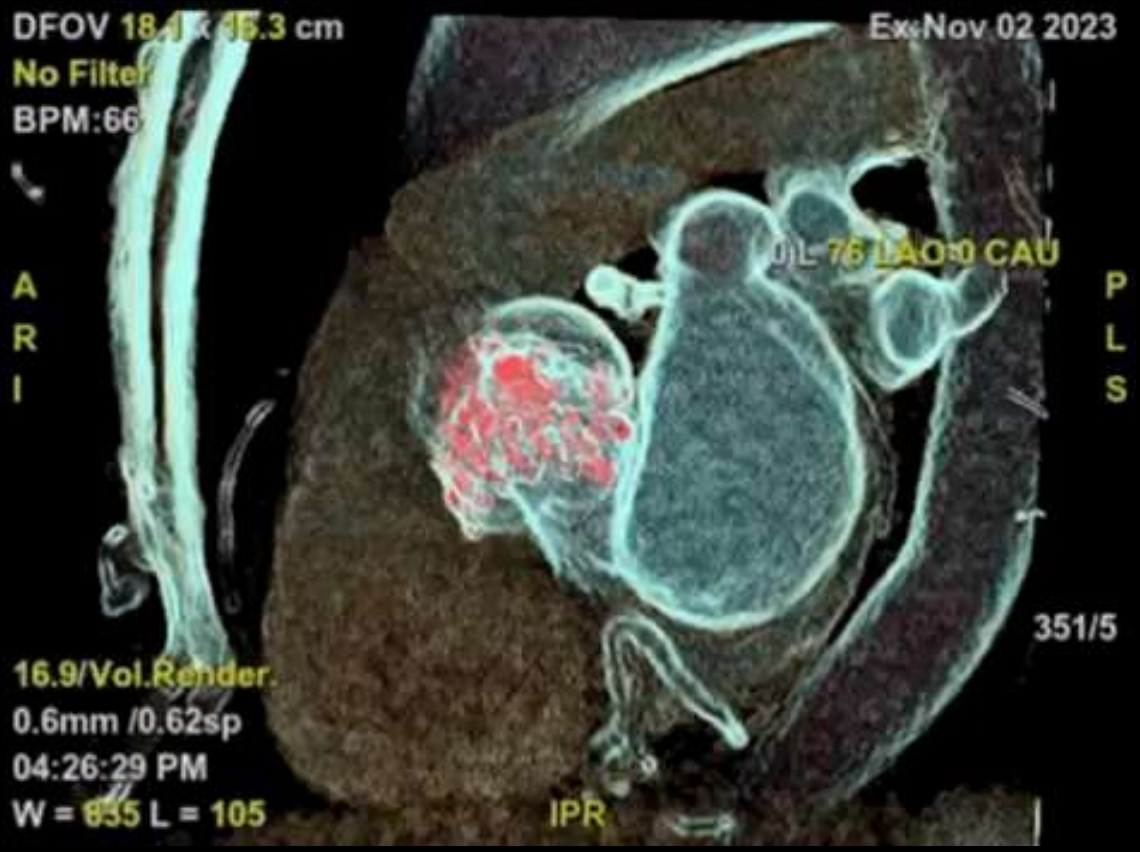
Cardiac CT provides valuable complementary information to echocardiography to determine the cause of PHV obstruction, especially by distinguishing thrombus from pannus.

Thrombus and pannus both present as a hypodense mass on CT imaging, but location and Hounsfield unit value measurements can help to differentiate between both entities.

Cardiac CT has a higher sensitivity than TEE for detecting pannus tissue as the cause of PHV obstruction.

In cases of PHV obstruction due to complex anatomical alterations, CT may provide valuable insight into the mechanism of obstruction.


DFOV 26.2 x 23.5 cm
STND/AR50 No Filter Ph:75%
BPM:66
Ex:Nov 02 2023
0 L 48 LAO 25 CRA
A
R
I
P
L
S
No VOI
kV 120
mA 645
Rot 0.28s/CH
0.6mm /0.62sp
Tilt: 0.0
04:26:29 PM
W = 835 L = 105
354/7
ILA


DFOV 18.4 x 15.3 cm
No Filter
BPM:66
Ex:Nov 02 2023
0 L 76 LAO 0 CAU
A
R
I
P
L
S
351/5
16.9/Vol.Render
0.6mm /0.62sp
04:26:29 PM
W = 835 L = 105
IPR


DFOV 18.2 x 18.2 cm
STND/AR50 Non-Ionic Ph 75%
BPM:66
Ex:Nov 02 2023
0 L 9 LAO 0 CRA
R
A
L
P
No VOI
kV 120
mA 645
Rot 0.28s/CH
0.6mm/0.62sp
Tilt: 0.0
04:26:29 PM
W = 835 L = 105
352/1


DFOV 18.2 x 16.3 cm
STND/DL-H No Filter Ph 75%
BPM:66
Ex Nov 02 2023
R
A
I
L
P
S
No VOI
kV 120
mA 636
Rot 0.28s/CH
0.6mm /0.62sp.
Tilt: 0.0
04:26:29 PM
W = 1534 L = -256
LAO 3 CAU
320/3
IPL

Volume Rendering No cut
DFOV 38.1 cm
STND Smooth 3D+ + Card 3 Ph:75%
Imágenes filtradas: mediciones calculadas a partir de imágenes nativas

Ex:Feb 07 2025

R
A
I

L
P
S

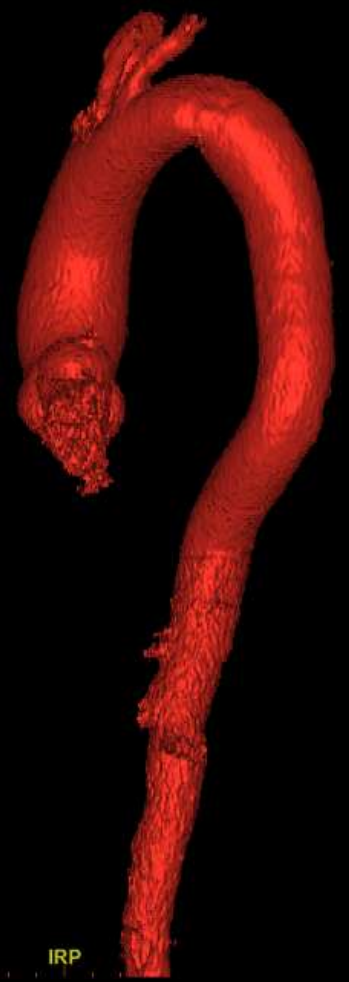
0 L 30 LAO 0 CAU

No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 800 L = 100

ILP

Volume Rendering No cut
DFOV 38.1 cm
STND Smooth 3D+ + Card 3 Ph:75%
Imágenes filtradas: mediciones
calculadas a partir de imágenes nativas

Ex:Feb 07 2025



A
R
I

P
L
S

0 L 87 LAO 3 CAU

No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 800 L = 100

IRP

Volume Rendering No cut
DFOV 38.1 cm
STND Smooth 3D+ + Card 3 Ph:75%
Imágenes filtradas: mediciones
calculadas a partir de imágenes nativas

Ex:Feb 07 2025

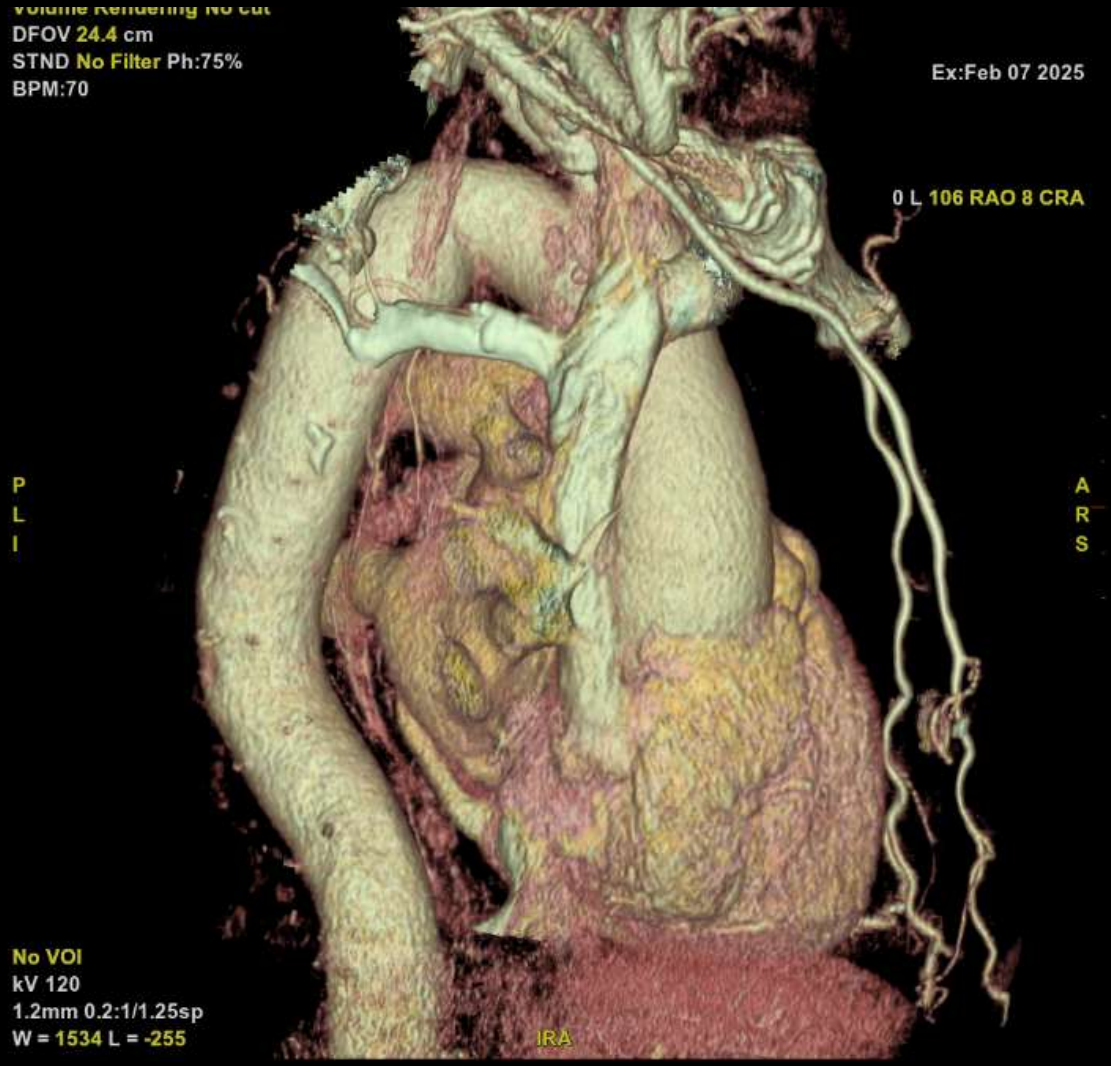
L
A

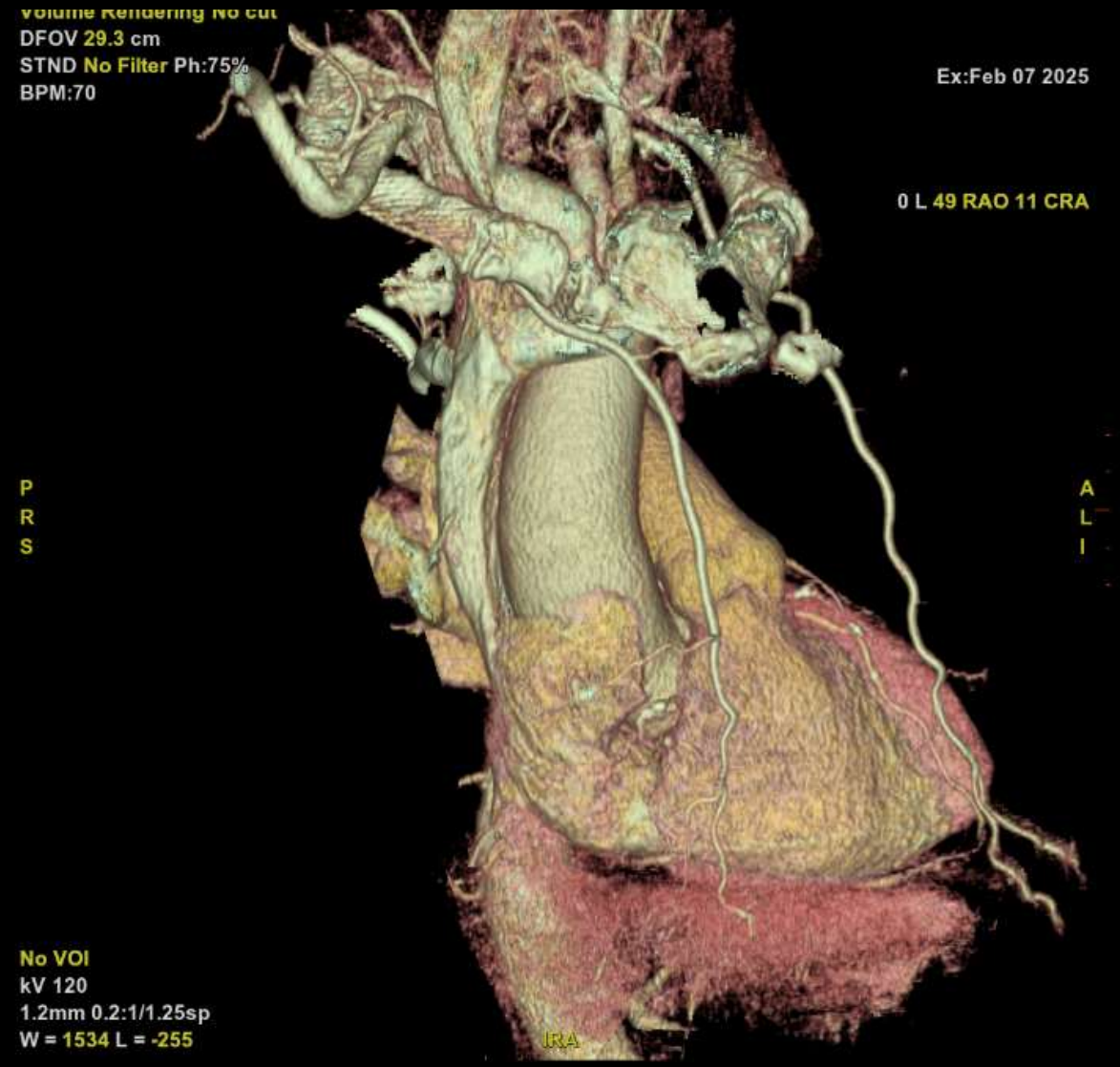
R
P

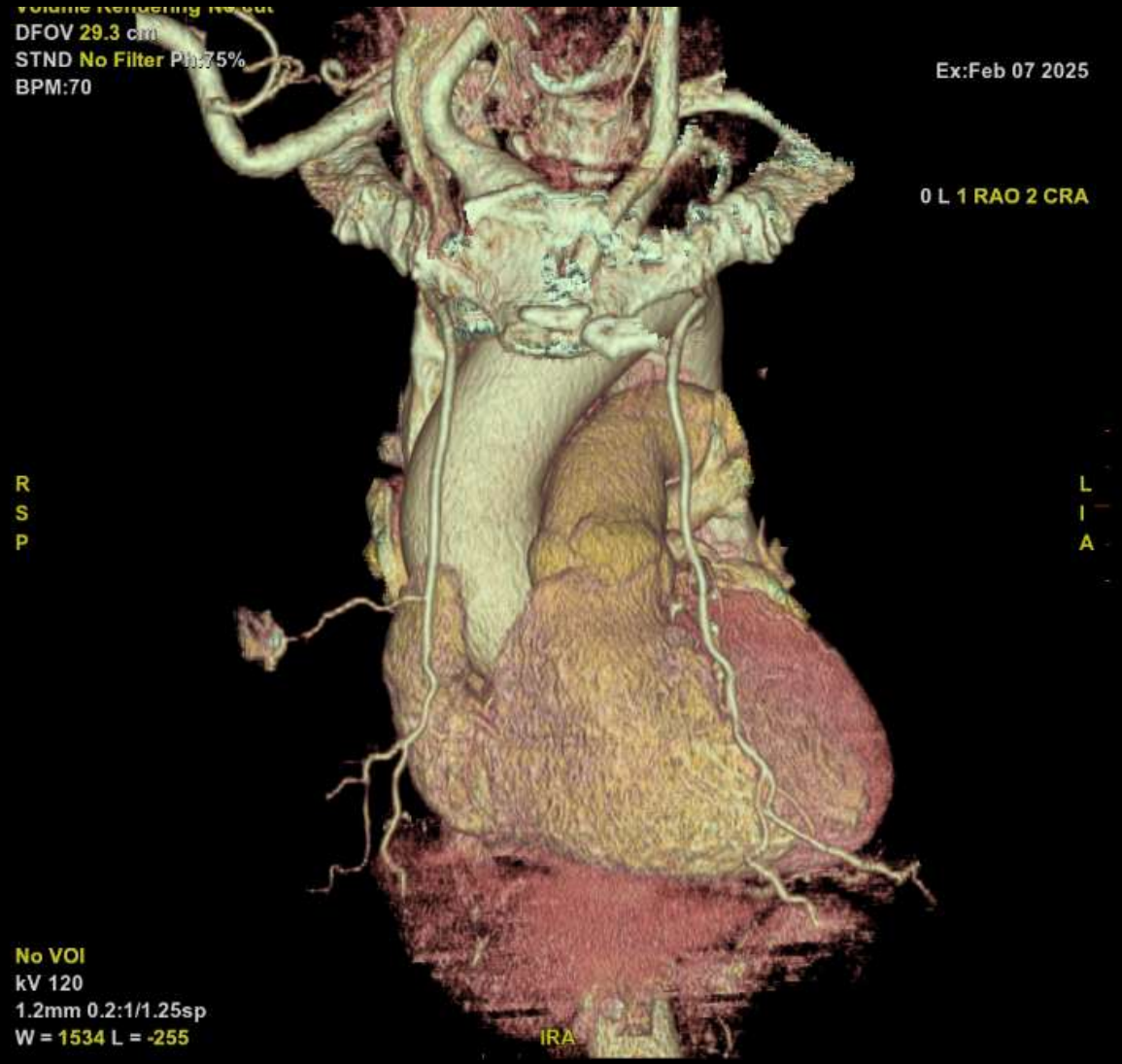
0 L 166 LAO 8 CAU

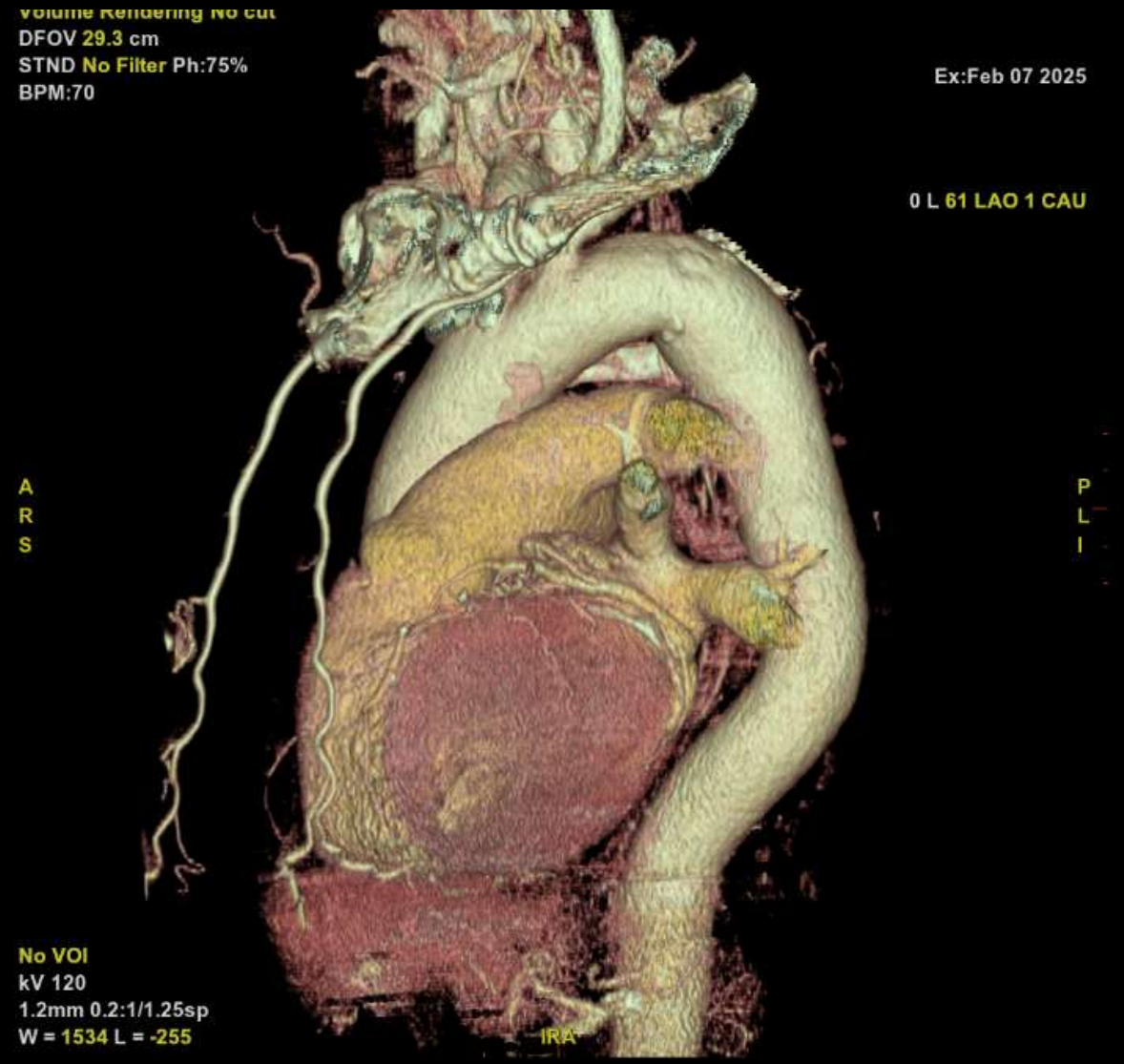
No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 800 L = 100

IAR




Volume Rendering No cut
DFOV 29.3 cm
STND No Filter Ph:75%
BPM:70
Ex:Feb 07 2025
0 L 49 RAO 11 CRA
P
R
S
A
L
I
No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 1534 L = -255
IRA


DFOV 29.3 cm
STND No Filter
BPM:70
Ex:Feb 07 2025
0 L 1 RAO 2 CRA
R
S
P
L
I
A
No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 1534 L = -255
IRA



Volume Rendering No cut
DFOV 53.1 cm
STND No Filter Ph:75%
BPM:72

Ex:Feb 07 2025

0 L 44 RAO 8 CRA

R
P
S

L
A
I

No VOI
kV 120
1.2mm 0.2:1/1.25sp
W = 1534 L = -255

IRA

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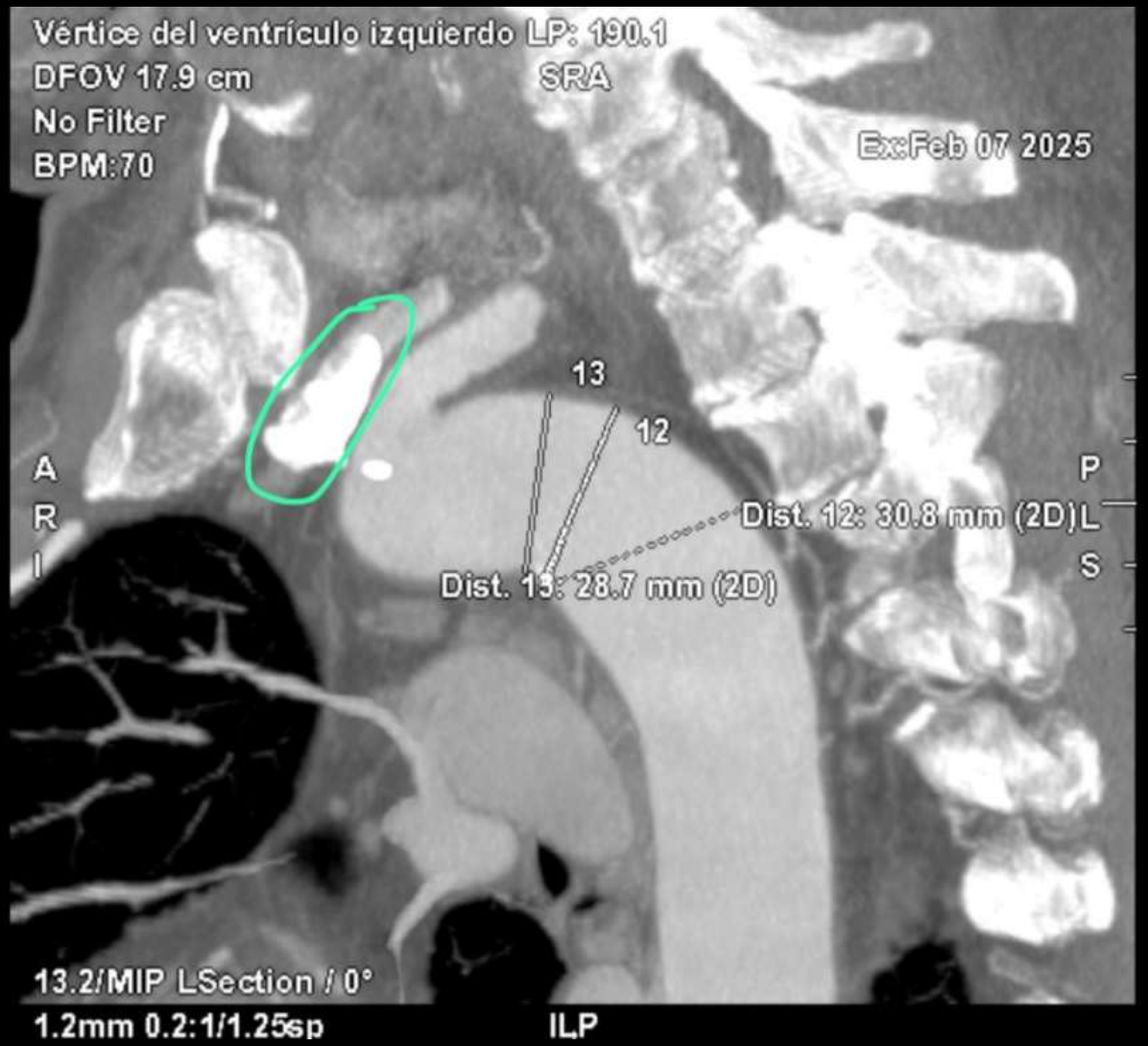


2025-02-07
Age: 74 years

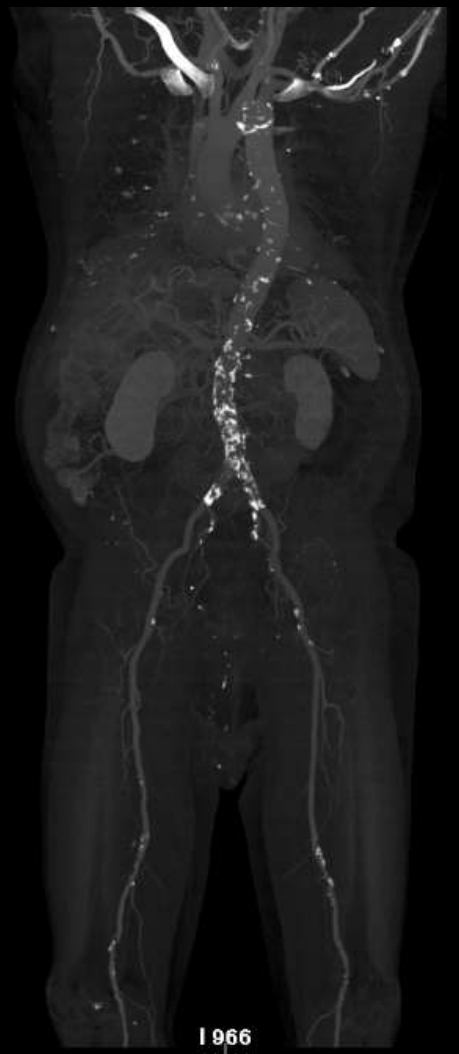
orte 5/10

W: 1301

HD MIP No cut
DFOV 107.1 cm
STND No Filter

Ex:May 02 2025

Calc. incl.



R

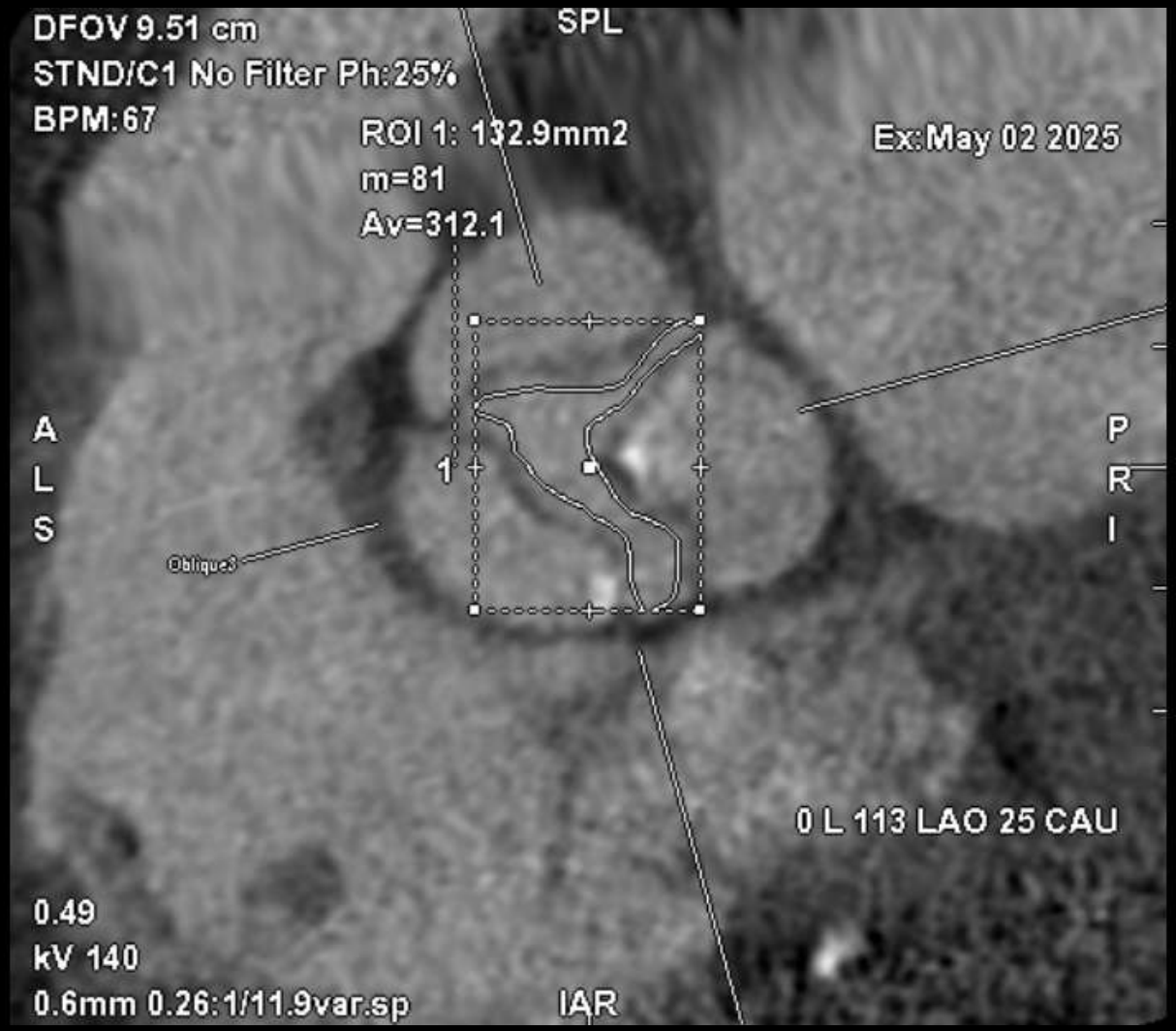
5
2
8

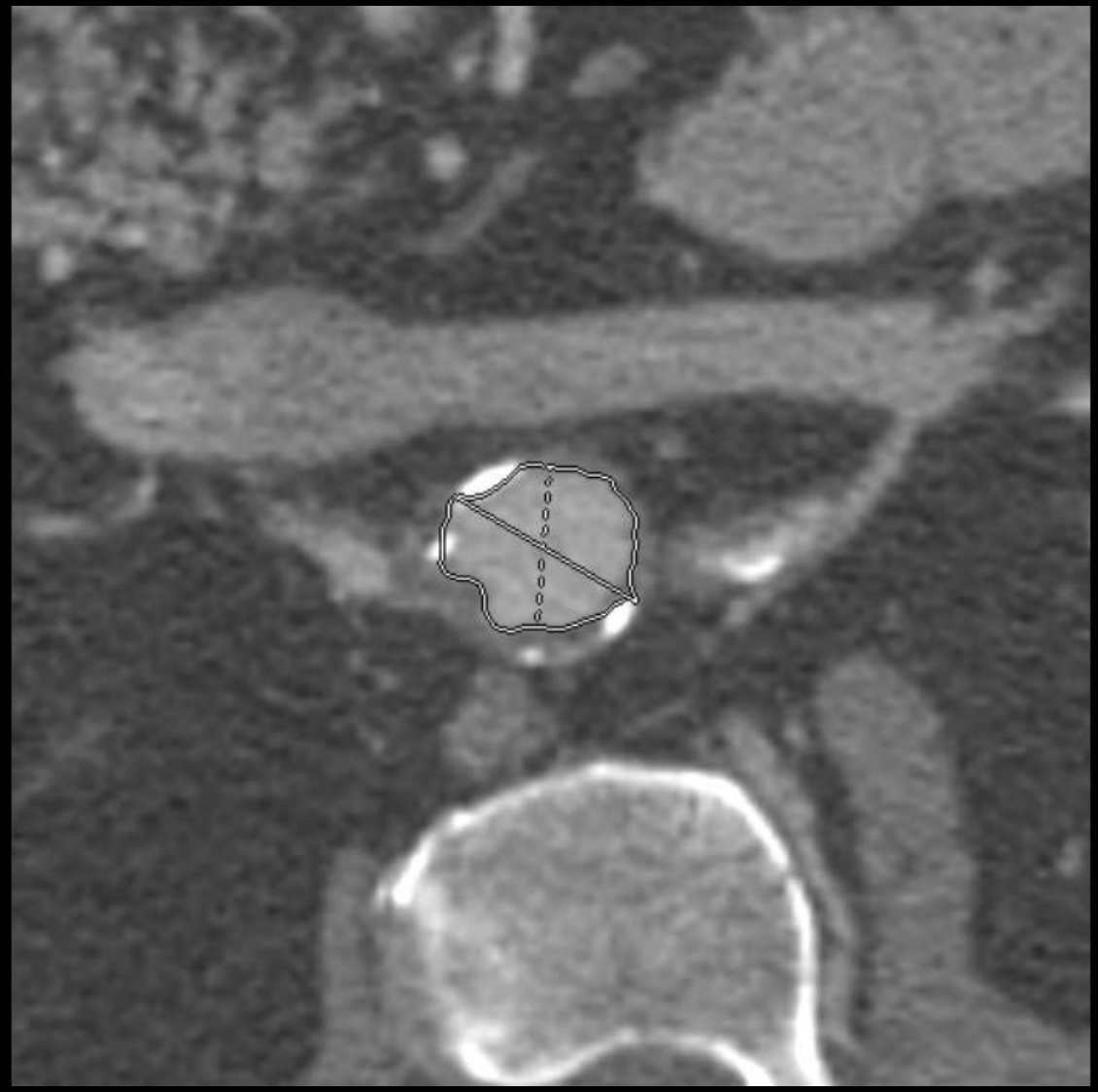
L

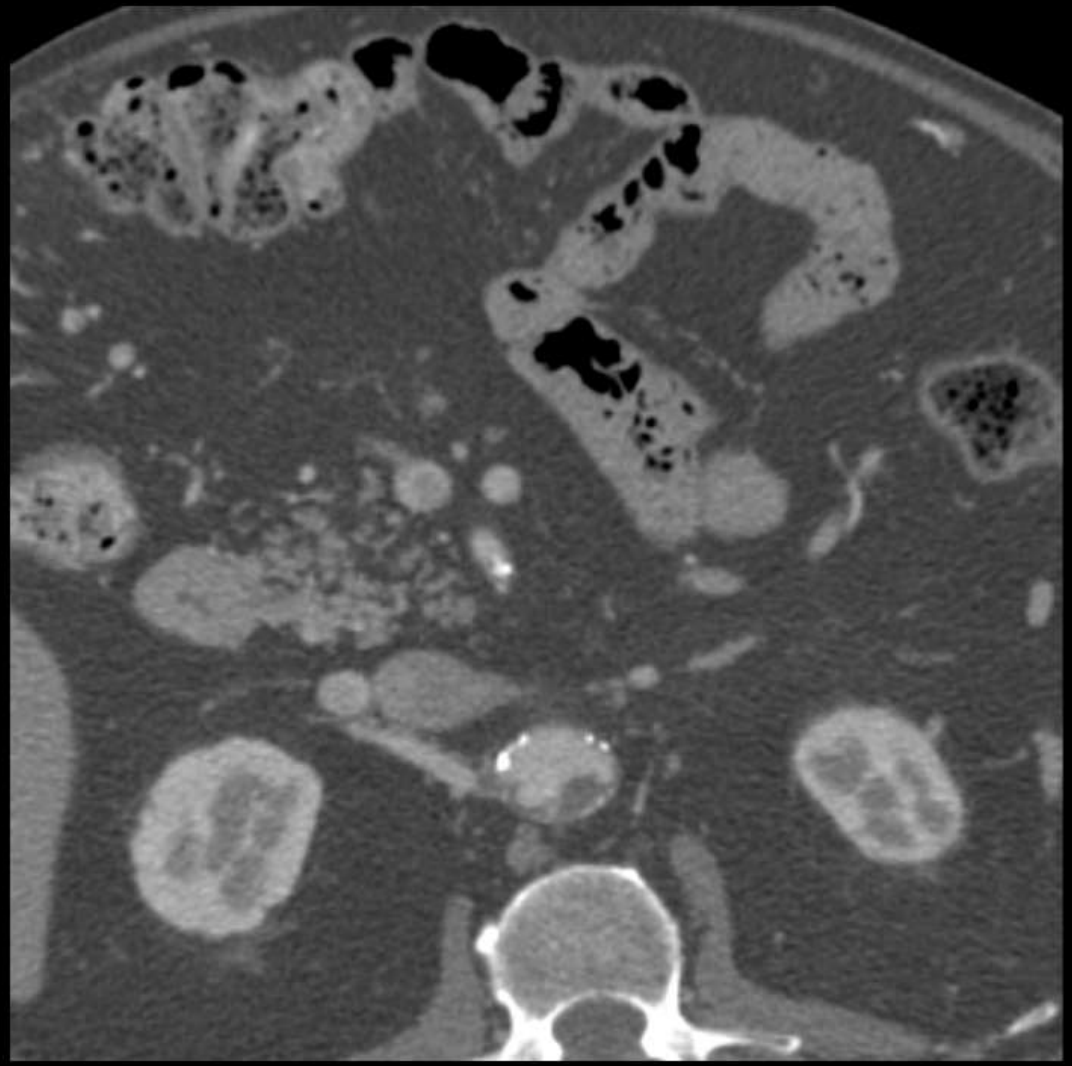
5
4
3

No VOI
kV 140
1.2mm 0.516:1/1.25sp

I 966


DFOV 9.51 cm
STND/C1 No Filter Ph:25%
BPM:67
SPL
ROI 1: 132.9mm2
m=81
Av=312.1
Ex:May 02 2025
A
L
S
1
P
R
I
Oblique3
0 L 113 LAO 25 CAU
0.49
kV 140
0.6mm 0.26:1/11.9var.sp
IAR





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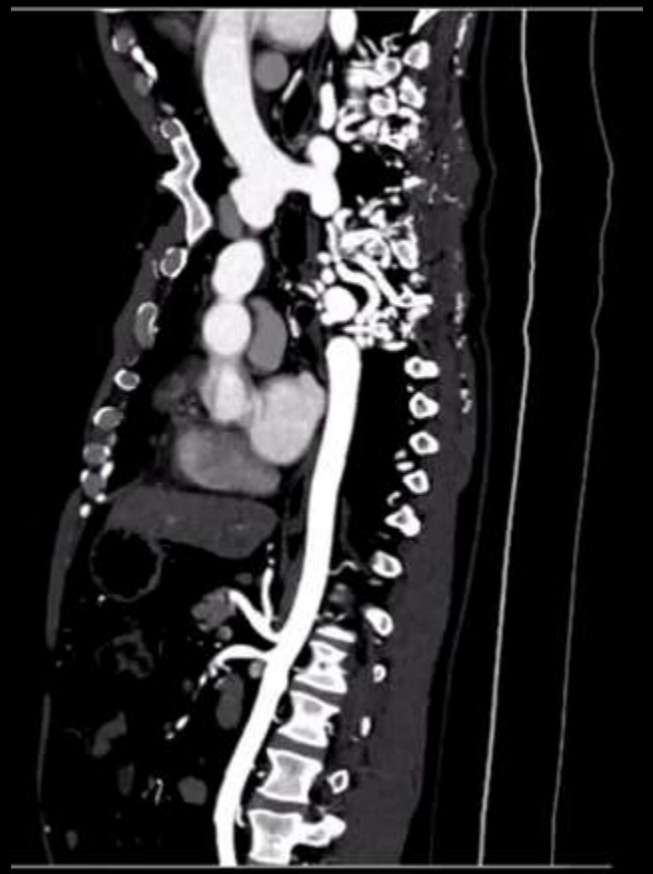
Aorta



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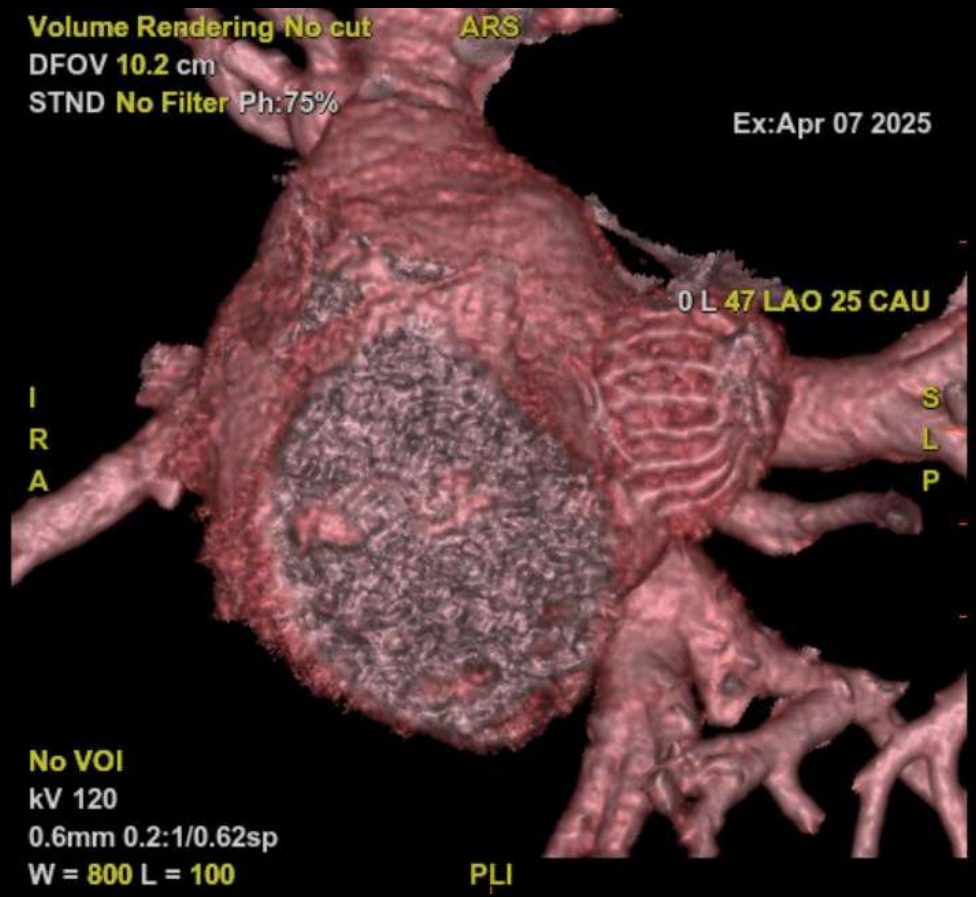

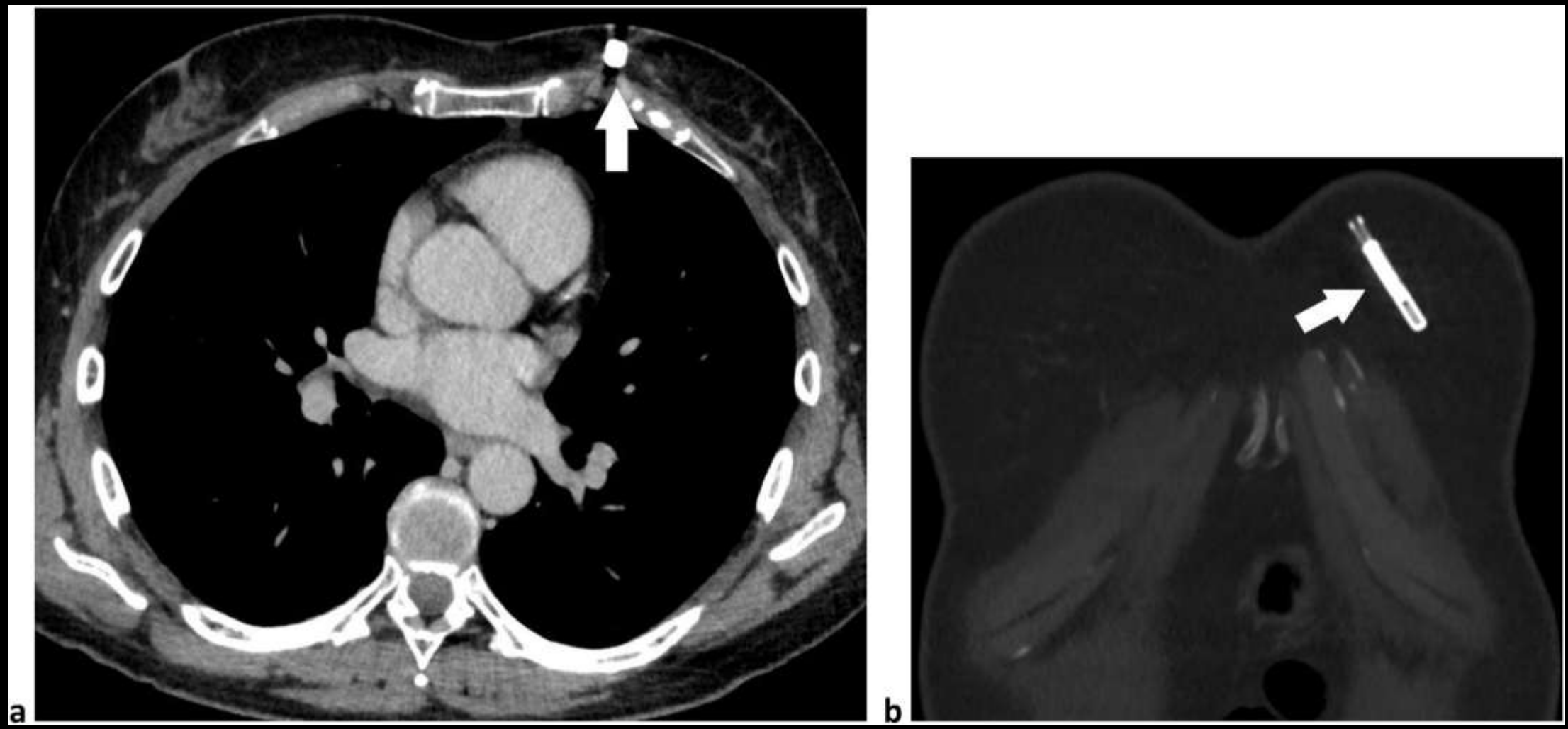
a
b

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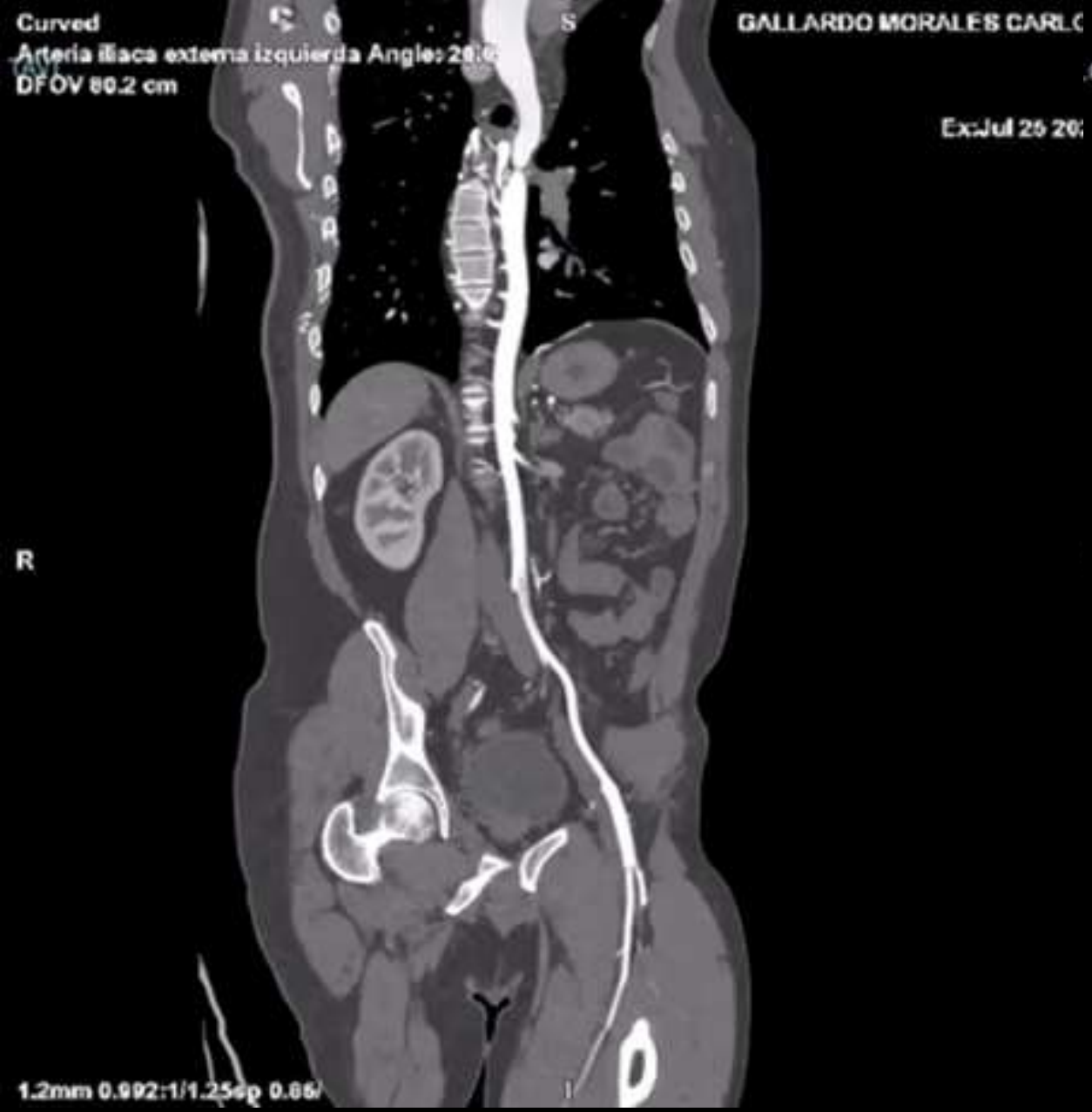
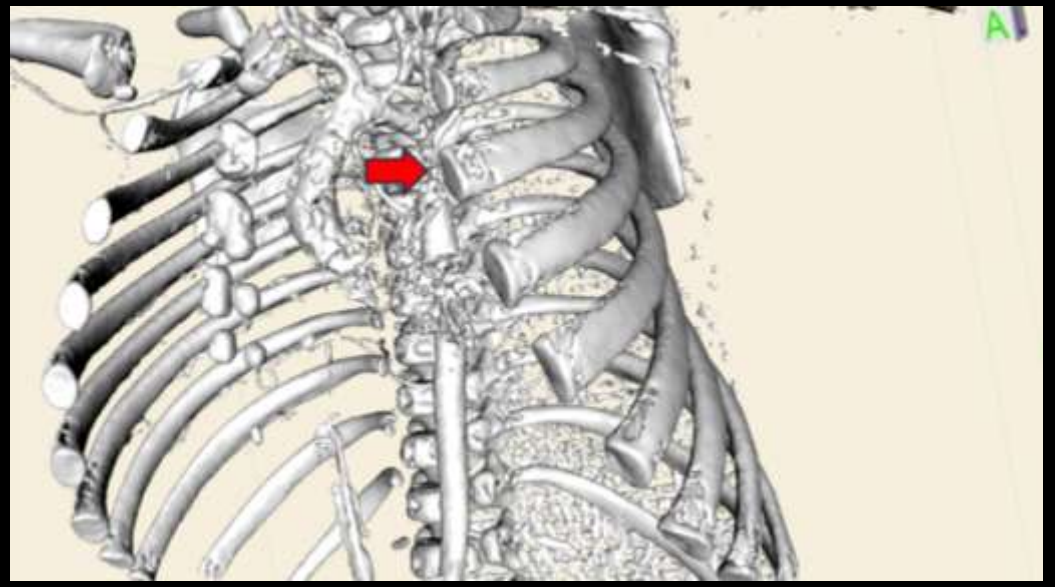
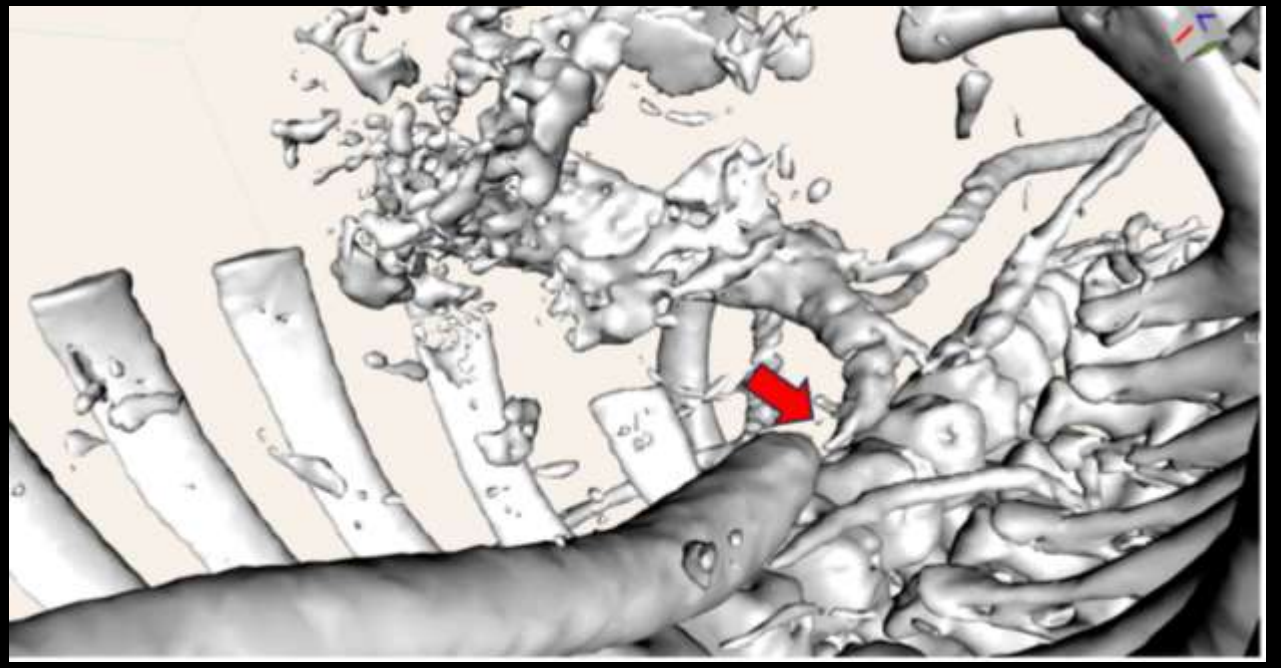
OLO TAVI

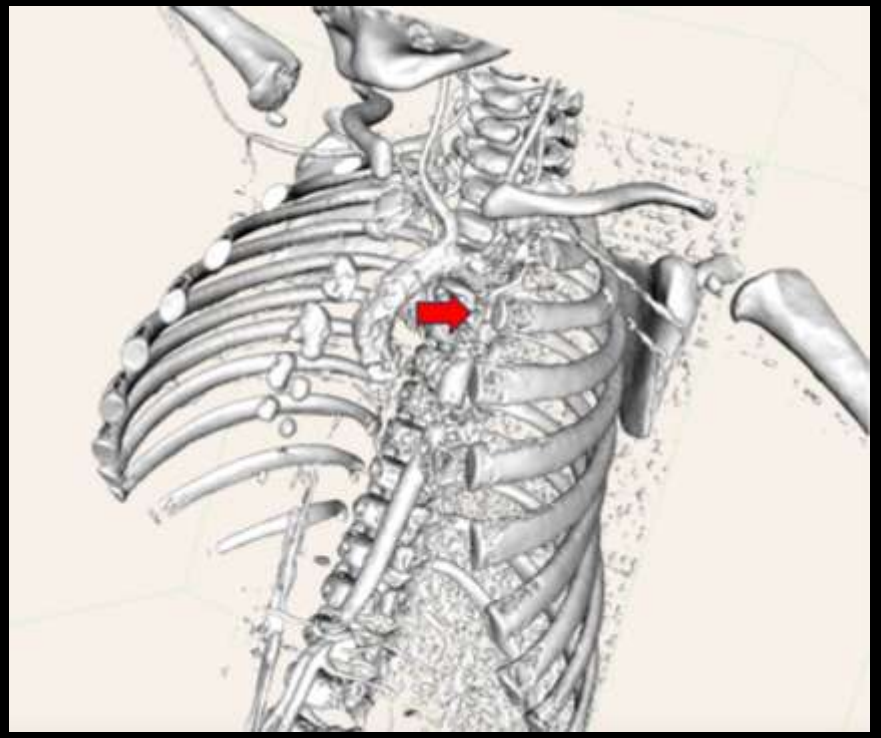

Curved
Arteria iliaca externa izquierda Angle: 28.6
DFOV 80.2 cm
GALLARDO MORALES CARLO
ExJul 25 20
R
1.2mm 0.992:1/1.25sp 0.66/

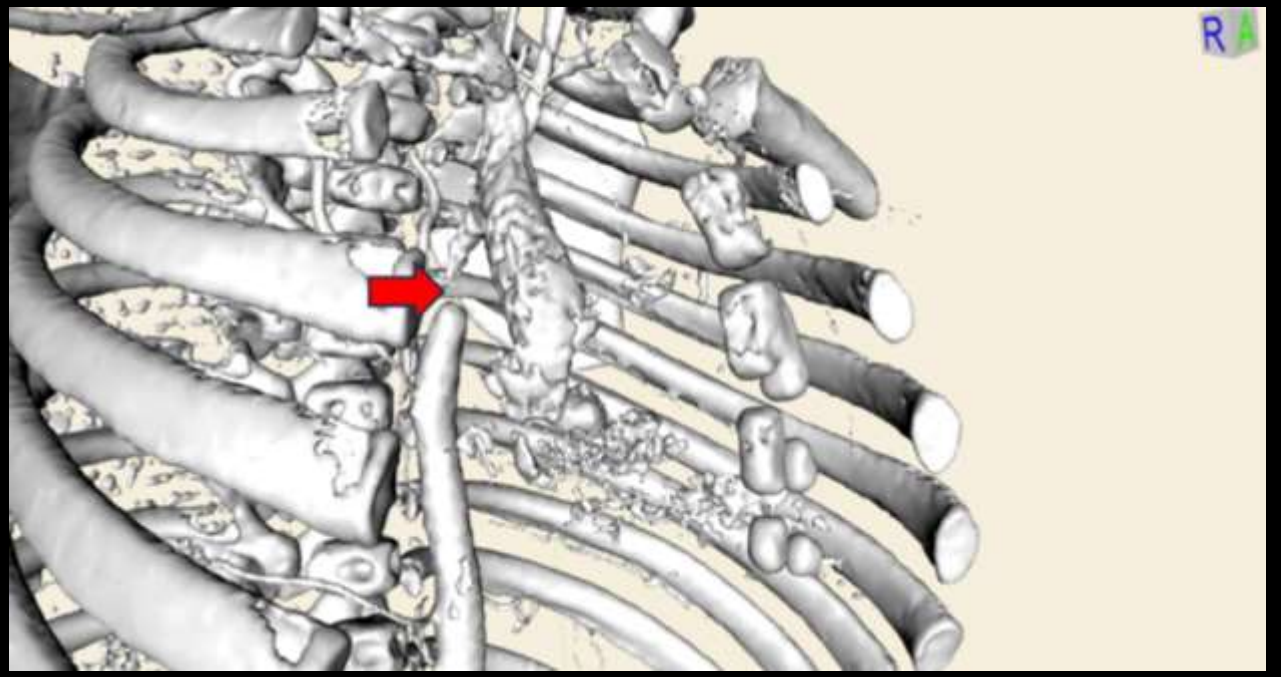

Curved
Arteria iliaca externa derecha Angle: 5.1
DFOV 78.9 cm
GALLARDO MORALES CARLOS
ExJul 25 2023
R
L
1.2mm 0.992:1/1.25sp 0.66/

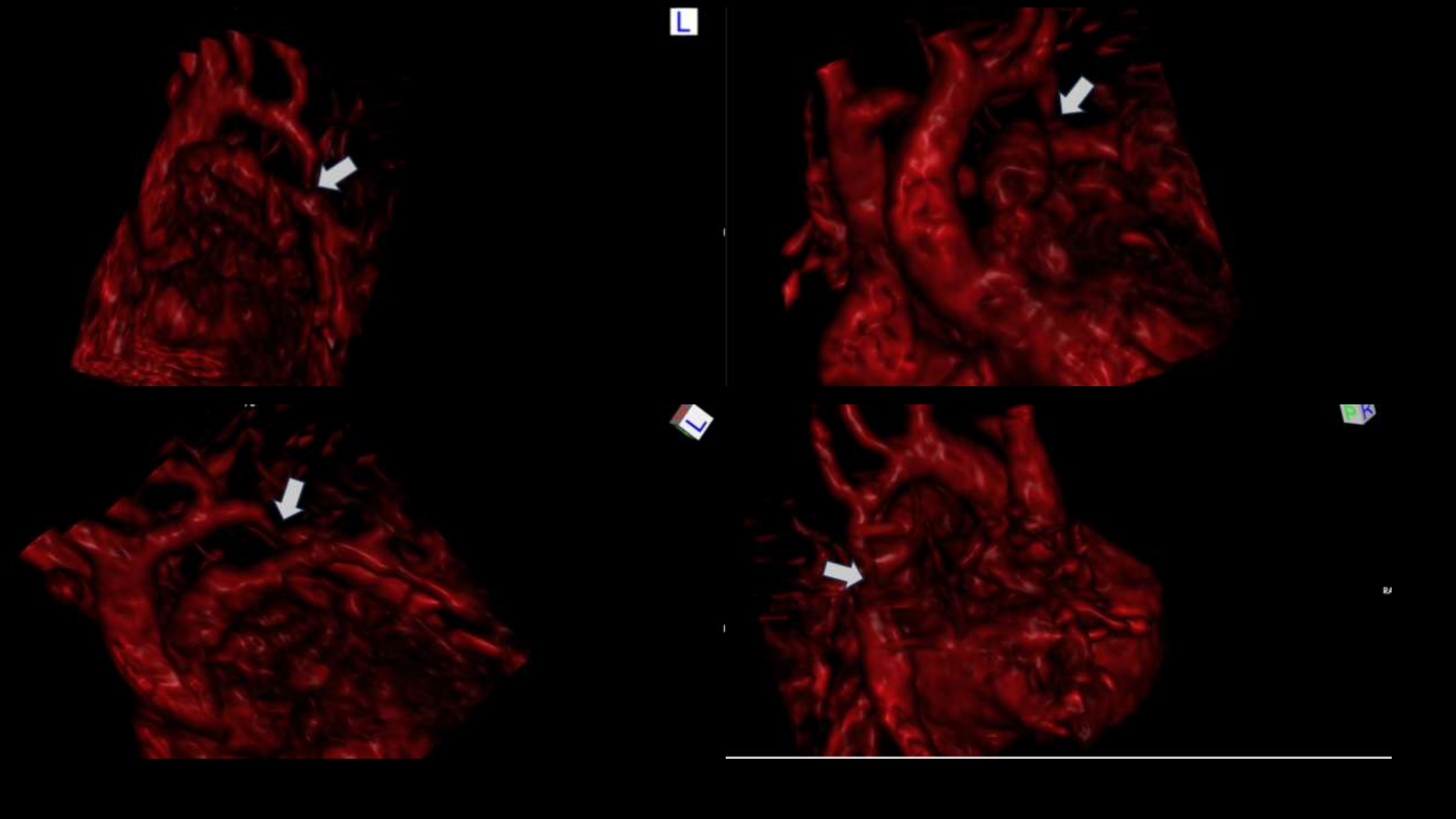
Aorta

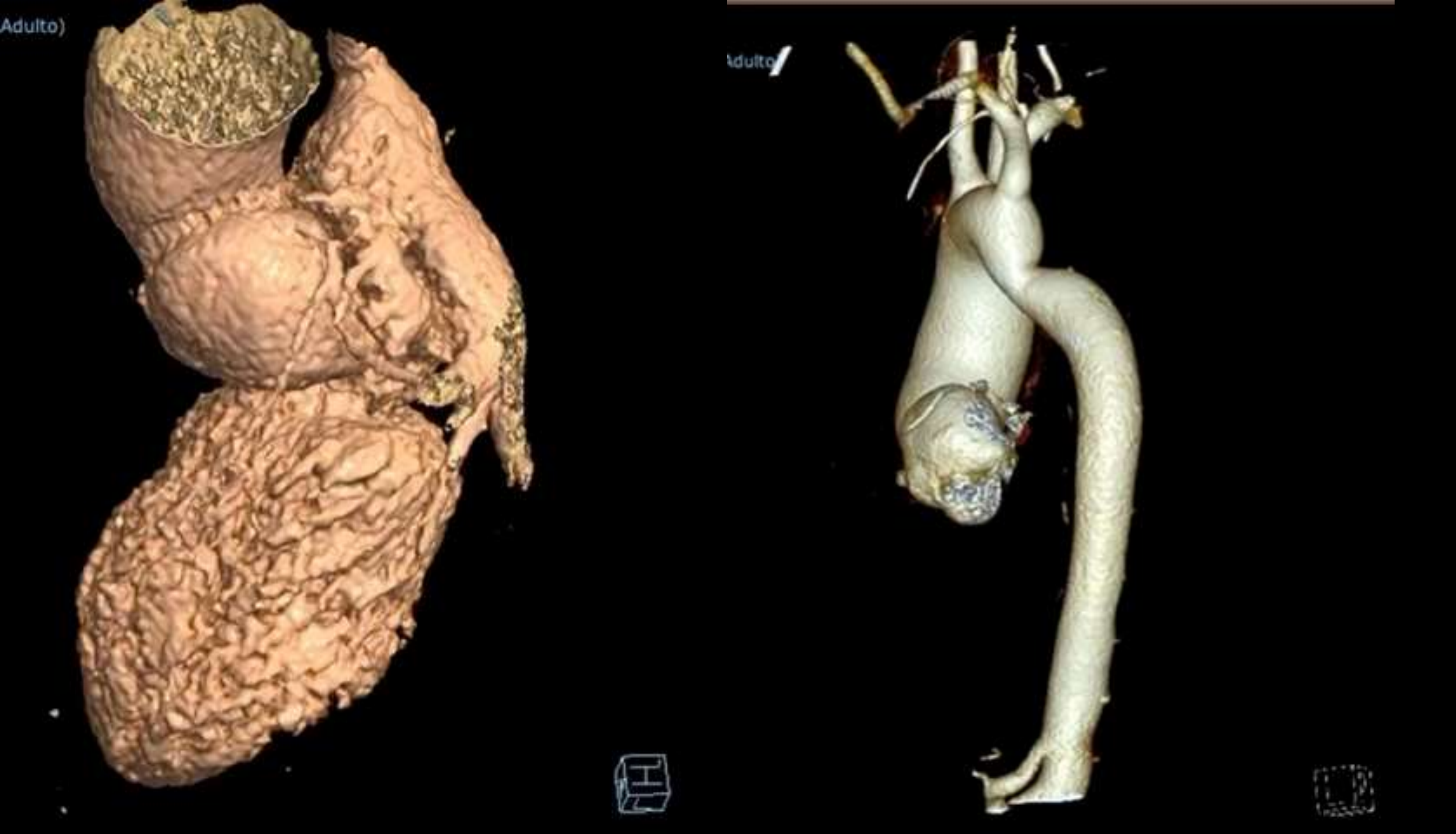


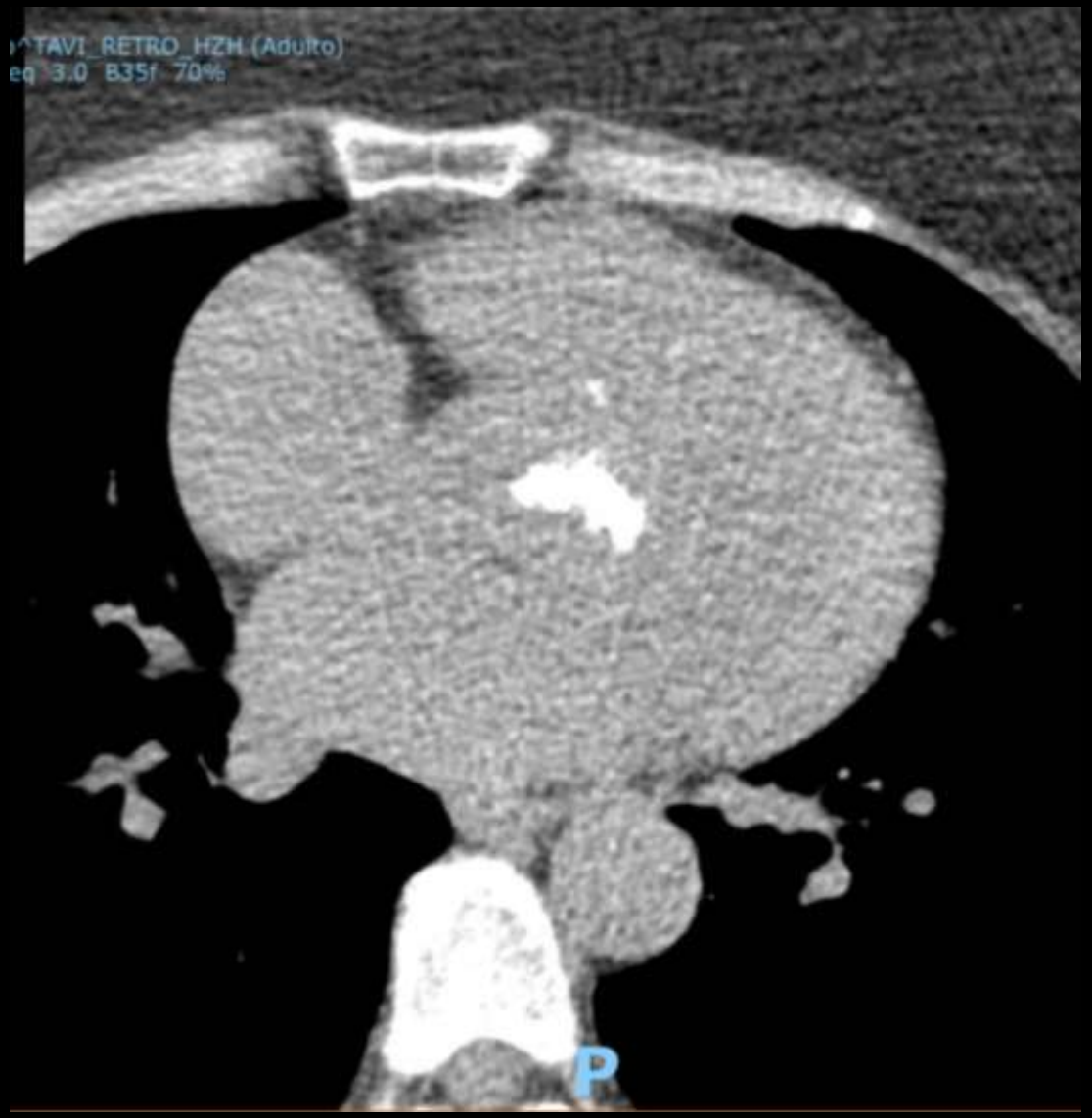







L
L
P
R


Adulto)
Adulto


^TAVI_RETRO_HZH (Adulto)
eq 3.0 B35f 70%
P


^TAVI_RETRO_HZH (Adulto)
MAGES PR
I


Volume Rendering No cut
Desc. del estudio: Cardio^ANGIO_CORO_STD (Adulto)
Desc. de la serie: Erasmo 3D
DFOV 21.2 x 19.0 cm
450 - 1
I26f\3 No Filter Ph:73%
Con pérdida (1:56)
Ex:Jan 10 2024
EC: 0.75 mm
C:0 B:0
Zoom: 70%
0 L 161 RAO 8 CRA
L
P
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IPL

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Cardiología e Imagen Cardiovascular Avanzada

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Letters

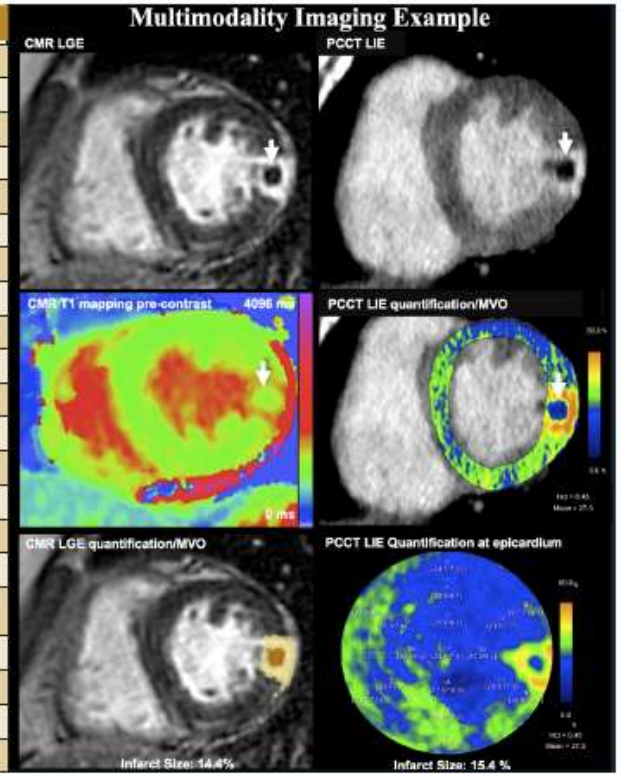
RESEARCH LETTER

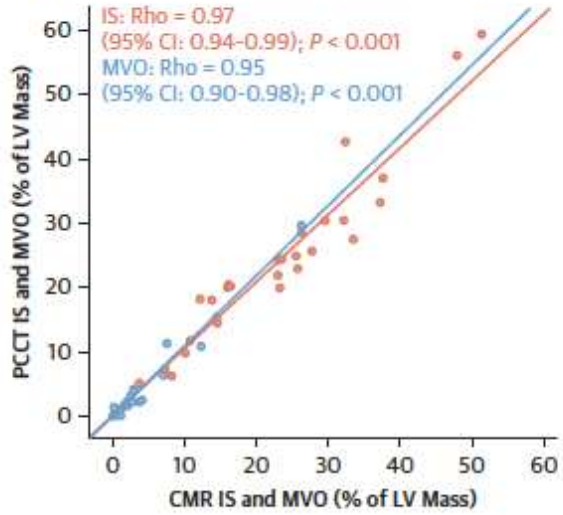
Evaluating Acute Ischemic Myocardial Injury With Photon-Counting Computed Tomography

FIGURE 1 Comparative Myocardial Injury Evaluation by PCCT Relative to CMR

A Demographic & CT Characteristics

Age (years)			67 (63-75)	
Body mass index (kg/m²)			26.2 (22.7-29.3)	
Male sex (n, %)			23 (76.7)	
Diabetes (n, %)			7 (23.3)	
Hypertension (n, %)			18 (60.0)	
Dyslipidemia (n, %)			21 (70.0)	
Hematocrit (n, %)			41 (39-43)	
Heart rate at scan (bpm)			59 (53-64)	
Iodine dose (g/kg)			0.64 (0.56-0.70)	
DLP first pass scan (mGy*cm)			93.80 (77.35-111.75)	
DLP UHR scan (mGy*cm)			273.00 (221.00-359.00)	
DLP late phase scan (mGy*cm)			48.55 (38.57-57.57)	
Culprit	ICA, n	PCCTA, n	LIE Territory	n
LAD	16	16	Anterior	16
LCx	4	4	Lateral	4
RCA	10	10	Inferior	10
Correctly identified by PCCTA bystander disease, (n, %)			23/23 (100%)	
PCCT infarct size (% LV mass)[‡]			22.44 (15.13-28.97)	
CMR infarct size (% LV mass)[‡]			23.15 (13.36-30.24)	
PCCT MVO (% of LV mass)[ƒ]			1.07 (0.00-2.73)	
CMR MVO (% of LV mass)[ƒ]			0.87 (0.10-2.94)	





CMR \ PCCT	Viable (<50%)	Non-viable (≥50%)	Total
Viable (<50%)	374 (94.9)	20 (5.1)	394 (100)
Non-viable (≥50%)	10 (11.6)	76 (88.4)	86 (100)

(A) Summary of patient demographics. Images showing myocardial infarction and microvascular obstruction (MVO) (arrows) in photon-counting computed tomography (PCCT) vs cardiovascular magnetic resonance (CMR). (B) Correlation plots of infarct size (IS) and microvascular obstruction between photon-counting computed tomography and cardiac magnetic resonance, and segment-level viability classifications and reclassifications as visualized in a Sankey diagram. [‡,ƒ]No statistically significant difference. CT = computed tomography; DLP = dose length product; ICA = invasive coronary angiography; LAD = left anterior descending (artery); LCx = left circumflex (artery); LGE = late gadolinium enhancement; LIE = late iodine enhancement; LV = left ventricular; PCCTA = photon-counting computed tomography angiography; RCA = right coronary artery.

Charalambos Antoniades · 1st
MD PhD FRCP FMedSci
Director, Acute Multidisciplinary Imagin...
3d ·

This is a major jump forward in the field of cardiac CT. Photon counting CT provides identical information to CMR on the evaluation of myocardial injury post MI... benchmarking late iodine enhancement on photon counting CT vs late gadolinium enhancement on CMR gives correlations between modalities of 0.97 for infarct size and 0.95 for MVO....! And we can get this at the time of the CT angiogram with an extra late acquisition at low radiation.

You can find the details in this paper from Rafail A Kotronias

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MENSAJES PARA LLEVAR

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- INDIVIDUALIZAR CADA CASO
- RECLASIFICAR TRATAMIENTO
- ASCVD, ETC
- INFORMARSE ACERCA DE DISPOSITIVOS IMPLANTABLES
- CONOCER LA PREPARACIÓN PARA CADA ESTUDIO

MENSAJES PARA LLEVAR

- NO SE PUEDE SER ARBITRO Y JUGADOR A LA VEZ
- LOS ESTUDIOS AVANZADOS SON COMPLEMENTARIOS
- TRABAJAR EN EQUIPO
- NINGÚN ESTUDIO AVANZADO ES DE URGENCIA
- LO BARATO SALE CARO

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GRACIAS

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