

ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΟΥ

Α. ΔΗΜΟΠΟΥΛΟΣ

*Αιμοδυναμικό Εργαστήριο - Καρδιολογική Κλινική
Τζάνειο Νοσοκομείο*

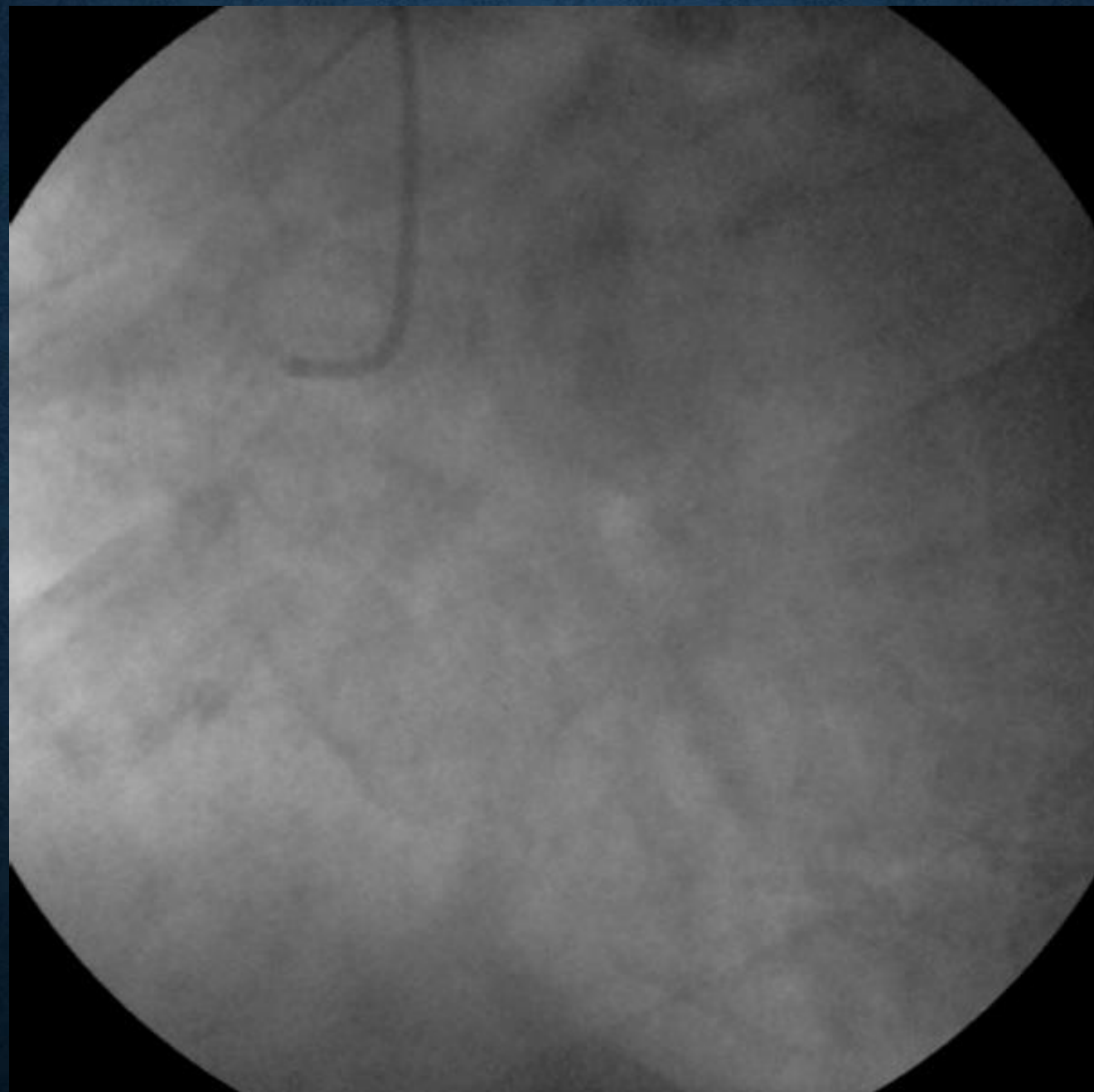
Νοέμβριος 2019

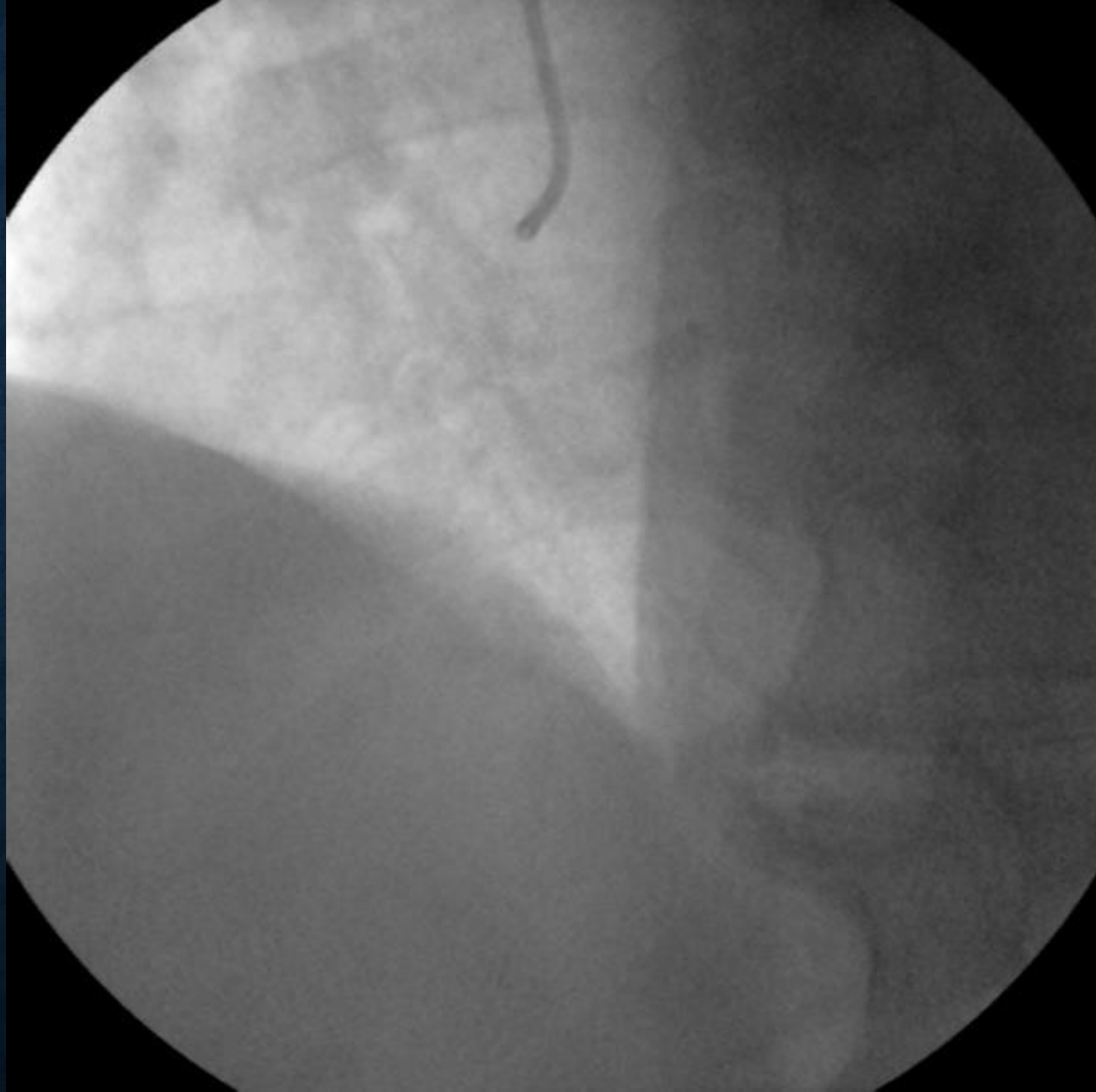
- Άνδρας 71 ετών
- Παράγοντες κινδύνου
 - Αρτηριακή υπέρταση
 - Δυσλιπιδαιμία
 - Καπνιστής
 - Υπέρβαρος
- Ελεύθερο ατομικό αναμνηστικό

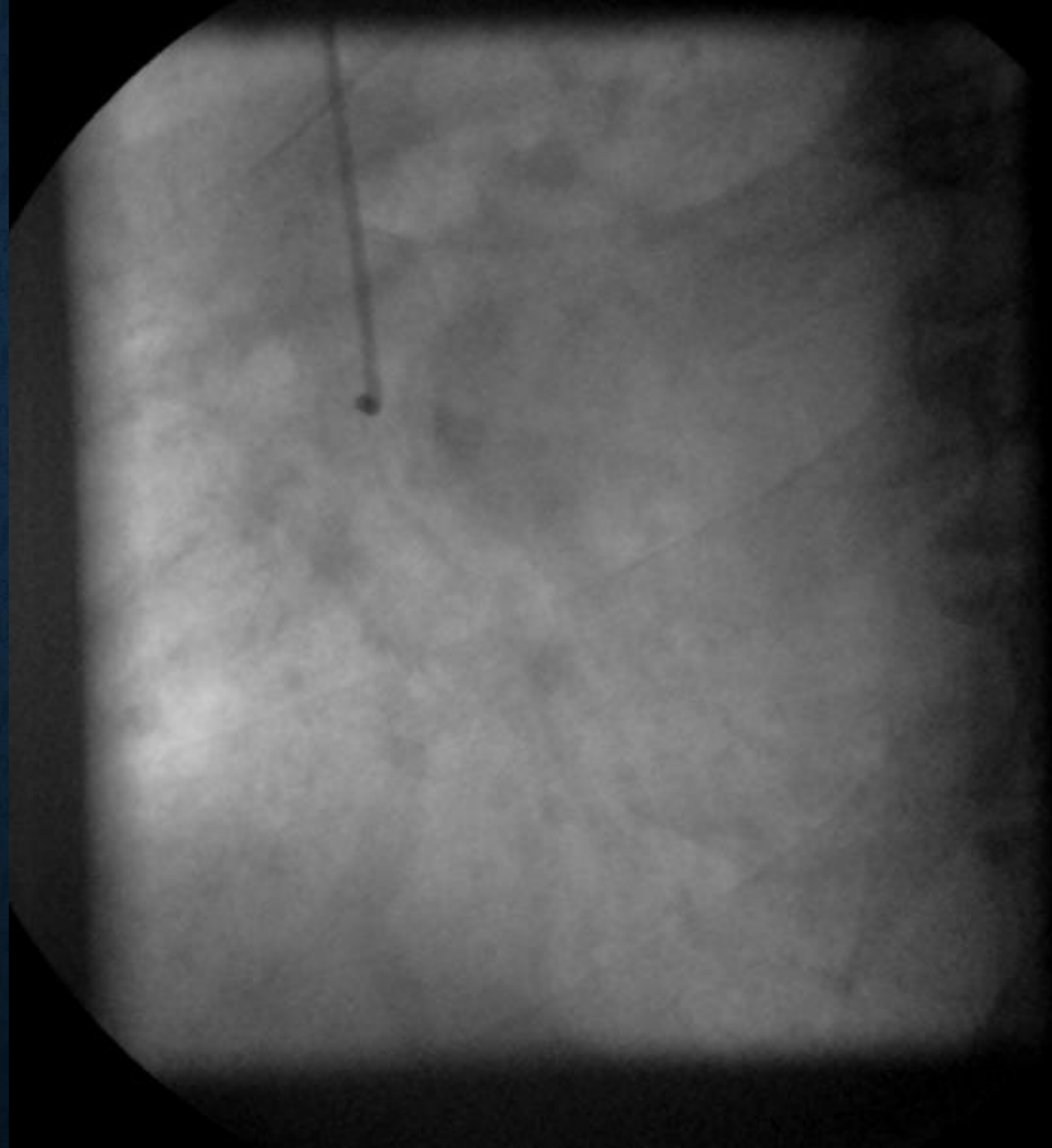
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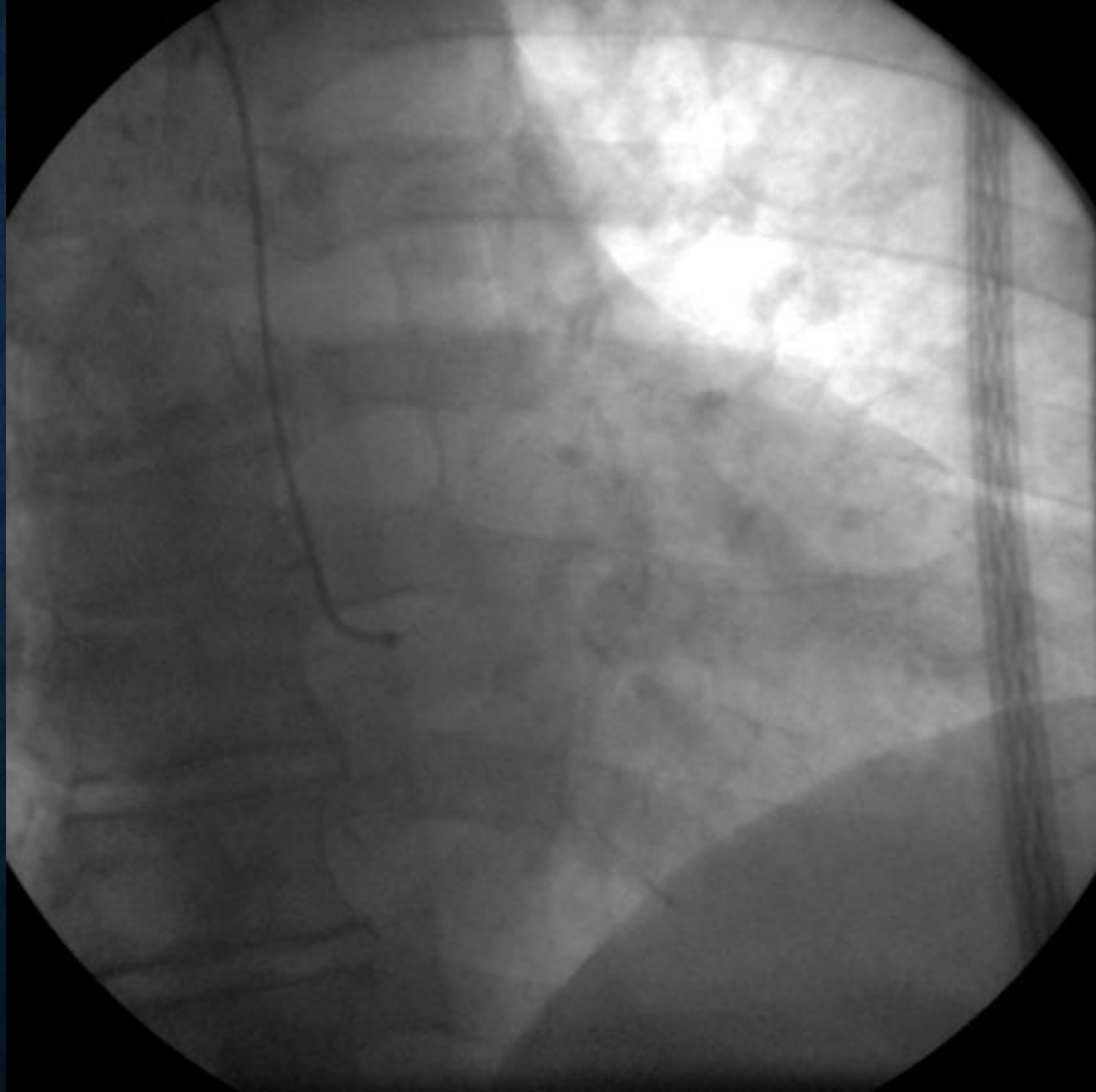


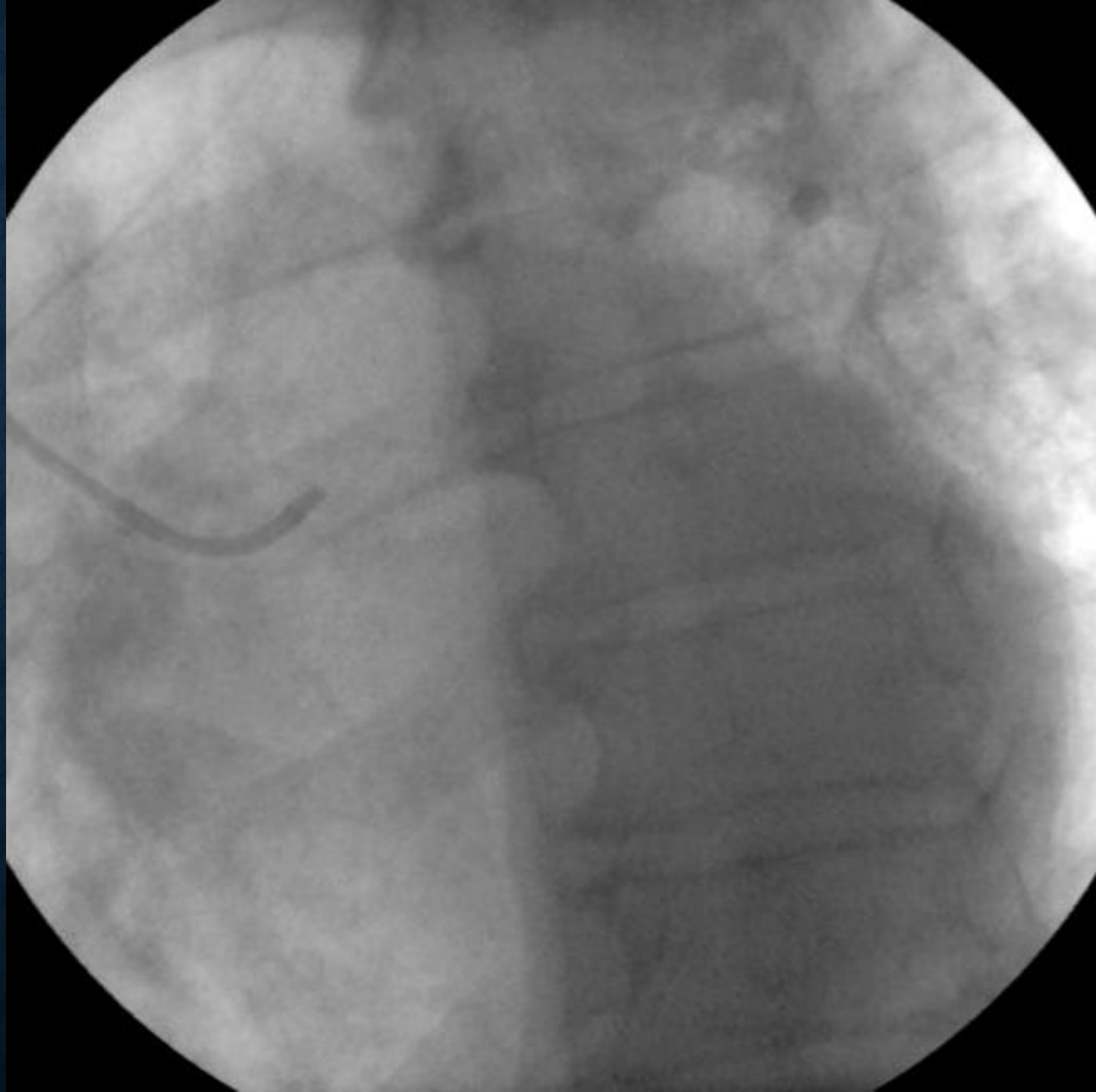
ΕΠΕΙΓΟΥΣΑ ΣΤΕΦΑΝΙΟΓΡΑΦΙΑ











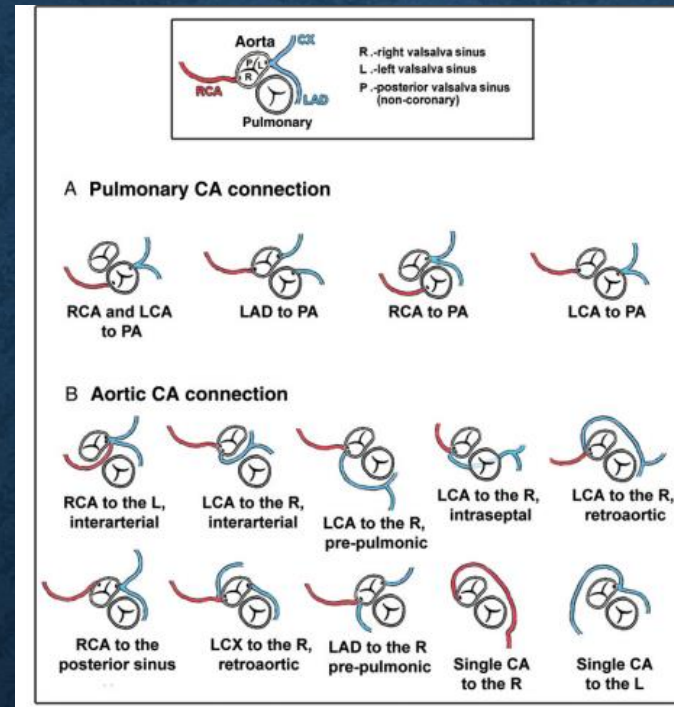
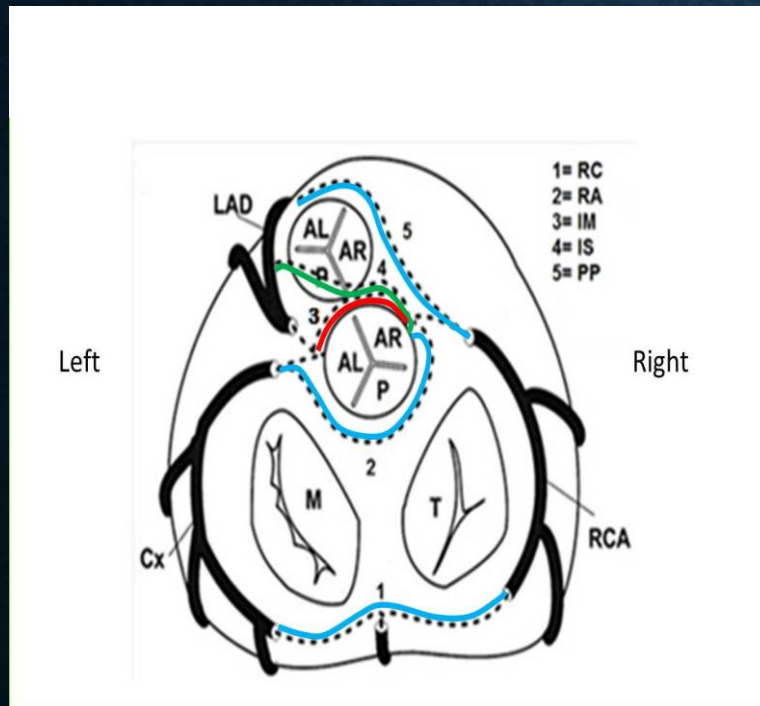
- Ανώμαλη έκφυση αριστερής στεφανιαίας αρτηρίας
- Ποια ανωμαλία προκύπτει από την αγγειογραφική εικόνα;



ANOMALOUS CORONARY ARTERY FROM THE OPPOSITE SINUS (ACAOS)

0,45%

1%.

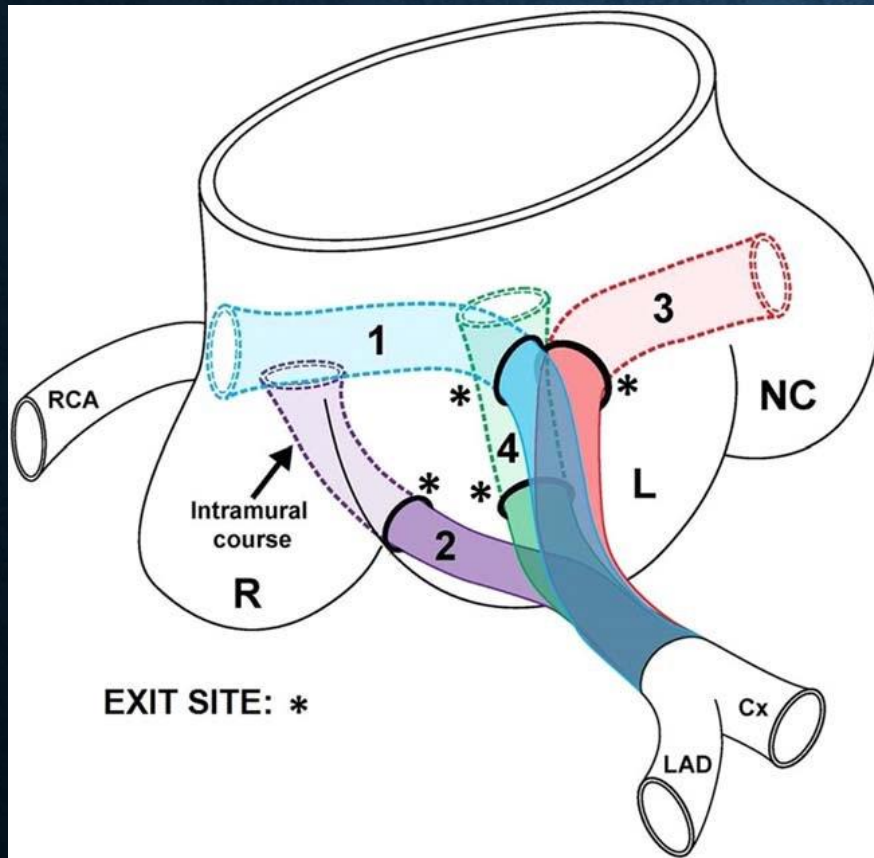


- 1) “L” or “R” prefix
 - indicate the affected coronary artery (LCA or RCA)
- 2) suffix to indicate the abnormal proximal course:
 - “IM” for intramural
 - “PP” for prepulmonic
 - “SP” for subpulmonary
 - “RA” for retroaortic
 - “RC” for retrocardiac,
 - “WA” for wrapping around the apex

L-ACAOS-IM constitutes the most serious group of LCA anomalies

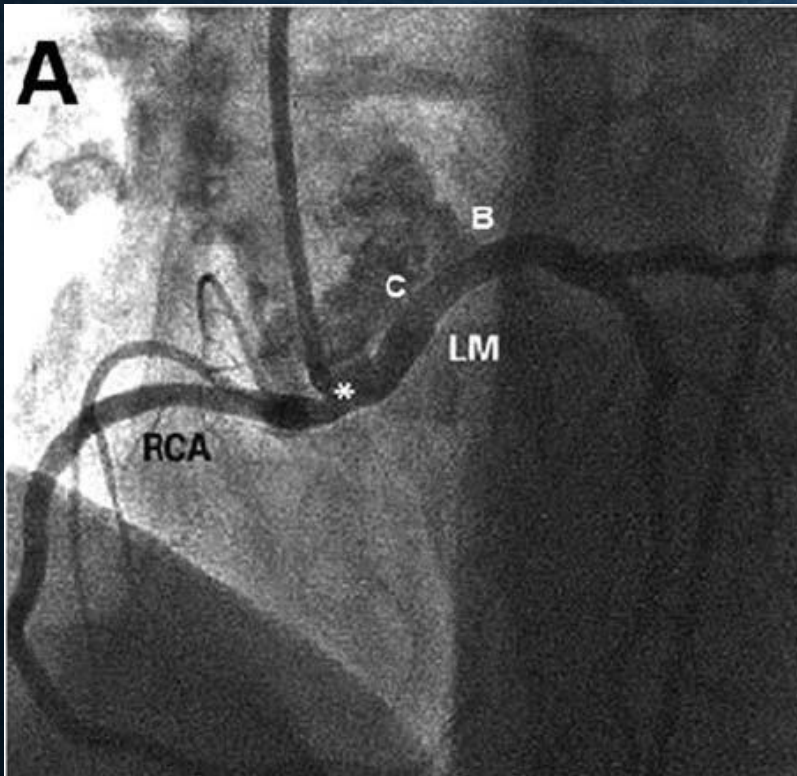
L-ACAOS-IM: THE MOST COMMON SITES OF ECTOPIC ORIGIN AND COURSE

0.1%



1. RCS origin L-ACAOS-IM
2. RCS peri-commissure L-ACAOS-IM
3. NCS origin L-ACAOS-NC
4. LCS orthotopic or isolated intramural, L-ACAOS-OT (slit-like LM trunk)

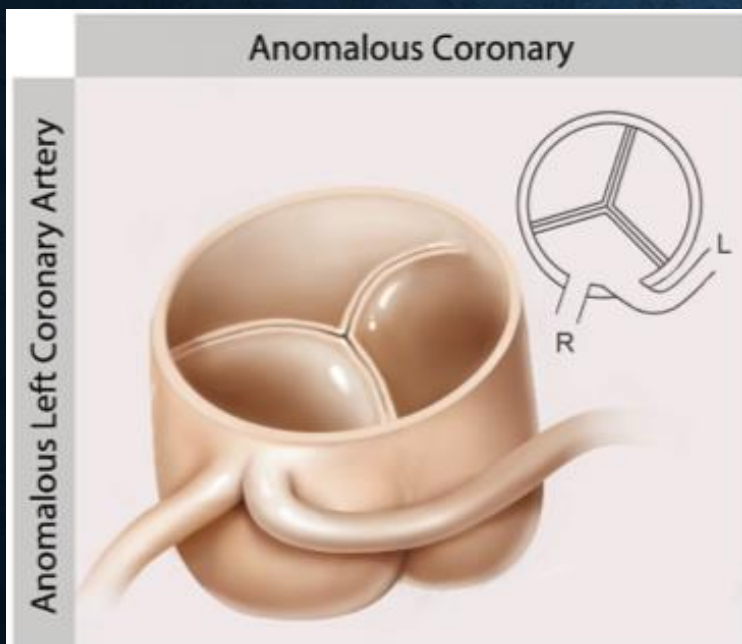
RCS ORIGIN L-ACAOS-IM (INTRAMURAL)



- The LCA typically originates from the right sinus of Valsalva (RSV) and the segment travelling to the left side has an intramural course inside the aortic tunica media

ΠΡΟΣΘΙΟΠΛΑΓΙΟ STEMI

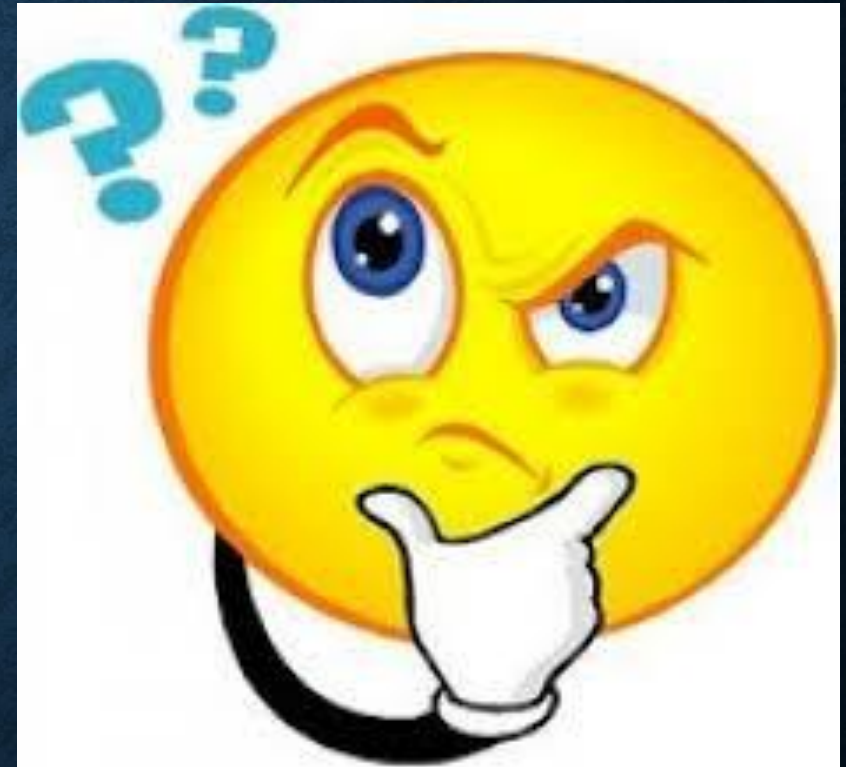
ΑΝΩΜΑΛΗ ΕΚΦΥΣΗ LCA ΑΠΟ RCA

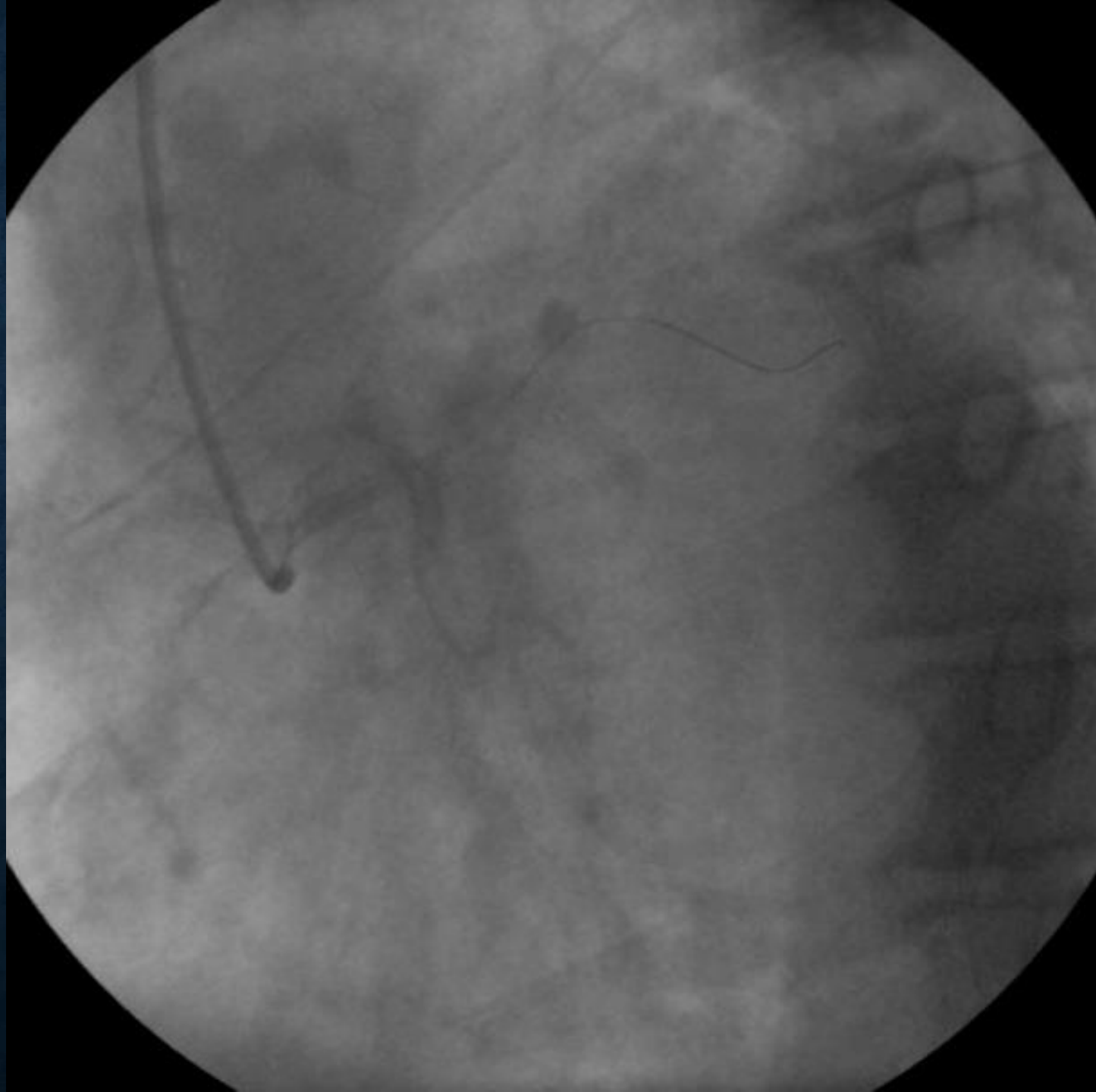


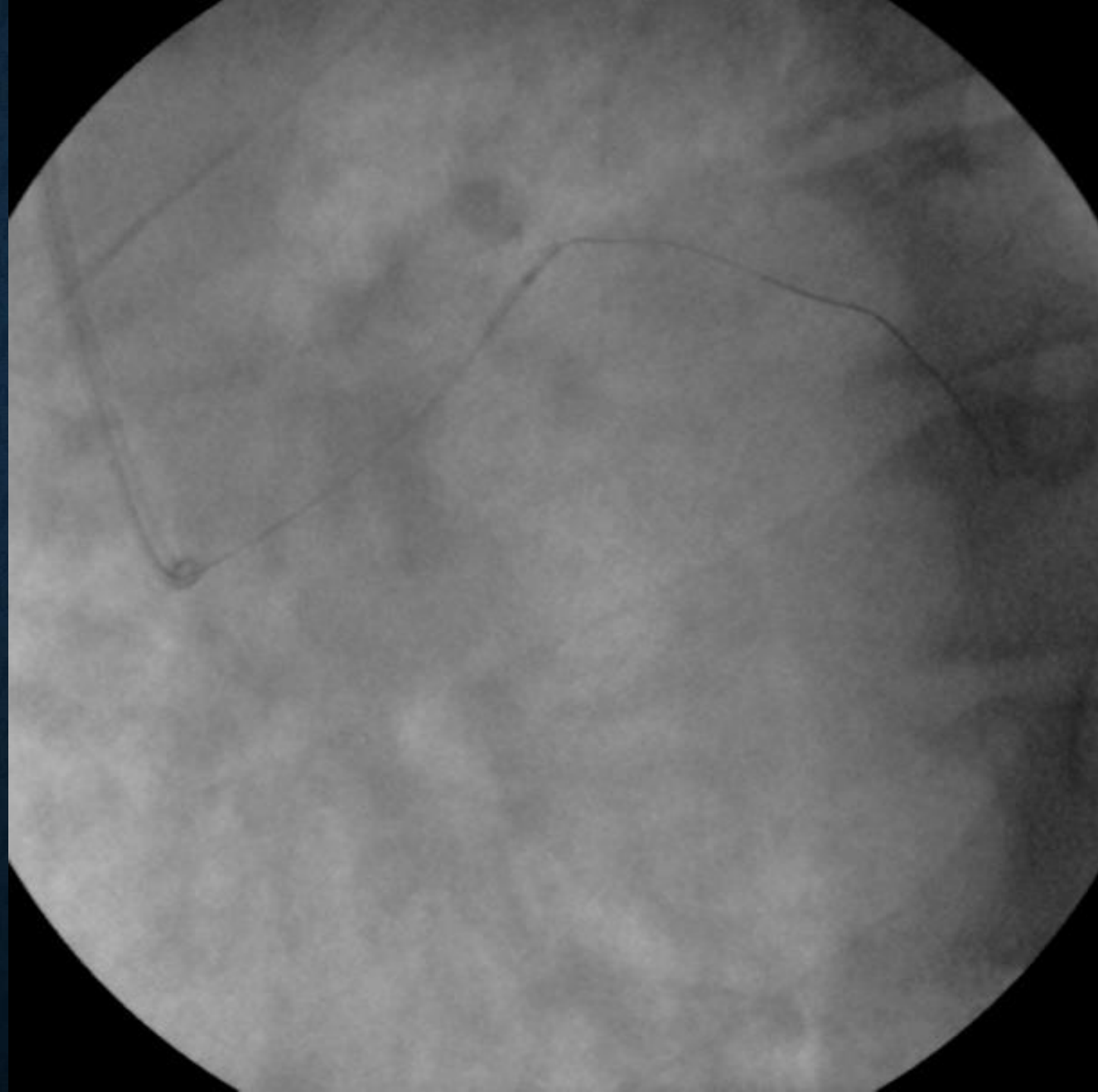
ΕΡΩΤΗΜΑ 1^ο

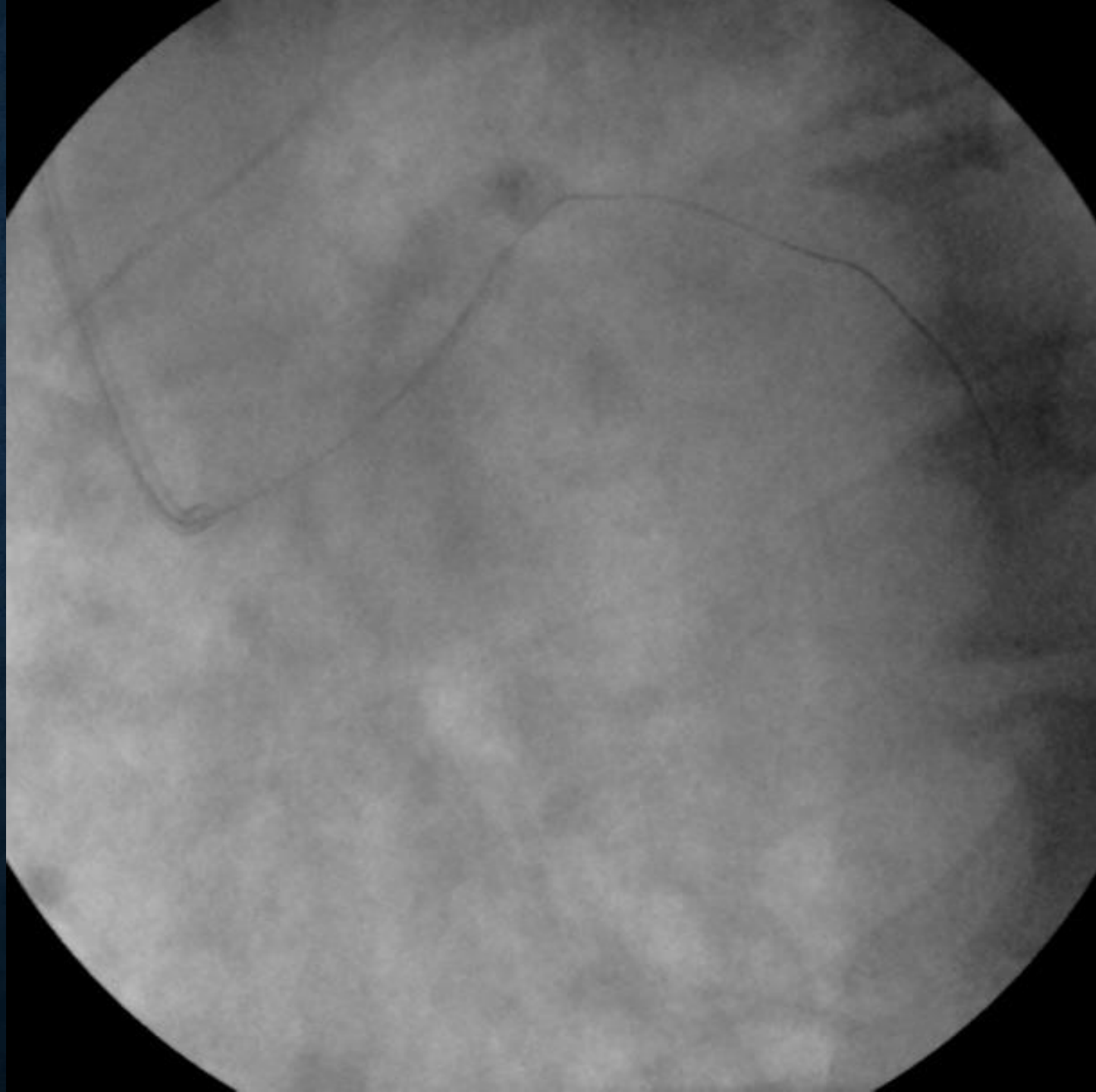
Ποιο το αρχικό πλάνο για αντιμετώπιση του οξέος εμφράγματος δεδομένου της αγγειογραφικής αυτής εικόνας ;

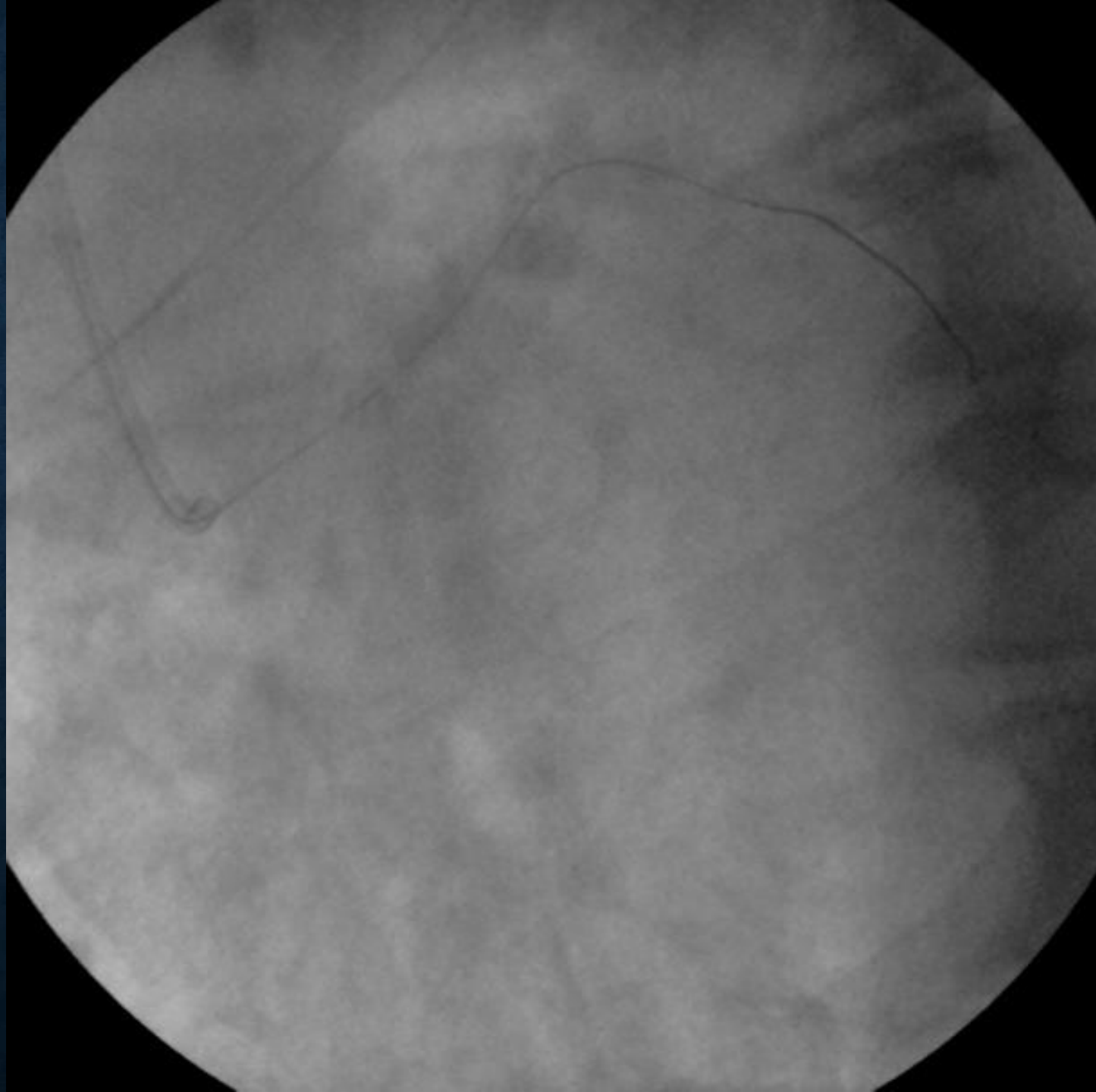
- a) Πρωτογενής αγγειοπλαστική με πλήρη αποκατάσταση της βλάβης και τοποθέτηση DES;
- b) Χειρουργική προσέγγιση
 - a) Υβριδική προσέγγιση με αποκατάσταση ροής στο στεφανιαίο δίκτυο και χειρουργείο σε δεύτερο χρόνο μετά την σταθεροποίηση του ασθενούς;
 - b) Επείγουσα καρδιοχειρουργική αντιμετώπιση;

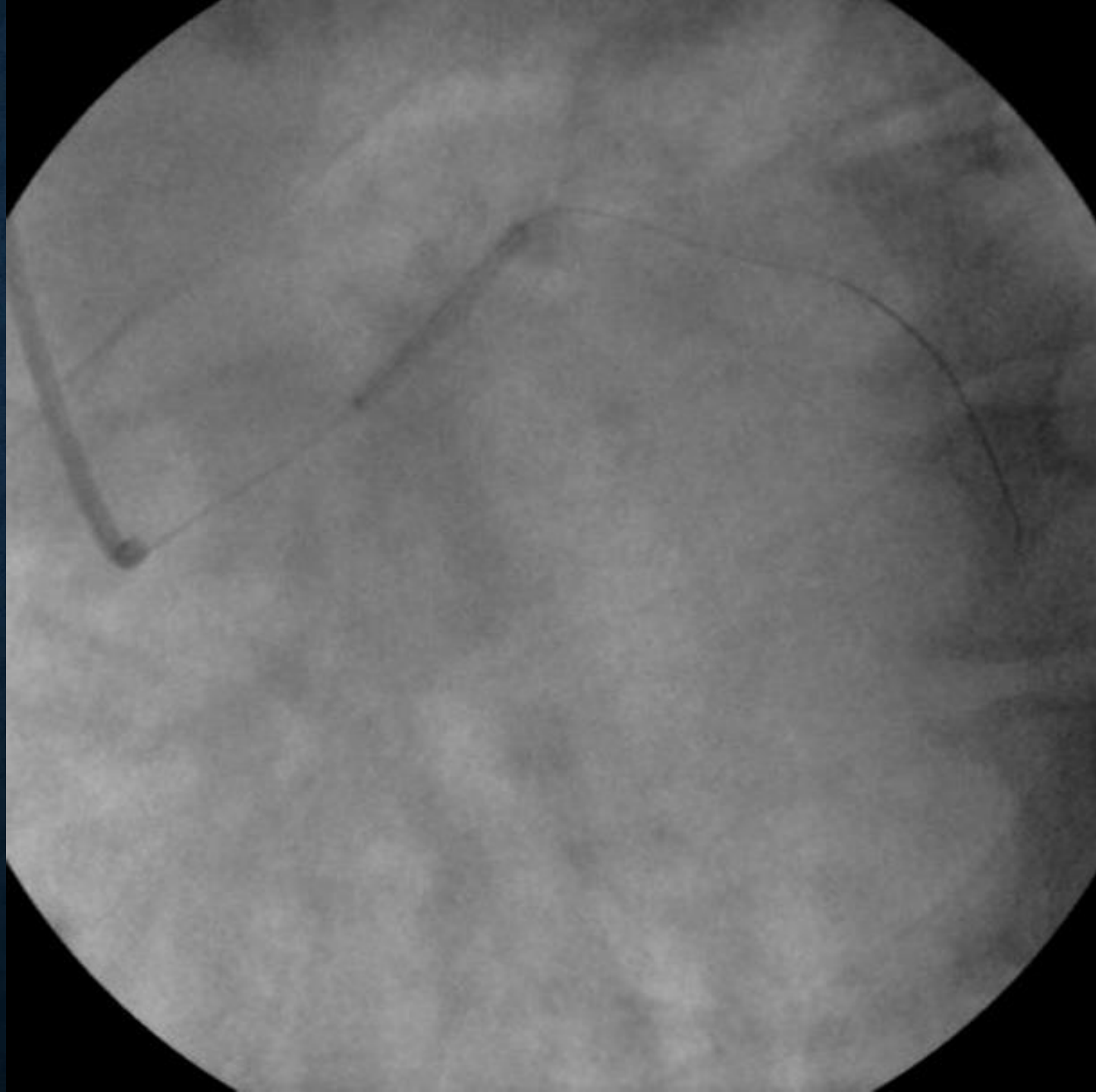


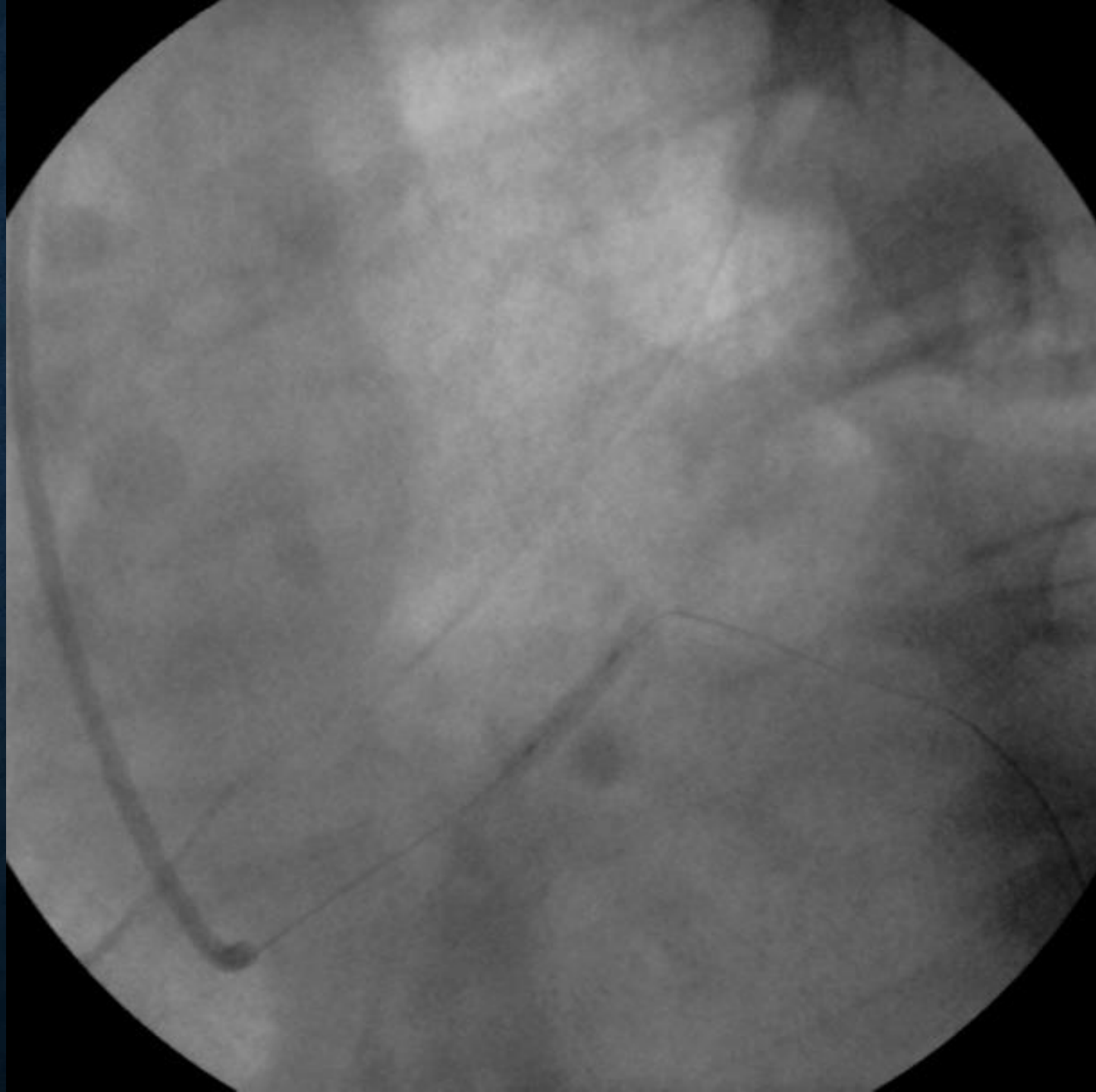


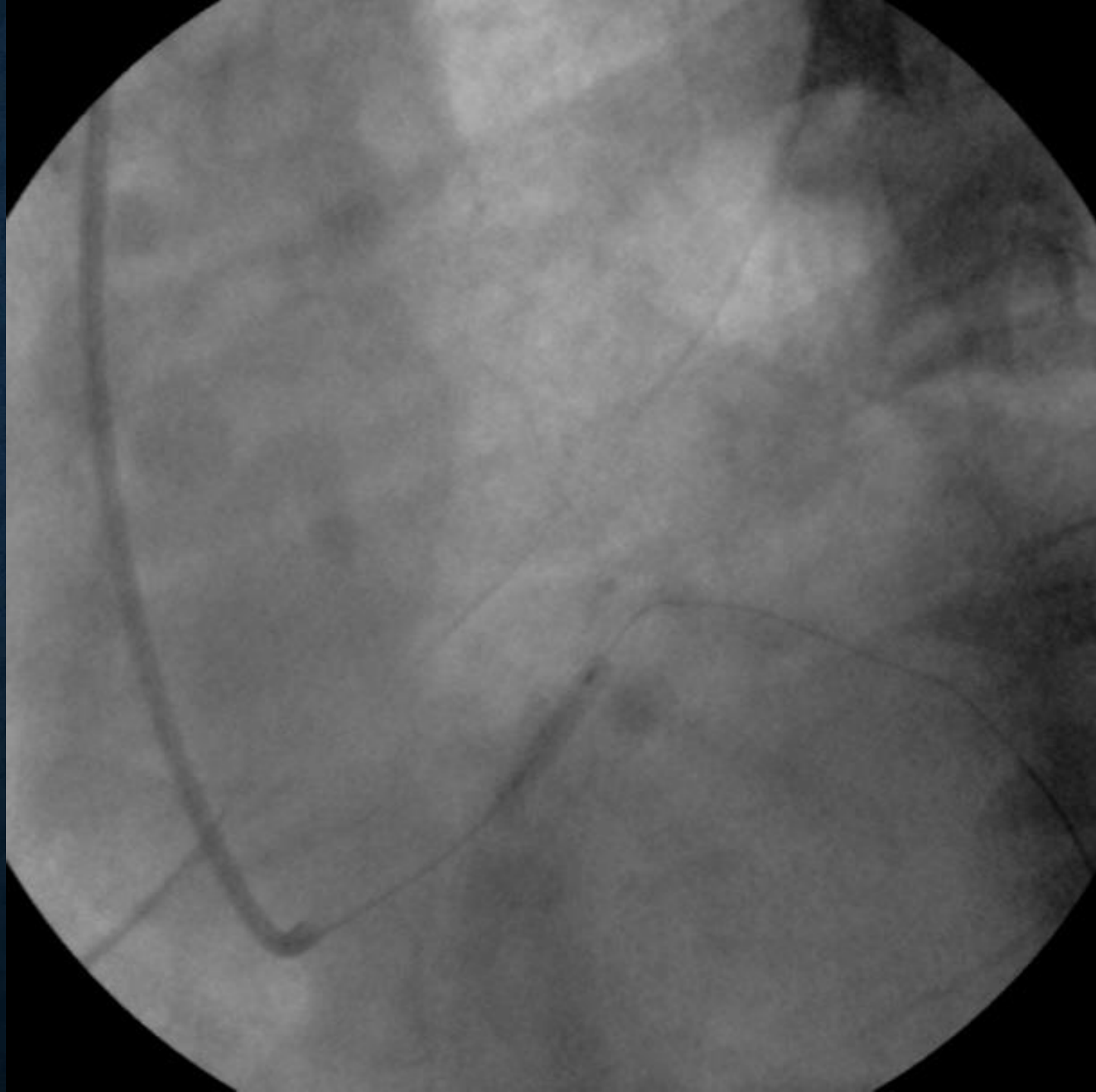


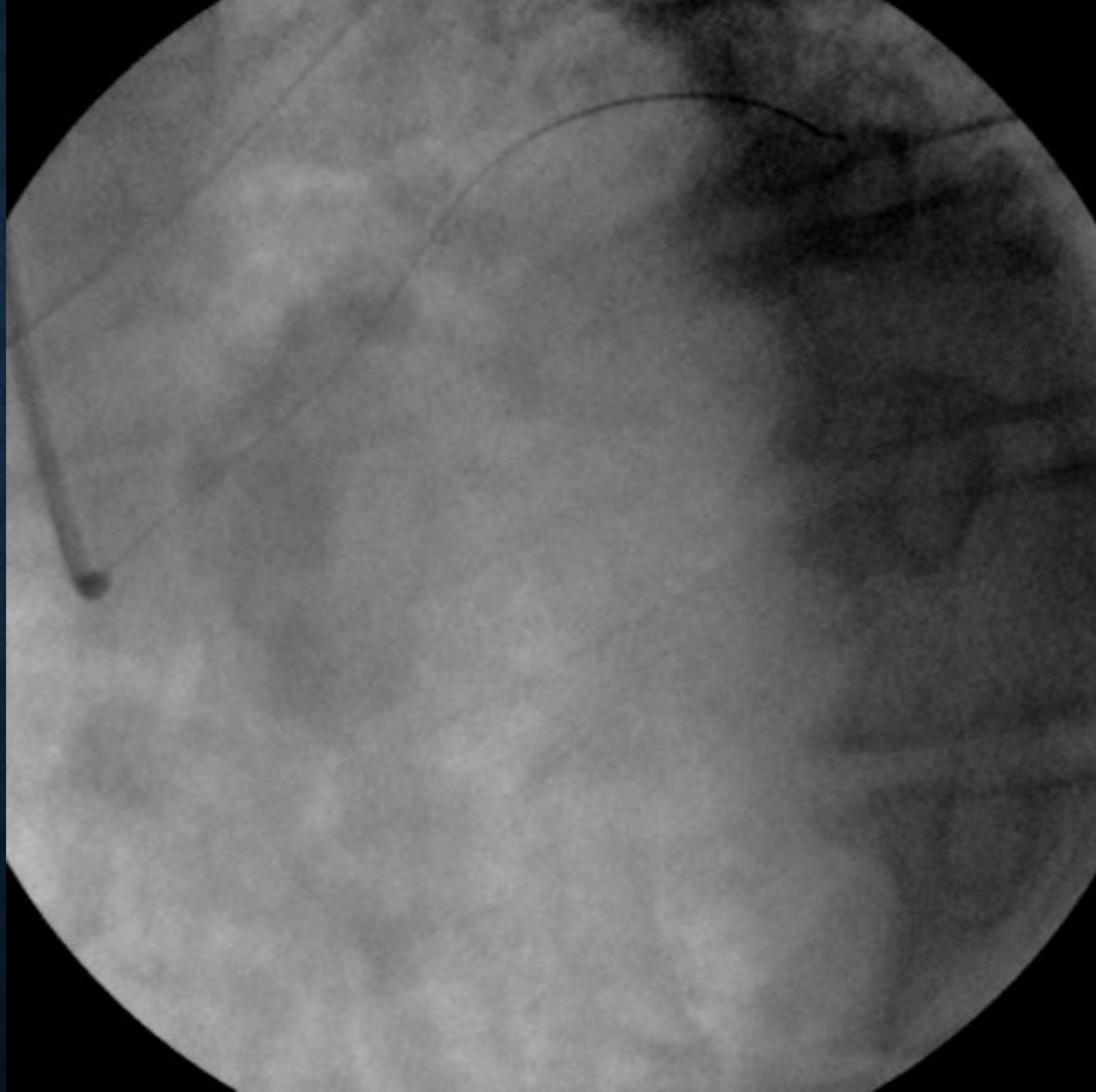












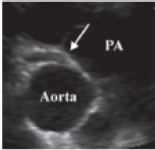
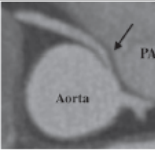
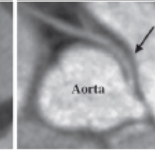
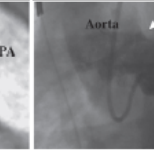
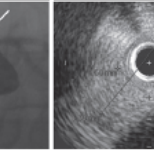
- Ομαλή πορεία νοσηλείας
- **Monitoring** χωρίς αρρυθμίες
- Σταδιακή κινητοποίηση, χωρίς επιπλοκές
- ΚΕΑΚ 40-45%, υποκινησία προσθίου και πλαγίου τοιχώματος
- Φαρμακευτική αγωγή εξόδου
 - Ασπιρίνη, Τικαγκρελόρη , Μετοπρολόλη , Ραμιπρίλη , Στατίνη , Ομεπραζόλη, Αμλοδιπίνη

Μετά από ένα μήνα:

- Ήπια δύσπνοια στην σημαντική προσπάθεια (NYHA 2)
- Απουσία στηθάγχης

ANOMALOUS CORONARY ARTERY EVALUATION

FIGURE 4 Anatomic Tests Used to Characterize AAOCA Vessels

	Echo	CTA	MRA	ICA	IVUS
					
Indication for AAOCA Imaging	-	Class I	Class I	Class IIa	Class IIa
Spatial Resolution	0.8 × 1.5 mm (4-MHz transducer)	0.5 mm (isotropic)	1.0 mm (volumetric)	0.3 mm	0.15 × 0.25 mm
Temporal Resolution	30 msec	75-175 msec	60 - 120 msec	7-20 msec	Variable
Visualize surround structures	Limited	✓✓	✓	X	X
Dynamic imaging	Limited	Limited	Limited	✓ (Limited at ostium)	✓✓
Strengths	<ul style="list-style-type: none"> ✓ Noninvasive, rapid ✓ Widely available ✓ Low cost 	<ul style="list-style-type: none"> ✓ Noninvasive, rapid ✓ Visualize takeoff + course + surrounding structures ✓ Evaluate CAD ✓ Examine multiple AAOCA features * 	<ul style="list-style-type: none"> ✓ Noninvasive ✓ Visualize takeoff + course + surrounding structures ✓ Evaluate cardiac function, perfusion and prior MI ✓ Avoid radiation & iodinated contrast 	<ul style="list-style-type: none"> ✓ Availability ✓ Improved spatial and temporal resolution ✓ Ancillary techniques (IVUS, OCT, FFR) 	<ul style="list-style-type: none"> ✓ Dynamic imaging ✓ Evaluation of proximal narrowing
Limitations	<ul style="list-style-type: none"> * Limited accuracy for detection of AAOCA * Dependent on body habitus and operator technique 	<ul style="list-style-type: none"> * Limited availability * Iodinated contrast * Radiation (low dose, e.g. 2-8 mSv now routine) 	<ul style="list-style-type: none"> * Limited availability * Cost and scan-time increased vs. CTA * Spatial resolution decreased vs. CTA 	<ul style="list-style-type: none"> * Invasive; Cost * Contrast and radiation * Limited visualization of ostium, proximal course, surrounding structures 	<ul style="list-style-type: none"> * Invasive * Cost * Difficulty engaging anomalous vessel

Recommendations for Anomalous Coronary Artery Evaluation

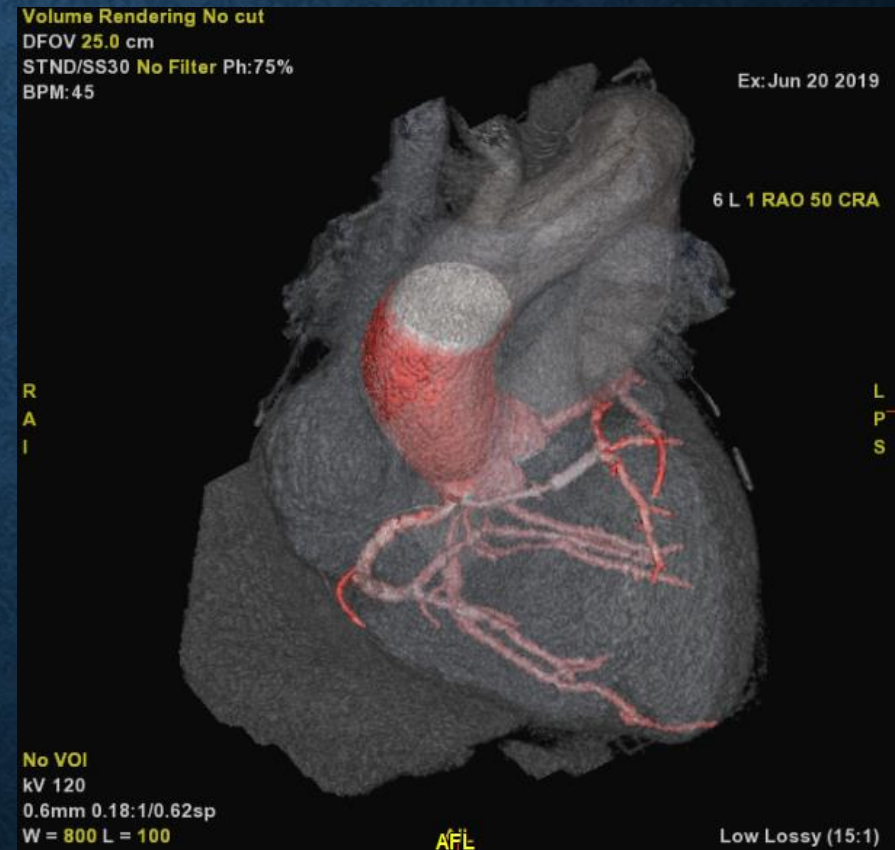
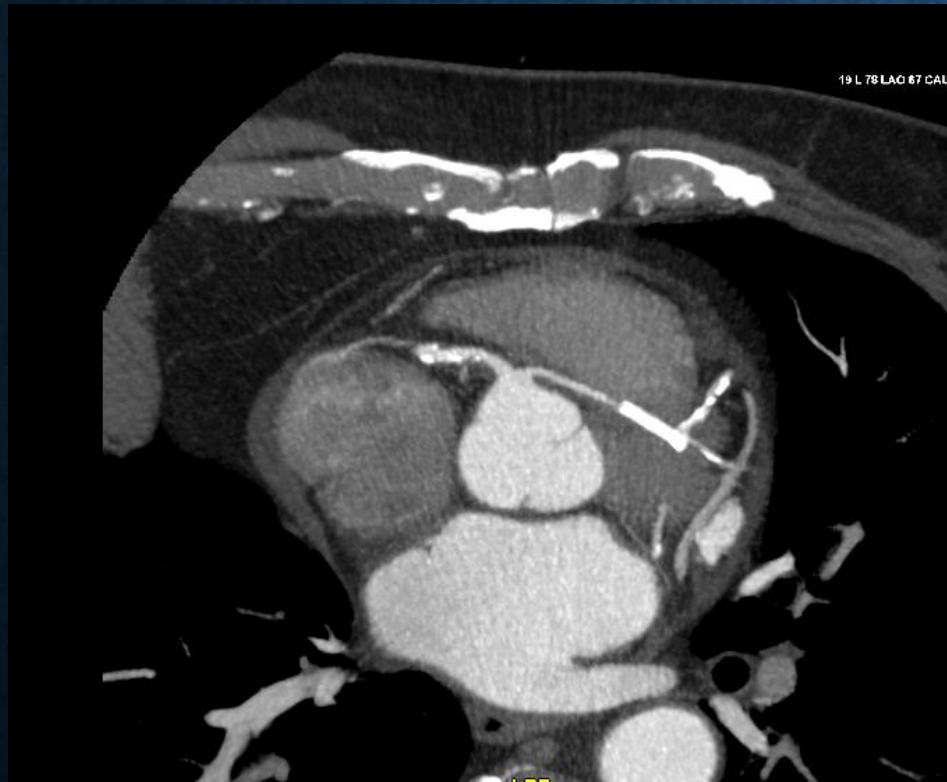
Referenced studies that support recommendations are summarized in Online Data Supplement 51.

COR	LOE	Recommendations
Diagnostic		
I	C-LD	1. Coronary angiography, using catheterization, CT, or CMR, is recommended for evaluation of anomalous coronary artery (S4.4.7.1-1–S4.4.7.1-3).
I	C-LD	2. Anatomic and physiological evaluation should be performed in patients with anomalous aortic origin of the left coronary from the right sinus and/or right coronary from the left sinus (S4.4.7.1-4–S4.4.7.1-9).

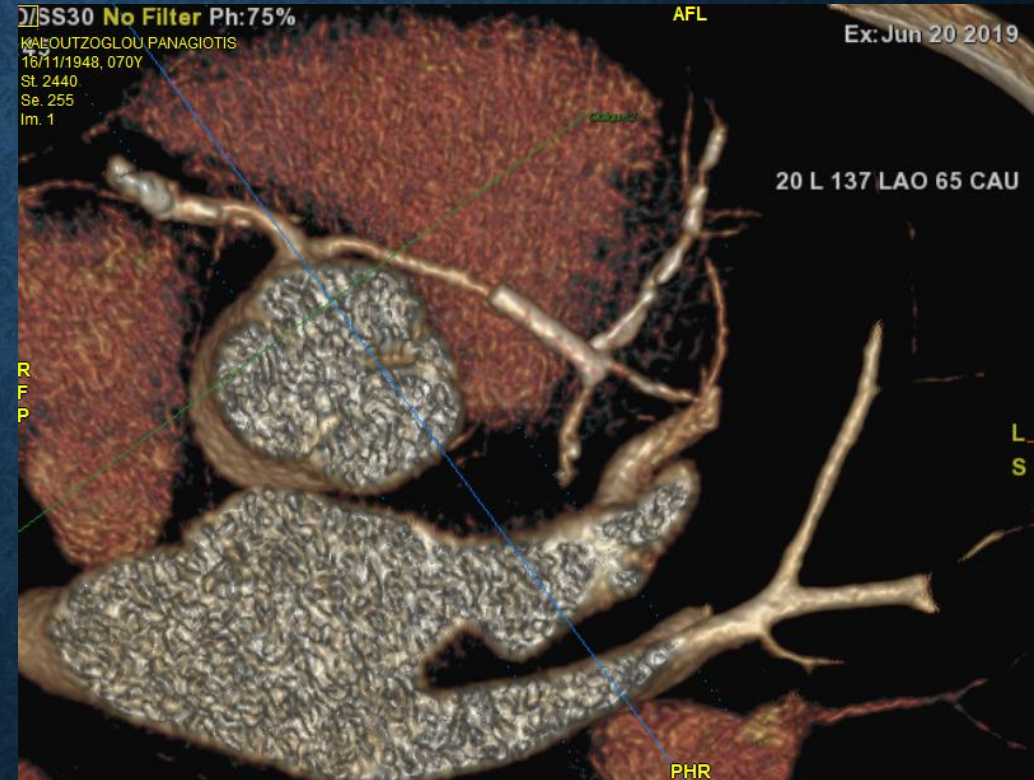
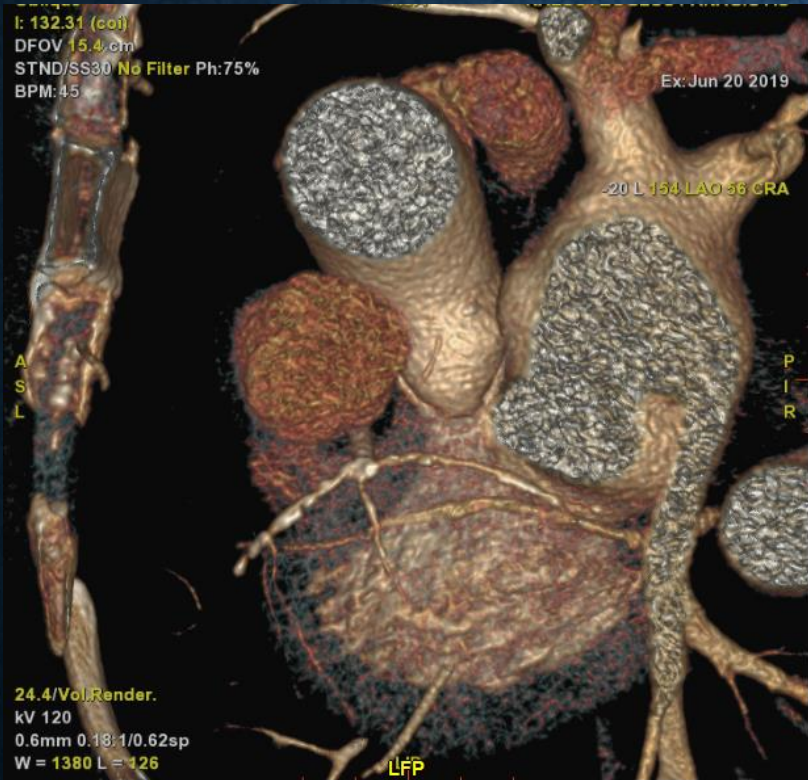
Recommendation-Specific Supportive Text

1. CTA, CMR, and catheterization can all delineate the proximal course of the coronary artery and relationship to other structures. CTA is generally preferred because it has superior spatial and temporal resolution, although CMR may also provide adequate delineation of the relationship of the coronary artery to the aorta, PA and other structures, including whether the proximal course appears to be intramural. Coronary angiography by catheterization can be helpful when there is concern about stenosis in the coronary artery or when concomitant hemodynamic evaluation for shunt assessment or intravascular ultrasonography/flow evaluation is needed.

ΑΞΟΝΙΚΗ ΣΤΕΦΑΝΙΟΓΡΑΦΙΑ



ΑΞΟΝΙΚΗ ΣΤΕΦΑΝΙΟΓΡΑΦΙΑ



- Ανώμαλη έκφυση αριστερής στεφανιαίας αρτηρίας από τον δεξιό κόλπο του **Valsalva** και πορεία μεταξύ αορτής και πνευμονικής αρτηρίας
- Προηγηθήσα αγγειοπλαστική με ενδοστεφανιαία πρόθεση μεταξύ των δύο μεγάλων αγγείων
- Δύσπνοια στην προσπάθεια

Ερωτήματα:

- Ποια είναι η πρόγνωση του ασθενούς όπως προκύπτει από την ανατομία των στεφανιαίων του αλλά και την προηγηθήσα αγγειοπλαστική;
- Ποιο λειτουργικό ή ανατομικό **test** θα μπορούσε να εκτιμήσει καλύτερα το ισχαιμικό φορτίο του ασθενή;
- Ποιος ο ρόλος ενός **elective** χειρουργείου;

ΠΡΟΓΝΩΣΗ

Table 34. Factors That May Relate to the Clinical Importance of AAOCA and Risk of SCD

Age	AAOCA is more commonly invoked as the cause of SCD in patients <35 y of age than in patients >35 y of age, in whom atherosclerotic coronary disease becomes a more prevalent cause. However, death has been attributed to AAOCA in patients of all ages; there does not seem to be an age beyond which the AAOCA may not be relevant, even in the setting of atherosclerotic coronary disease and other concomitant conditions (S4.4.7-1, S4.4.7-2).
Anatomy of coronary ostium and proximal coronary course	Slit-like/fish-mouth-shaped orifice, acute angle takeoff, intramural course, interarterial course and hypoplasia of the proximal coronary artery have all been proposed as reasons for symptoms, ischemia and SCD in patients with AAOCA. The slit-like orifice is more commonly seen in anomalous right coronary artery arising from the left sinus. Each of these anatomic findings offers a pathophysiological mechanism for intermittent ischemia, particularly at times of high cardiac output and/or increased aortic wall tension, such as during exercise (S4.4.7-6, S4.4.7-9–S4.4.7-11).
Anomalous origin	Left coronary artery arising from the right cusp is less common than the right coronary artery arising from the left cusp but is more often found in autopsy series of SCD (S4.4.7-1, S4.4.7-3, S4.4.7-15). This suggests that anomalous origin of the left coronary artery from the right cusp is more likely to cause SCD than anomalous origin of the right coronary artery from the left cusp. This may be due either to anatomic features that make anomalous aortic origin of the left coronary artery prone to coronary compromise or because a larger proportion of myocardium is supplied by the left coronary artery, or both.
Exercise	Autopsy series suggest a most patients die during, or in close temporal association with, exercise (S4.4.7-3–S4.4.7-5).

Ischemia	Autopsy series demonstrate myocardial fibrosis in a significant number of patients whose deaths were attributed to AAOCA, particularly in patients with anomalous left coronary artery arising from the right cusp (S4.4.7-5). Surgical series describe patients with ischemia or MI before surgical repair in the absence of other CAD, suggesting a relation of the coronary anomaly to the ischemia (S4.4.7-16). This suggests that had perfusion imaging been obtained before SCD, ischemia would have been found in
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	such patients (S4.4.7-17, S4.4.7-18). However, other data indicate that a normal stress test does not preclude a SCD event, with the proviso that most of those studies used only stress ECG, rather than the more sensitive and specific modalities of nuclear perfusion imaging or stress echocardiography. In addition, postoperative studies have shown that ischemia may be found after surgical repair in the distribution not supplied by the abnormal coronary artery and may not persist on repeat testing (S4.4.7-19).
Symptoms	In autopsy and surgical series, a significant number of patients reported cardiovascular symptoms, including before SCD events (S4.4.7-4, S4.4.7-7, S4.4.7-8, S4.4.7-20, S4.4.7-21). Symptoms are more commonly reported in patients in whom the left coronary artery arises from the right sinus. Surgical series have described improvement in symptoms after surgical repair (S4.4.7-3–S4.4.7-8).

AAOCA indicates anomalous aortic origin of the coronary artery; CAD, coronary artery disease; ECG, electrocardiogram; MI, myocardial infarction; and SCD, sudden cardiac death.

Mechanism of myocardial ischemia with an anomalous left coronary artery from the right sinus of Valsalva

- compression of the coronary artery
- slit-like ostium
- acute take-off angle

L-ACAOS-IM

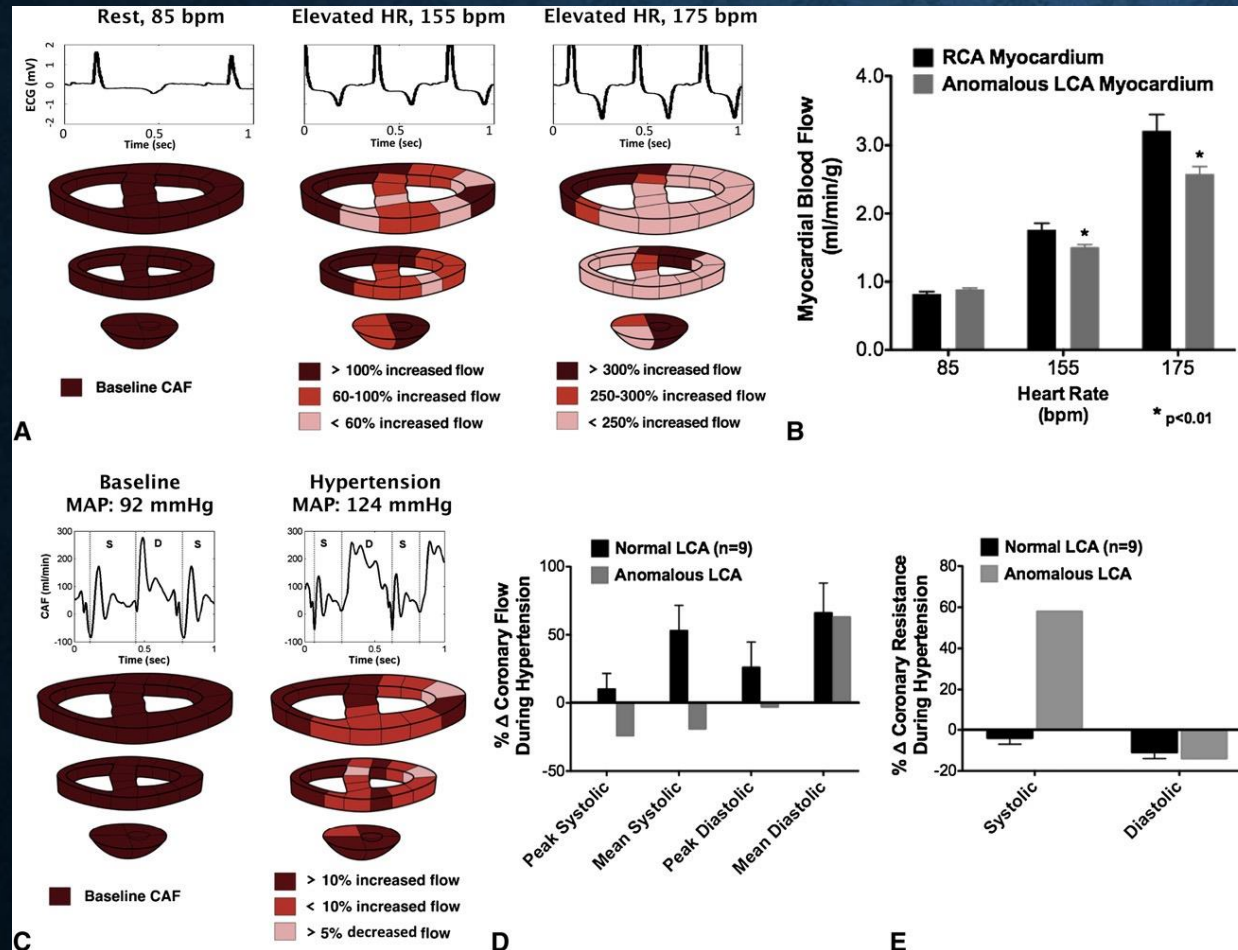
Mechanisms of myocardial ischemia

Anomaly	Frequency		Phasic stenosis	Fixed stenosis	Spasm	High-risk
	<0.05%	>0.05%				
COSA	+	—	—	+	—	—
L-ACAOS-OT	+	—	+	+	—	+
L-ACAOS-IM	—	+	+	+	—	+
L-ACAOS-PP	+	—	—	—	+	—
L-ACAOS-SP	—	+	—	—	+	—
L-ACAOS-RA	—	+	—	—	+	—
L-ACAOS-NC	+	—	+	+	—	+
L-ACAOS-WA	+	—	—	—	+	—
L-ACAOS-SC	+	—	+	—	n.a.	+

- Two mechanisms of ischemia
 - Phasic stenosis
 - Functional stenosis
 - Fixed stenosis

L-ACAOS-IM

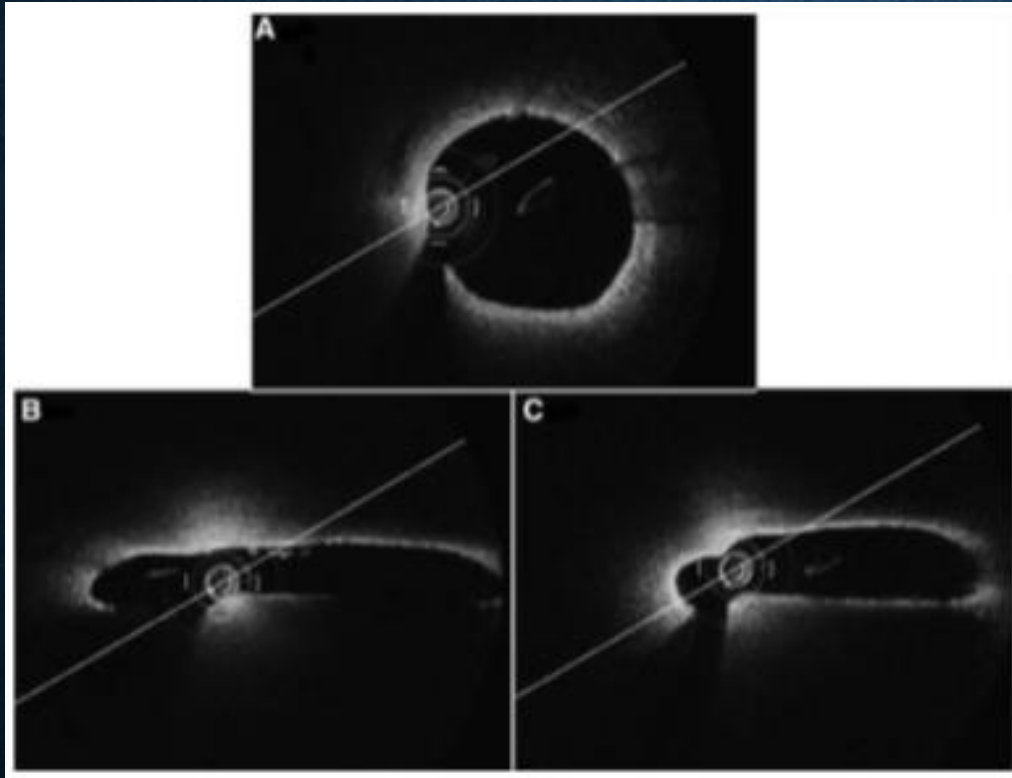
Mechanisms of myocardial ischemia



Phasic
And
Functional
stenosis

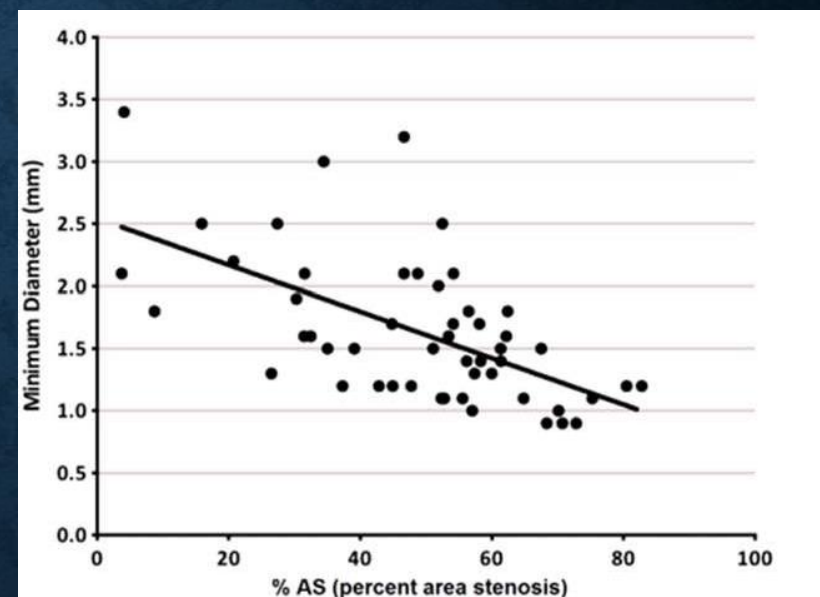
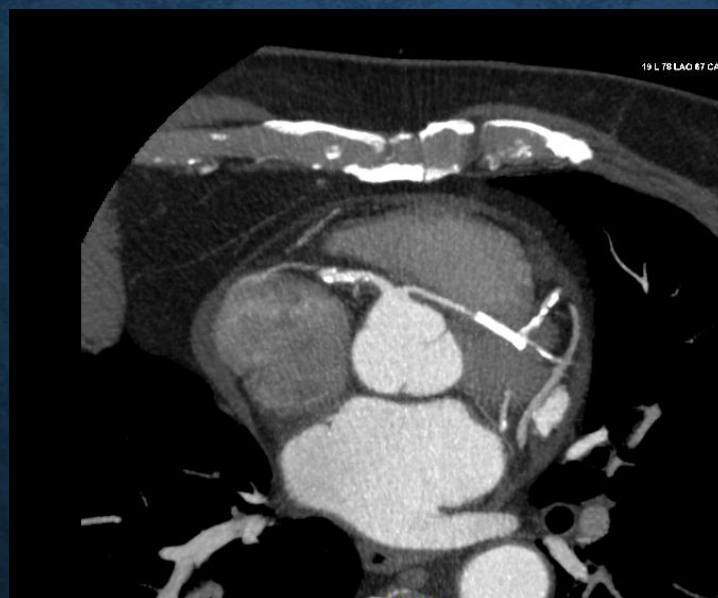
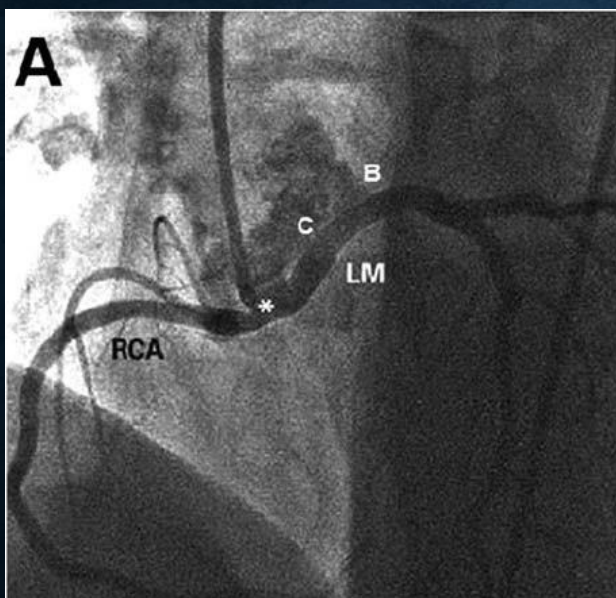
L-ACAOS-IM

Mechanisms of myocardial ischemia

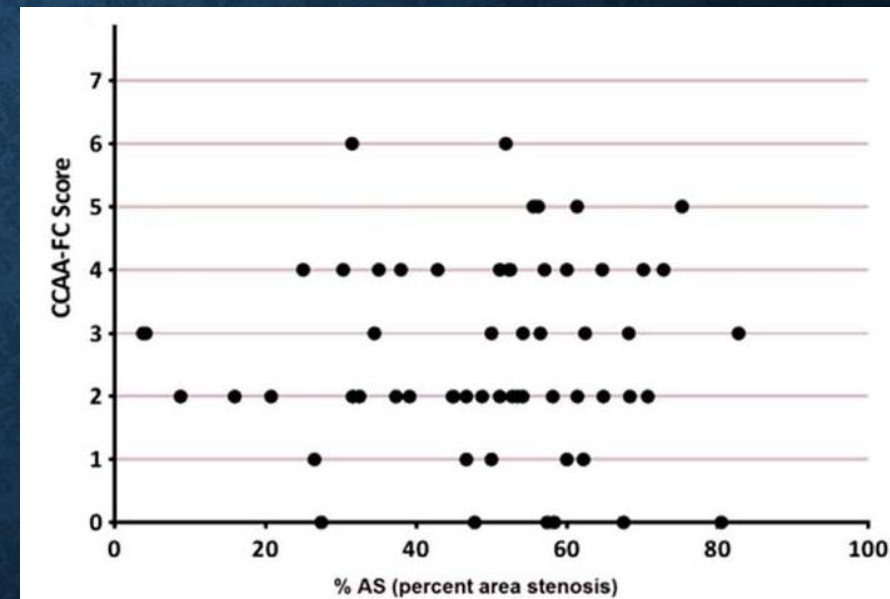
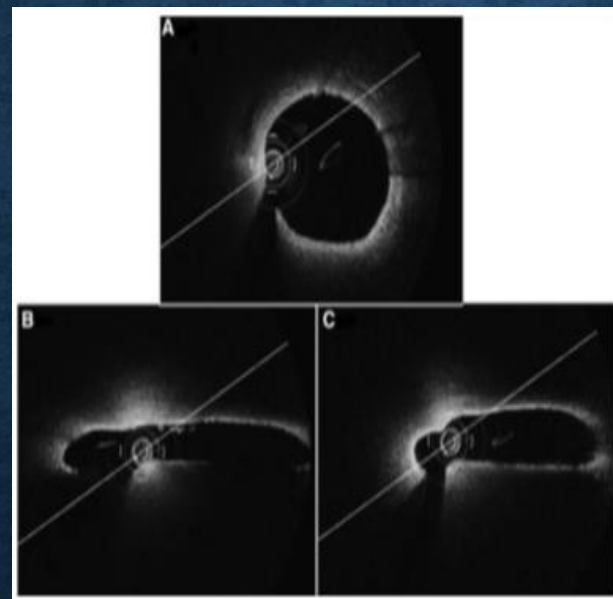
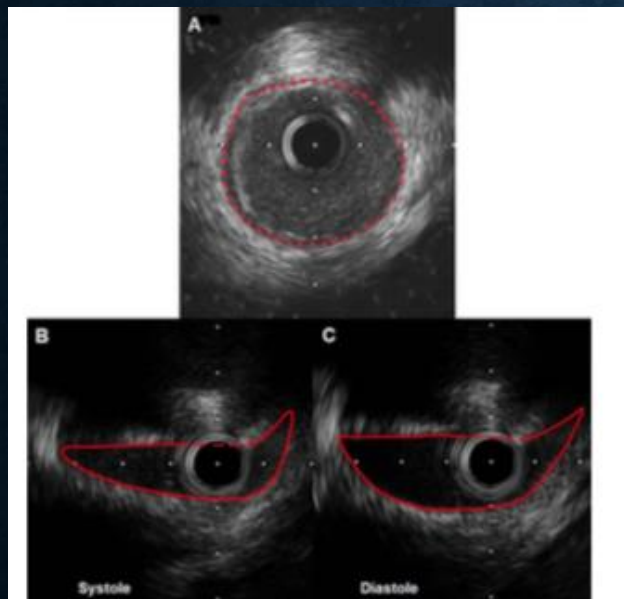


**Fixed
stenosis**

PROGNOSTIC EVALUATION BY ANATOMY CA AND CTA



PROGNOSTIC EVALUATION BY ANATOMY IVUS AND OCT



EVALUATION OF ISCHEMIA

1.2.3 | Physiologic testing

Current stress-testing methods (i.e., treadmill, nuclear scintigraphy, stress or dobutamine echocardiography, and fractional flow reserve) do not significantly correlate with clinical symptoms and prognosis [11,12]. Dobutamine testing in the catheterization laboratory may induce significant arrhythmias in patients with severe L-ACAOS-IM, much as it does in patients with atherosclerotic LM lesions. Adenosine-type testing is not predictive, because stenosis does not increase with vasodilation as it does with physiologic exercise.



Expert consensus guidelines: Anomalous aortic origin of a coronary artery



Julie A. Brothers, MD,^a Michele A. Frommelt, MD,^b Robert D. B. Jaquiss, MD,^c Robert J. Myerburg, MD,^d Charles D. Fraser, Jr, MD,^e and James S. Tweddell, MD^f

- Individuals with suspected AAOCA should undergo **transthoracic echocardiography** to identify the origin and course of the proximal coronary arteries. (Class I, Level of Evidence B)
- Additional imaging studies, such as **coronary CT angiography or cardiac MRI** are reasonable to better visualize the coronary artery anatomy and to confirm the diagnosis. (Class IIa, Level of Evidence B)
- In those individuals without a history of ischemic chest pain or aborted SCD, **exercise stress testing combined with nuclear perfusion scan or echocardiographic imaging** should be used to help assess the potential ischemic burden of the anatomic variant. (Class I, Level of Evidence B)
- Cardiac catheterization should be performed in those individuals with anomalous origin of a coronary artery if the anatomy cannot be defined with noninvasive imaging, and in adults with risk factors for coexistent atherosclerotic coronary artery disease. (Class I, Level of Evidence B)

PERCUTANEOUS CORONARY INTERVENTION

- Limited evidence exists regarding the use of PCI in patients with interarterial ALCA or ARCA.
 - In a study of 42 predominantly adult patients with interarterial ARCA undergoing PCI, the rate of **in-stent restenosis was 13% by serial IVUS**
 - In that study, **29% of patients had recurrent symptoms** during a median follow-up period of 5 years.

PCI is currently not considered a routine option for revascularization in these patients

2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on
Clinical Practice Guidelines

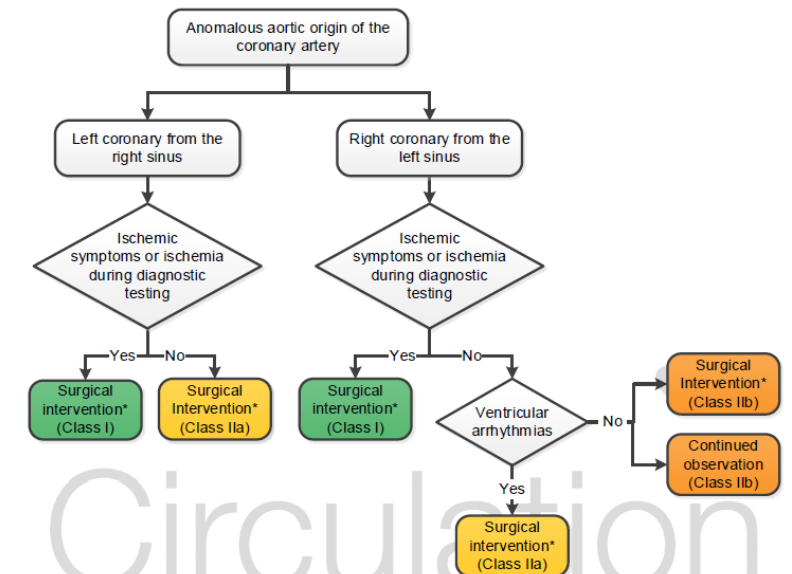
4.4.7.2. Anomalous Aortic Origin of Coronary Artery

Recommendations for Anomalous Aortic Origin of Coronary Artery

Referenced studies that support recommendations are summarized in Online Data Supplement 51.

COR	LOE	Recommendations
Therapeutic		
I	B-NR	1. Surgery is recommended for AAOCA from the left sinus or AAOCA from the right sinus for symptoms or diagnostic evidence consistent with coronary ischemia attributable to the anomalous coronary artery (S4.4.7.2-1–S4.4.7.2-3).
IIa	C-LD	2. Surgery is reasonable for anomalous aortic origin of the left coronary artery from the right sinus in the absence of symptoms or ischemia (S4.4.7.2-4–S4.4.7.2-6).
IIa	C-EO	3. Surgery for AAOCA is reasonable in the setting of ventricular arrhythmias.
IIb	B-NR	4. Surgery or continued observation may be reasonable for asymptomatic patients with an anomalous left coronary artery arising from the right sinus or right coronary artery arising from the left sinus without ischemia or anatomic or physiological evaluation suggesting potential for compromise of coronary perfusion (e.g., intramural course, fish-mouth-shaped orifice, acute angle) (S4.4.7.2-4–S4.4.7.2-6).

Figure 5. Anomalous Aortic Origin of the Coronary Artery



Expert consensus guidelines: Anomalous aortic origin of a coronary artery



Julie A. Brothers, MD,^a Michele A. Frommelt, MD,^b Robert D. B. Jaquiss, MD,^c Robert J. Myerburg, MD,^d Charles D. Fraser, Jr, MD,^e and James S. Tweddell, MD^f

- Individuals with AAOCA and symptoms of ischemic chest pain or syncope suspected to be due to ventricular arrhythmias, or a history of aborted SCD, should be activity restricted and offered surgery. (Class 1; Level of Evidence B)
- **Individuals without symptoms with anomalous origin of a left coronary artery from the right sinus of Valsalva with an interarterial course should be offered surgery.** (Class 1; Level of Evidence B)
- Individuals with AAOCA and symptoms of ischemic chest pain or syncope suspected to be due to ventricular arrhythmias, or a history of aborted SCD, should be activity restricted and **if deemed prohibitively high risk for surgery, catheter-based intervention may be considered.** (Class IIb; Level of Evidence C)

ΠΡΟΣΘΙΟΠΛΑΓΙΟ STEMI ΑΝΩΜΑΛΗ ΕΚΦΥΣΗ LCA ΑΠΟ RCA – PPCI LCA ΕΡΩΤΗΜΑ 2

- 1)
- Σπινθηρογράφημα αιμάτωσης μυοκαρδίου
 - Stress echo
 - Νέα στεφανιογραφία με FFR/iFR ή IVUS



surgery
Or
New PCI

?

- 2)
- Παραπομπή για χειρουργείο ανεξαρτήτου συμπτωμάτων και ισχαιμικού ελέγχου;

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