

Updates on Prevention of Sudden cardiac Death in Athletes
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Texas Heart Institute

Experience of right anomalous coronary artery angioplasty in a selected population: Prospective ANOCOR stenting registry

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Introduction

- Anomalous coronary arteries from the opposite sinus of Valsalva (ACAOS) with interarterial course are at risk for sudden death (SD) and myocardial ischemia.
- Prevalence of ACAOS in a healthy school population:
 - anomalous left coronary artery (ALCA): 0.04%
 - anomalous right coronary artery (ARCA): 0.32%
- Increasingly recognized by cardiac imaging.
- Debate regarding ACAOS management.
- Emerging of PCI as a treatment option in a selected population?

Guidelines

2015

AHA/ACC Scientific Statement

Eligibility and Disqualification
Recommendations for Competitive Athletes
With Cardiovascular Abnormalities:
Task Force 4: Congenital Heart Disease

Surgical procedures are the only therapies available for correcting these anomalies,⁵⁰ with return to intense athletic activities permitted after 3 months after the procedure with demonstration of the absence of ischemia on postoperative stress testing.⁵¹

Van Hare et al, J Am Coll Cardiol 2015

2018

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

COR	LOE	Recommendations
Therapeutic		
I	B-NR	1. <u>Surgery</u> 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. ^{S4.4.5.2-1–S4.4.5.2-3}
IIa	C-LD	2. <u>Surgery</u> is reasonable for anomalous aortic origin of the left coronary artery from the right sinus in the absence of symptoms or ischemia. ^{S4.4.5.2-4–S4.4.5.2-6}
IIa	C-EO	3. <u>Surgery</u> for AAOCA is reasonable in the setting of ventricular arrhythmias.
IIb	B-NR	4. <u>Surgery</u> 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 (eg, intramural course, fish-mouth-shaped orifice, acute angle). ^{S4.4.5.2-4–S4.4.5.2-6}

Stout et al, Circulation 2019

Guidelines

2017

AATS EXPERT CONSENSUS GUIDELINES: ANOMALOUS CORONARY ARTERY

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 I; Level of Evidence B—supporting references*^{6,18,21-23,29,32,40,58,72,82,105,113,123,124})

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*)

Background

Six-Month Success of Intracoronary Stenting for Anomalous Coronary Arteries Associated With Myocardial Ischemia

- First series of PCI patients (n=14).
- Objective evidence of ischemia.
- 9 ARCA with interarterial course.
- 44-72 year-old.
- Bare-metal stents (BMS).
- No procedural complications.
- Resolution of myocardial ischemia on stress testing at follow-up.

Background

Origin of the Right Coronary Artery from the Opposite Sinus of Valsalva in Adults: Characterization by Intravascular Ultrasonography at Baseline and After Stent Angioplasty

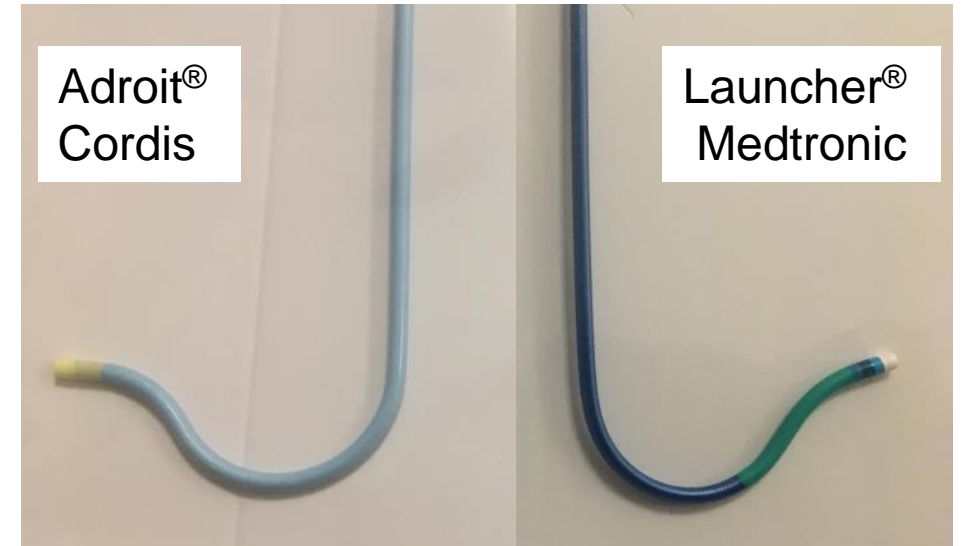
- 42 patients with ARCA and interarterial intramural proximal course.
- Mean age 48±12 years (12-73).
- IVUS-guided PCI.
- Symptomatic, positive stress test, significant stenosis (IVUS surface reduction >50%).
- Successful PCI in all patients with 93% of drug-eluting stents (DES).
- Improved symptoms at one-year follow-up (30 patients).
- 13% restenosis rate at 5-year follow-up.
- No ACAOS-related deaths during follow-up.

PCI in surgically treated patients

- Surgical series of Necker Hospital, Paris, France.
- 31 patients between 2005 and 2017.
- Mean age 14 years (4-66).
- 9 ALCA and 22 ARCA.
- Coronary reimplantation / Ostioplasty / No unroofing.
- No death.
- 3 post-operative PCI (2 for acute ischemia, 1 for late ischemia) = 10%.

Technical aspects

- Difficult canulation
 - No coaxiality because of tangential origin
 - Less back-up support
- Amplatz Left (AL) guiding catheters
- Use of catheters with a longer tip
- 0.014 guidewires to improve stability
- Anchoring balloon technique



Rationale for PCI in ACAOS

- Guidelines focused on young people.
- Recommendations built regardless of age.
- No randomized controlled studies.
- Lack of long-term data after surgical correction.
- Possible failure (stenosis/aneurysm/thrombosis) after surgery.
- Population with very low risk of sudden death (>25 year-old).
- Population with ischemic symptoms (>25 year-old).

French ANOCOR program

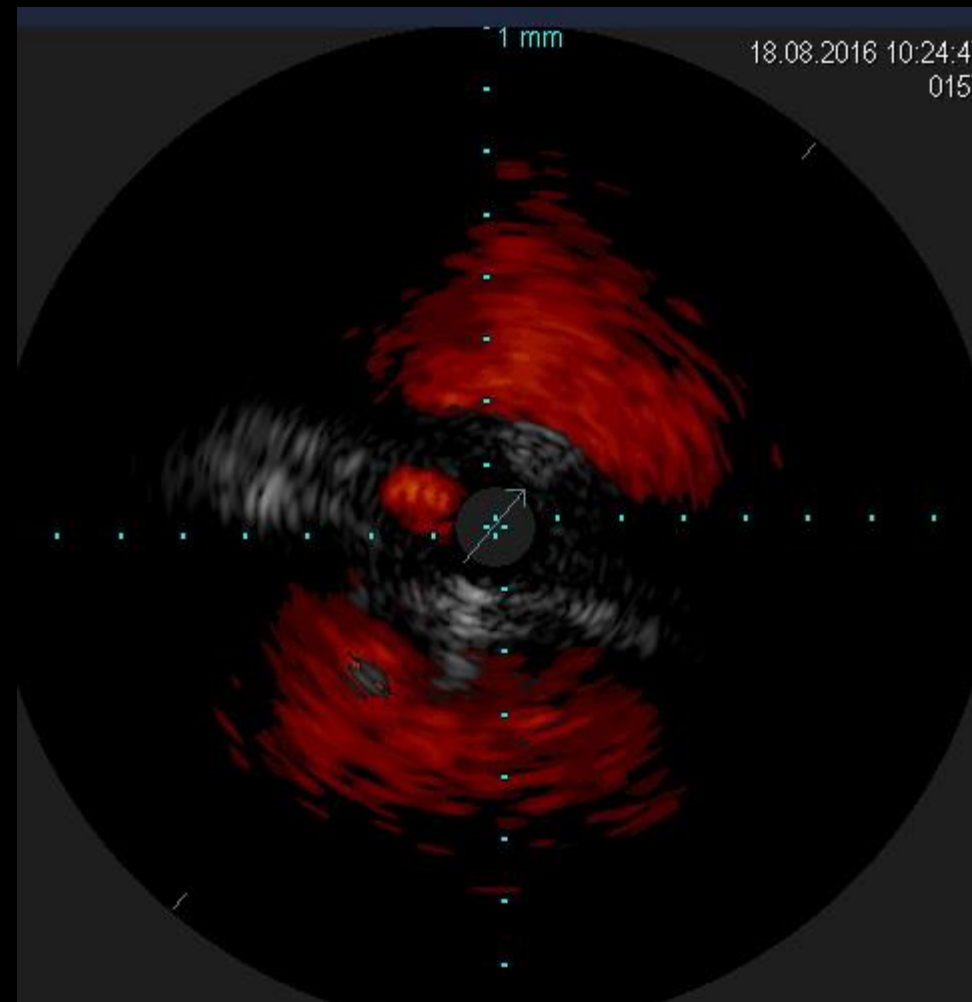
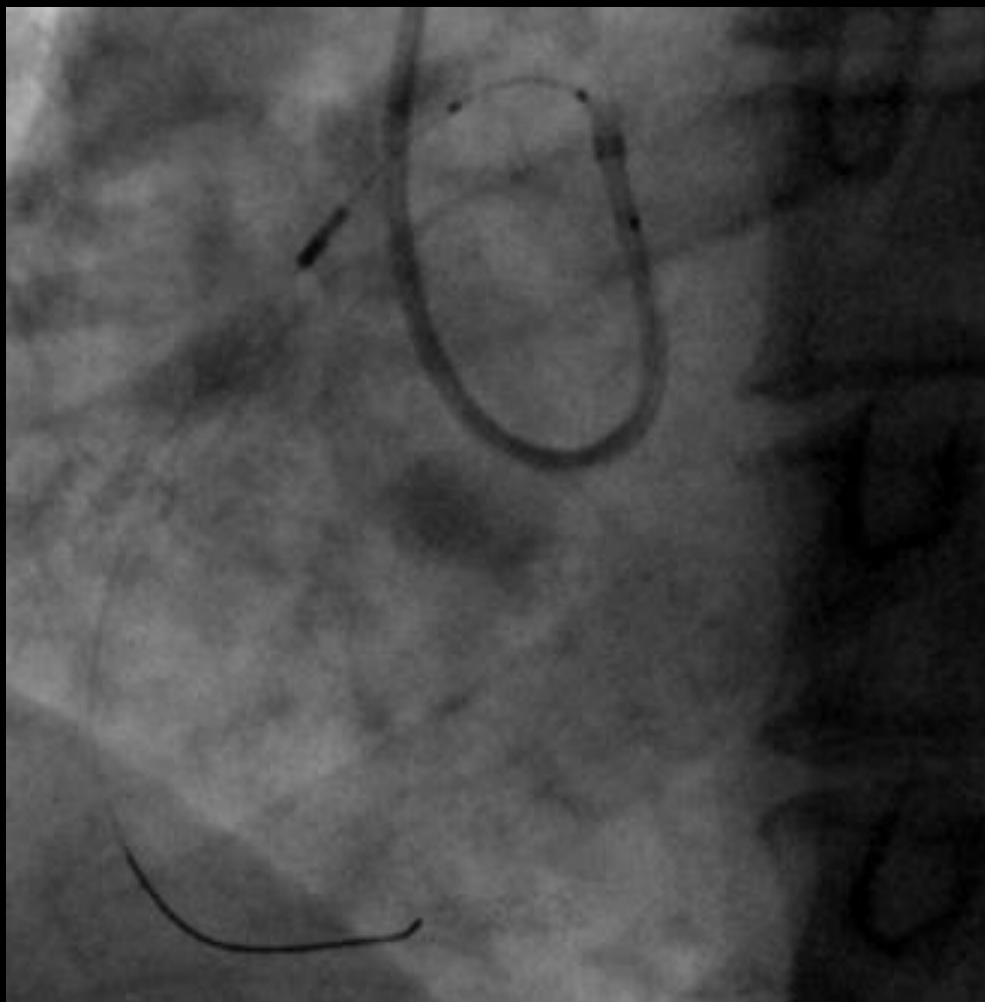


- 2010 - ongoing
- Multidisciplinary team with a monthly meeting (5-10 files).
- Congenital coronary anomalies in patients >12 year-old.
- Review of clinical, functional and angiographic data.
- Consensus advise given on:
 - potential risk of sudden death and myocardial ischemia
 - Relationship with symptoms and/or documented myocardial ischemia
 - management and treatment (conservative/interventional/surgical/exercise restriction)
- Final management of the patient decided by the local referring physician.

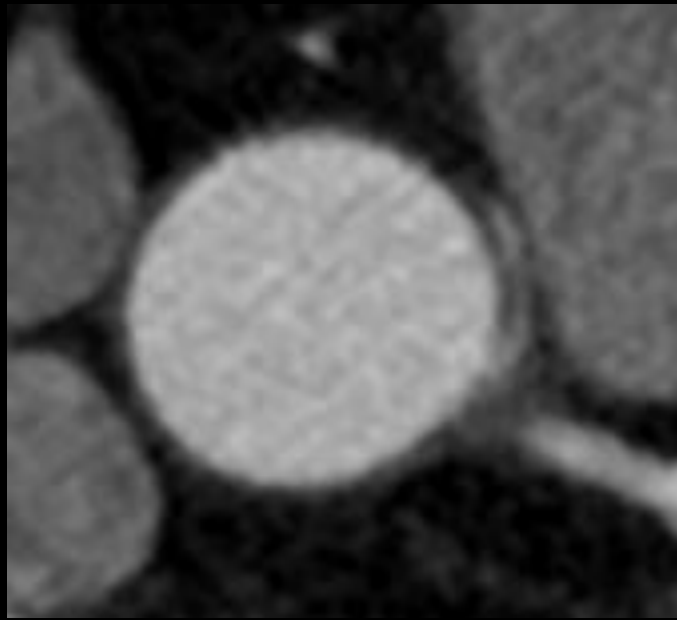
ANOCOR stenting registry:

- ARCA with interarterial course with/without intramural pathway
- Age ≥ 25 years
- No history of aborted sudden death
- Ischemic symptoms and/or documented ischemia
- No significant associated CAD
- IVUS/OCT guidance
- 6-12 month CT follow-up
- Clinical follow-up at 6, 12 and 60 months

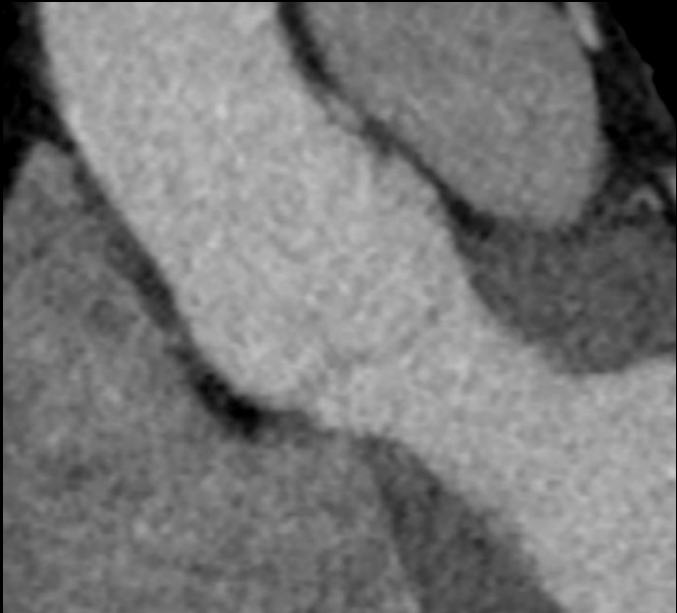
Intravascular imaging-guided PCI



CT scan



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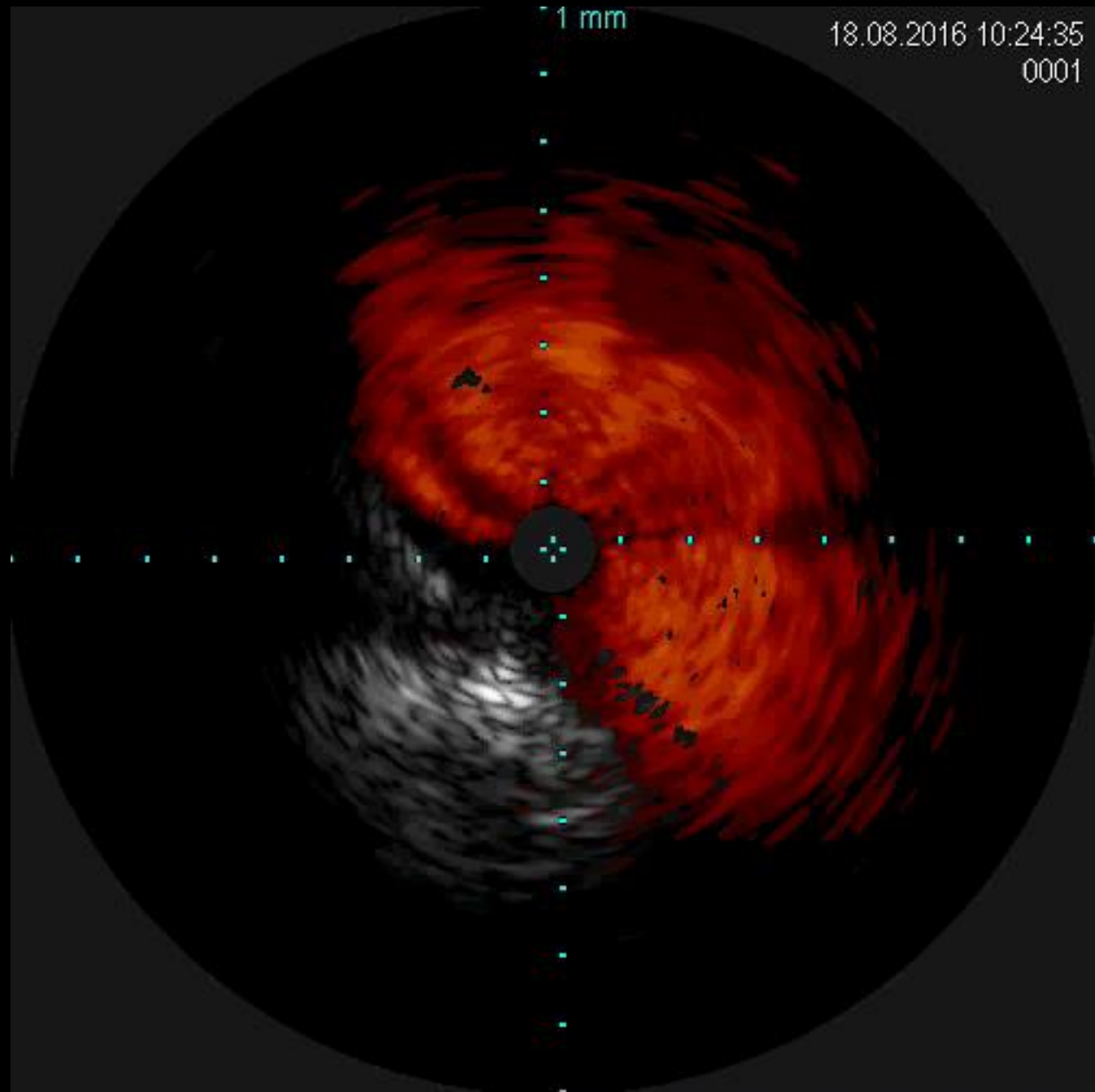




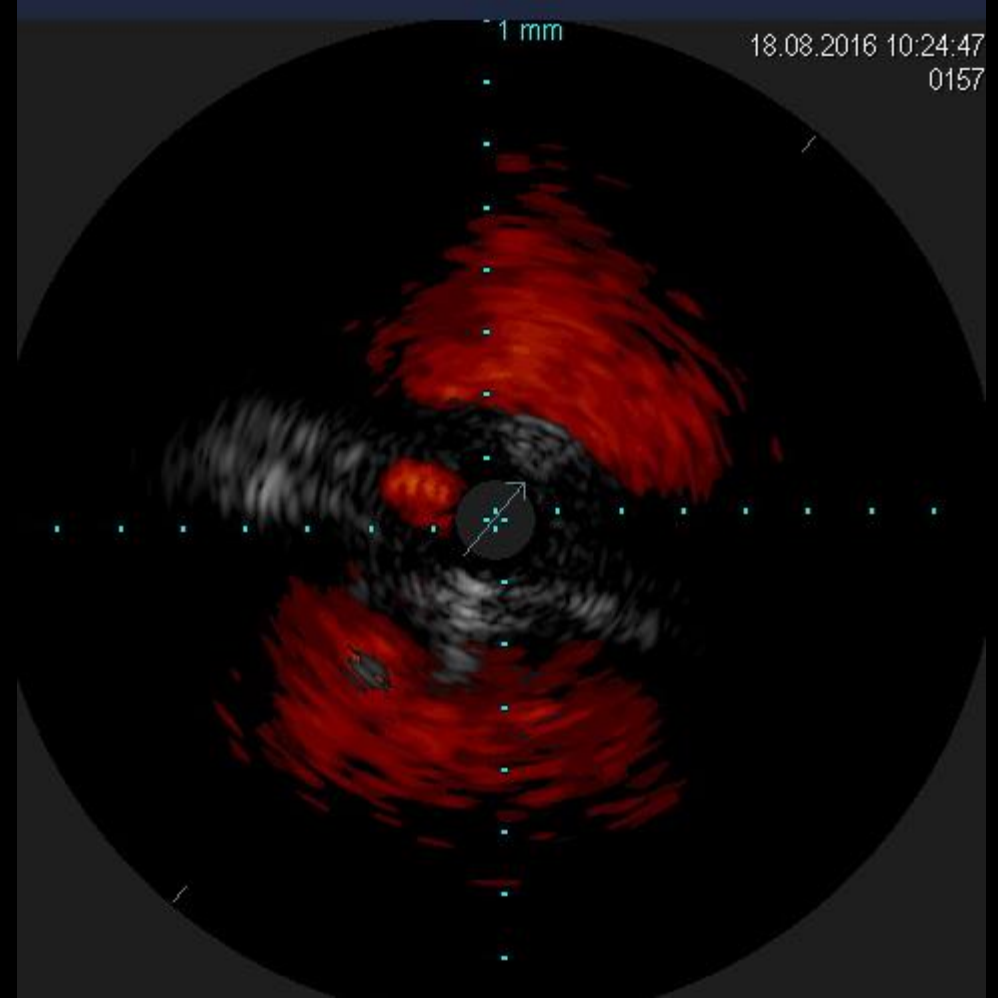
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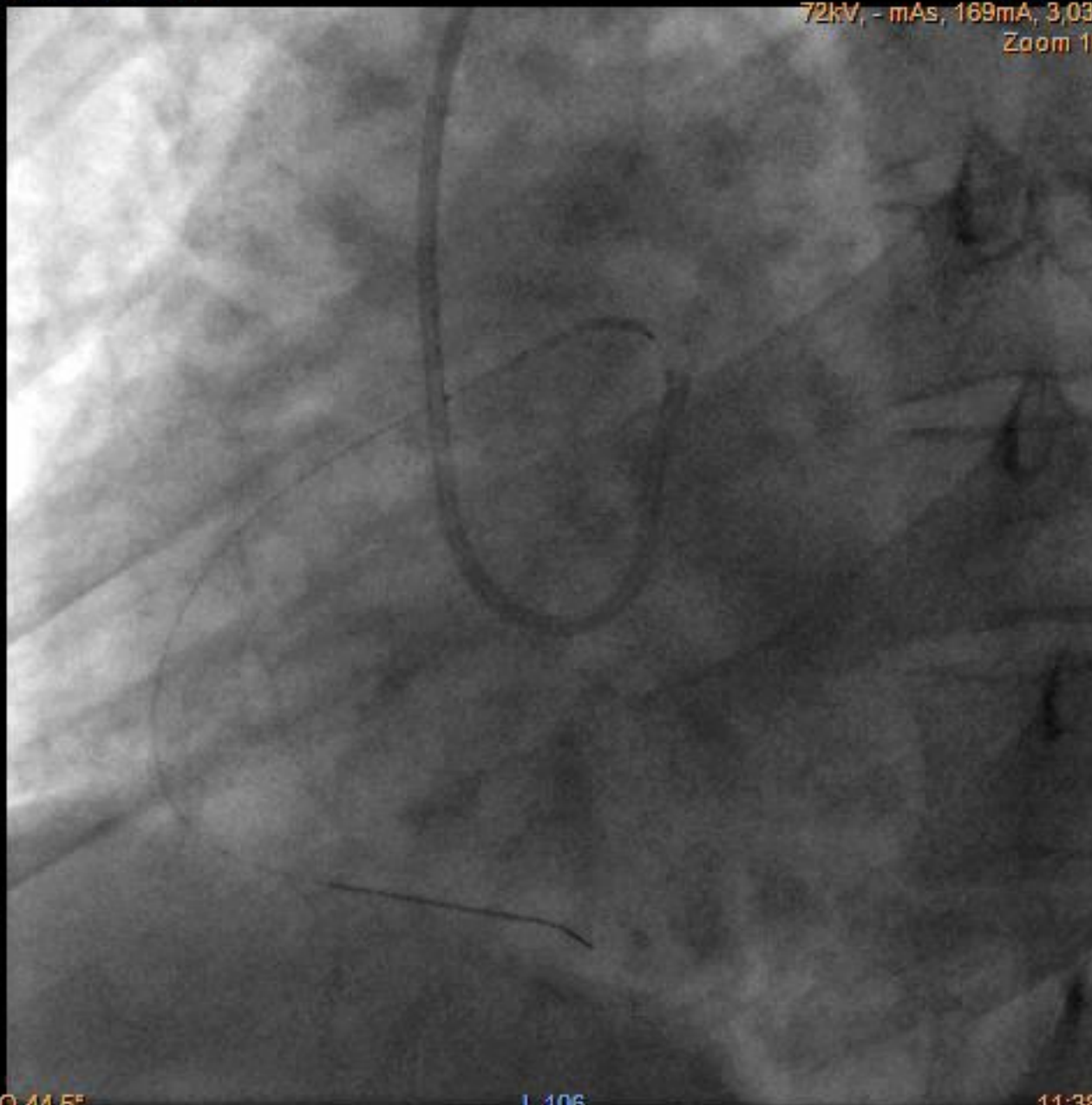
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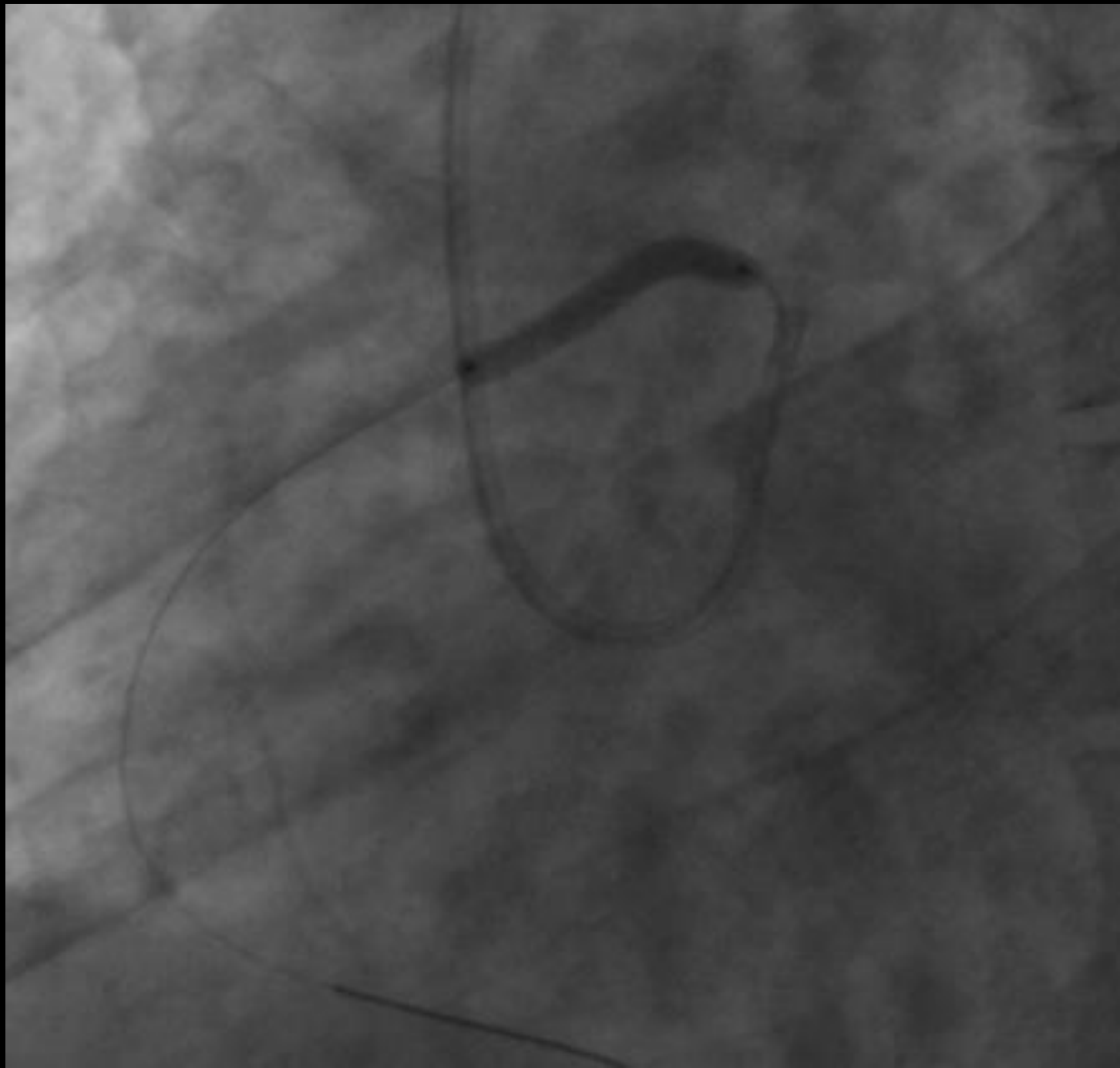
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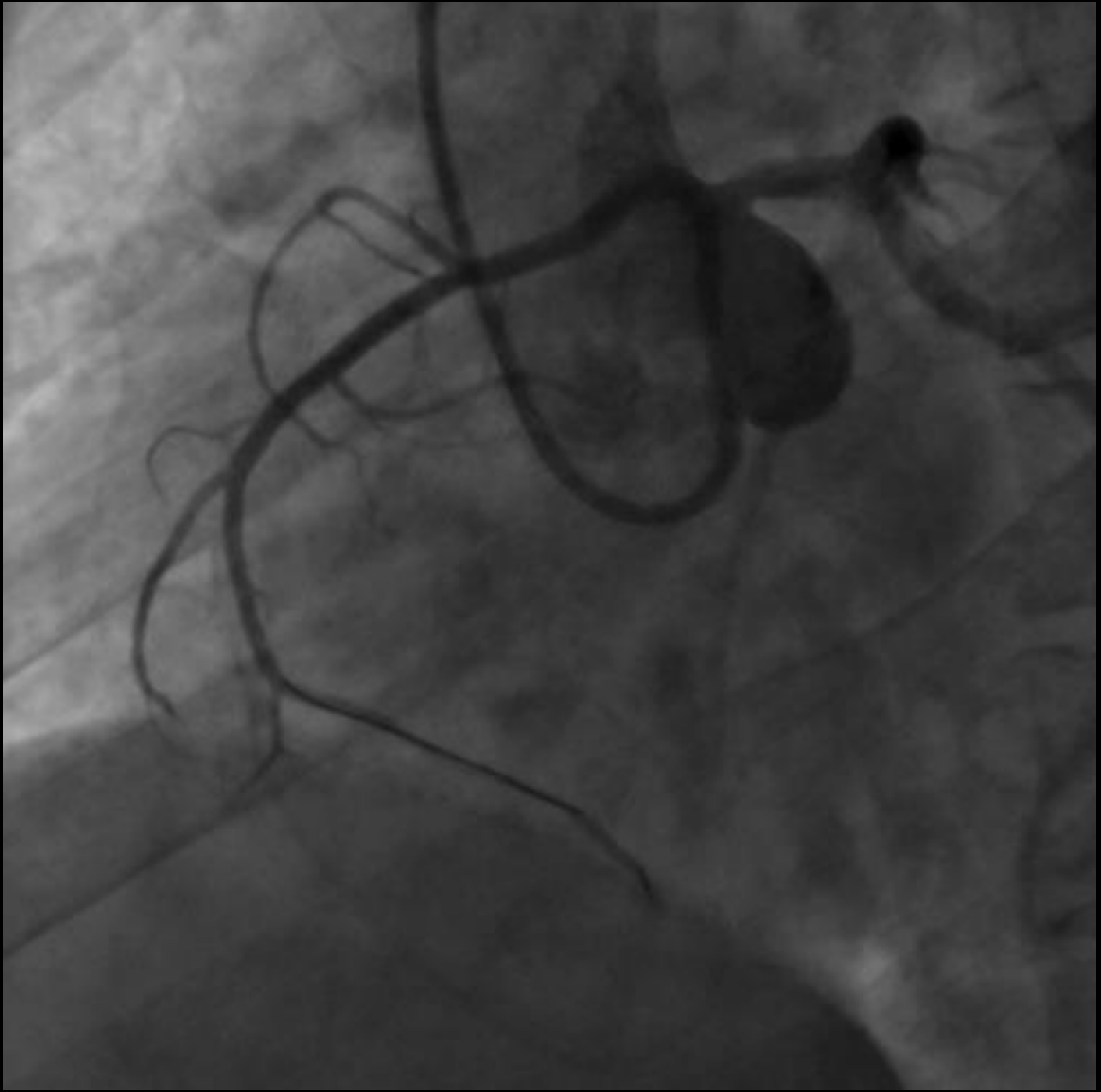


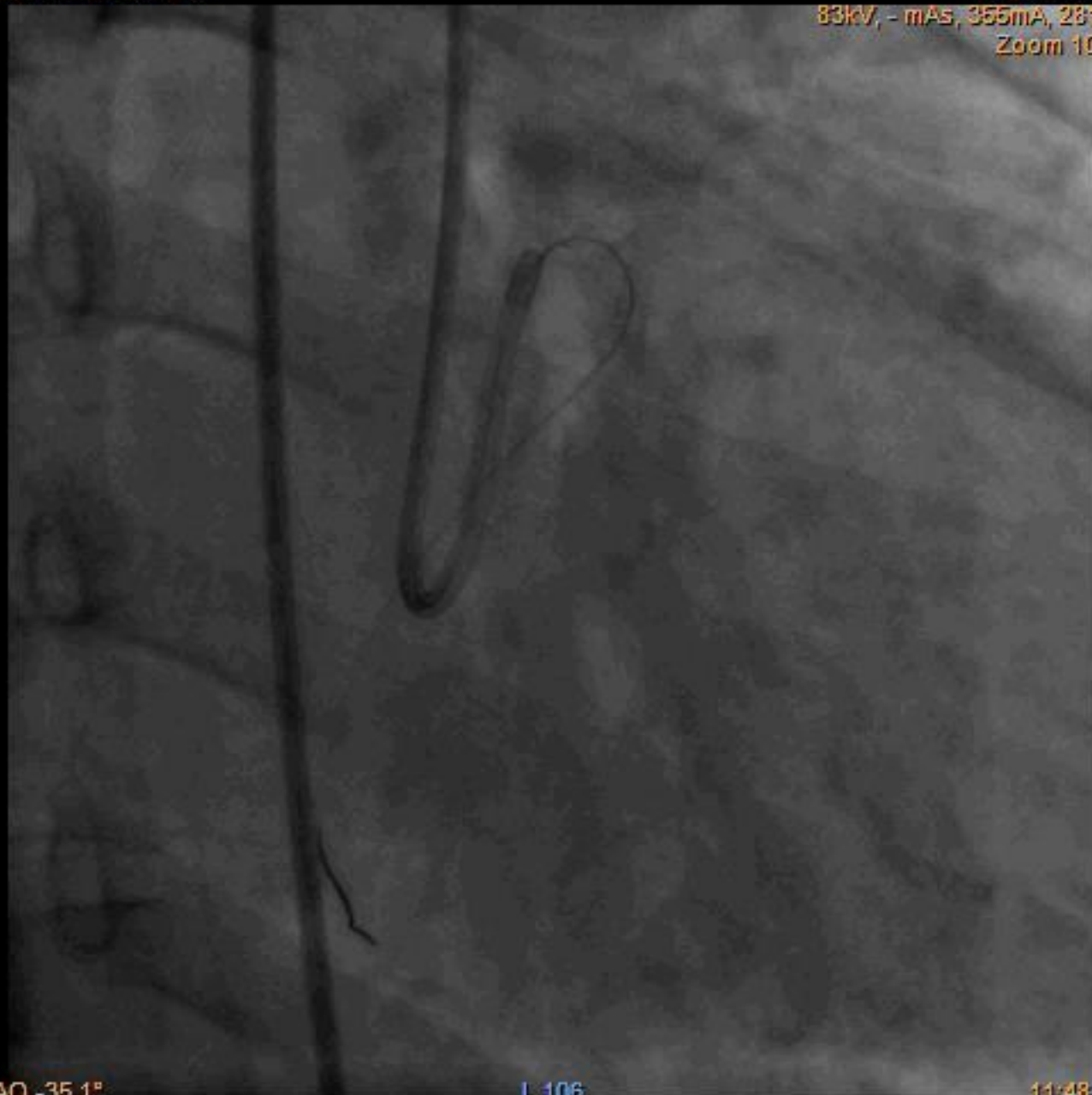
Pre-PCI







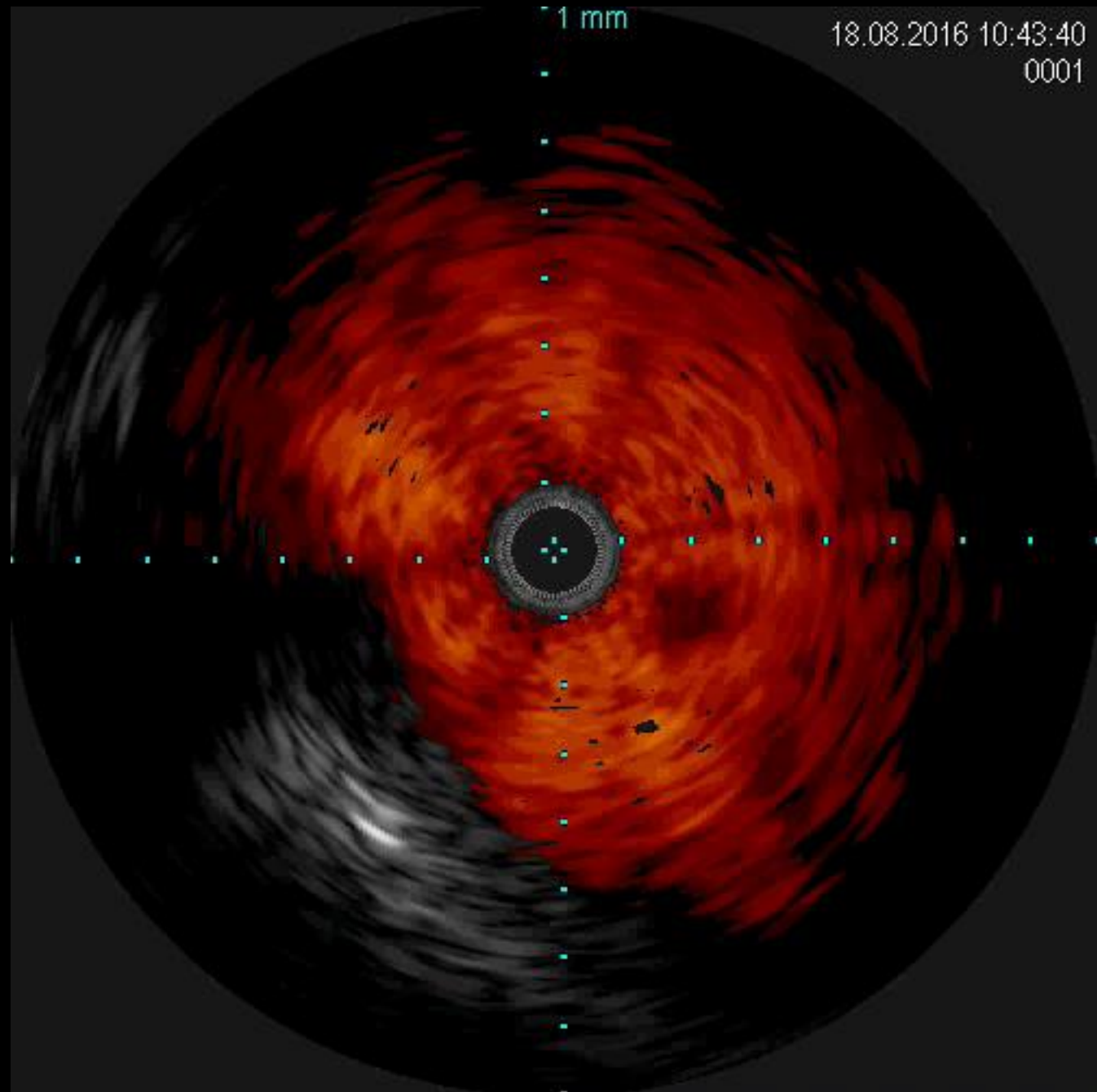




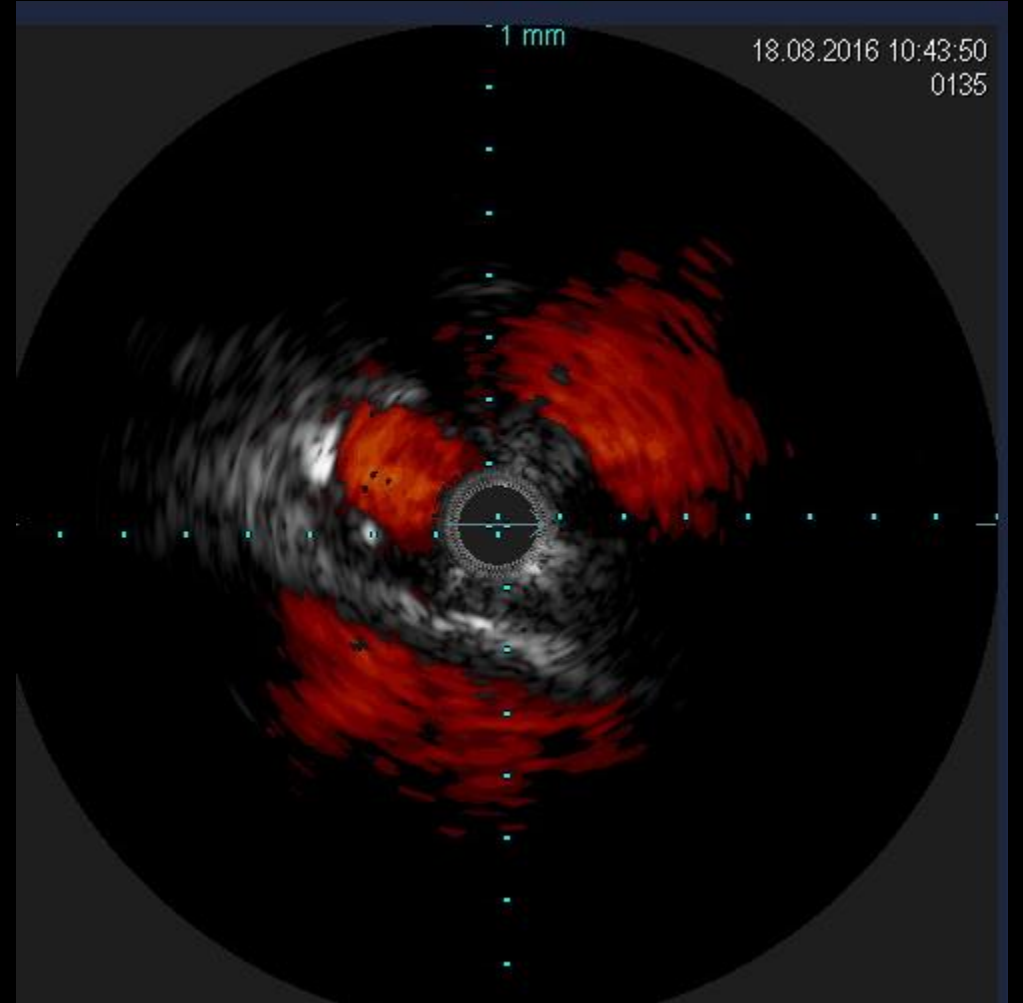
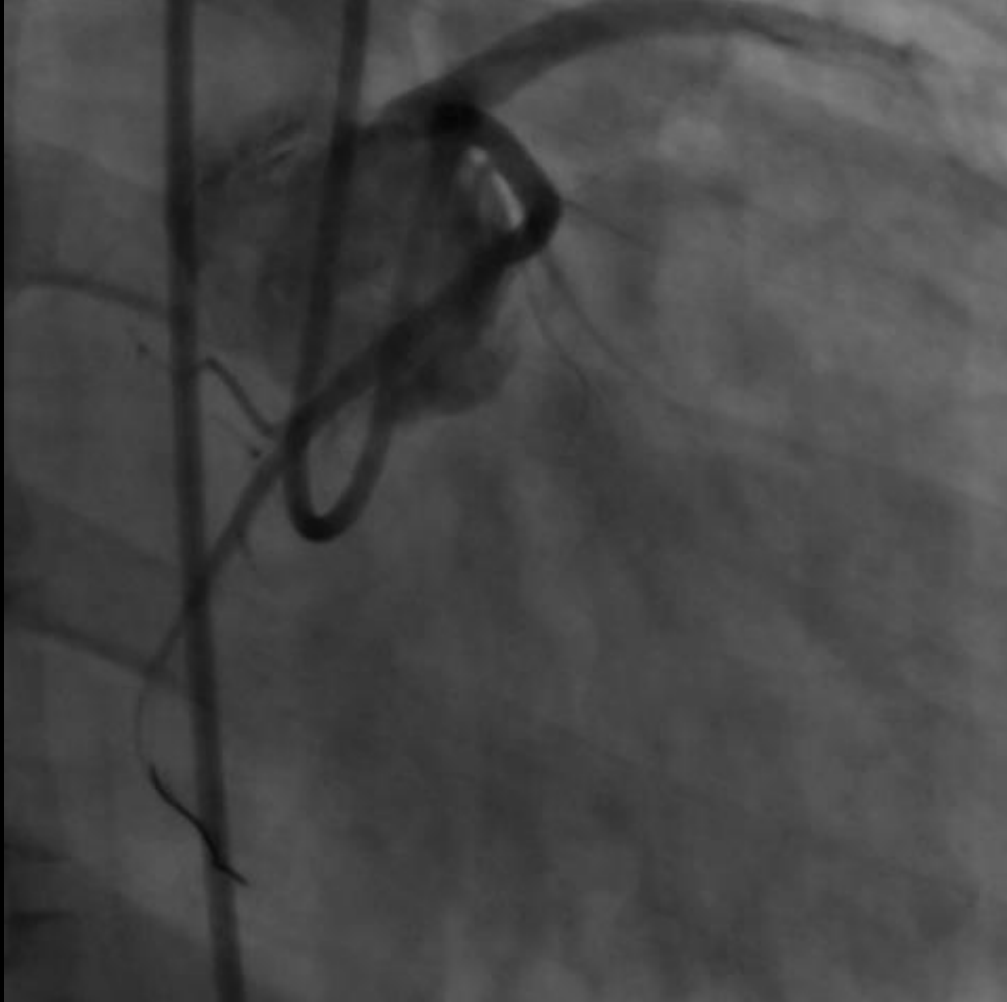
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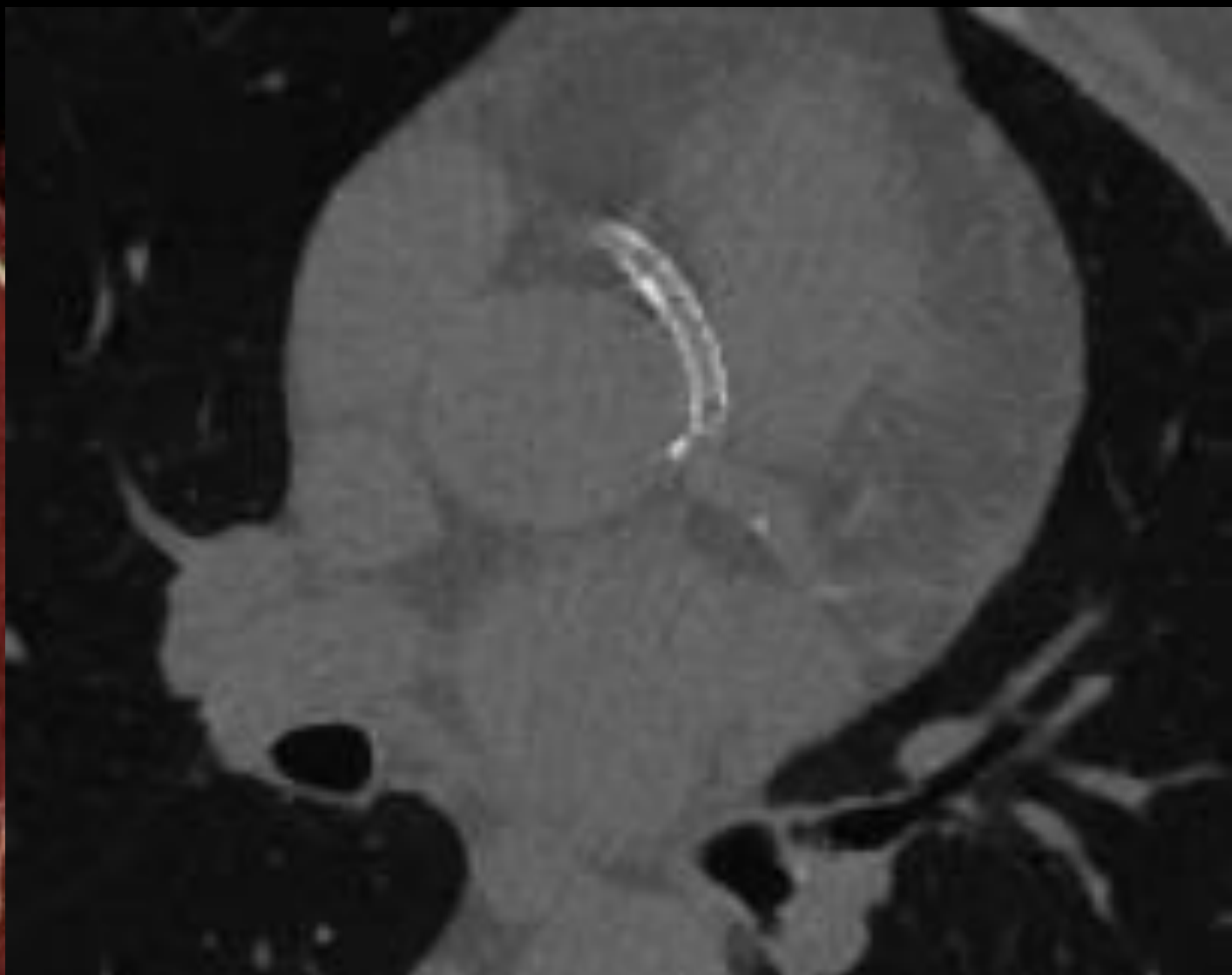
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Post-PCI



CT scan – 6 months



Baseline and angiographic characteristics

Inclusion period: 2014-2019	N=16
Mean age (years)	52 (29-81)
Male sex (%)	10 (63)
<i>Presentation</i>	
ACS (%)	2 (12.5)
Stable angina (%)	11 (69)
Silent ischemia (%)	2 (12.5)
Syncope (%)	1 (6)
<i>Angiography</i>	
ARCA with interarterial course (%)	16 (100)
Intramural segment (%)	11 (69)

Procedural characteristics

	N=16
Successful stenting (%)	16 (100)
DES use (%)	15 (94)
Radial access (%)	7 (44)
IVUS/OCT guidance (%)	13 (82)
Mean stent diameter (mm)	3.4
Mean stent length (mm)	25
Mean fluoroscopic time (min)	19

Outcomes

	N=16
Mean troponin (microg/L) at day 1	0.51
In-hospital complications (%)	0 (0)
Mean follow-up (months)	27 (1-60)
In-stent restenosis rate (%) (M8)	2 (12.5)
Stent compression on CT-scan (%)	0 (0)
Death during follow-up (%)	0 (0)

Conclusion

- Preaortic segment stenting of ARCA with interarterial course appears feasible and safe in this preliminary experience.
- A longer follow-up and a more important population are needed to know whether this technique is suitable for a next therapeutic algorithm.