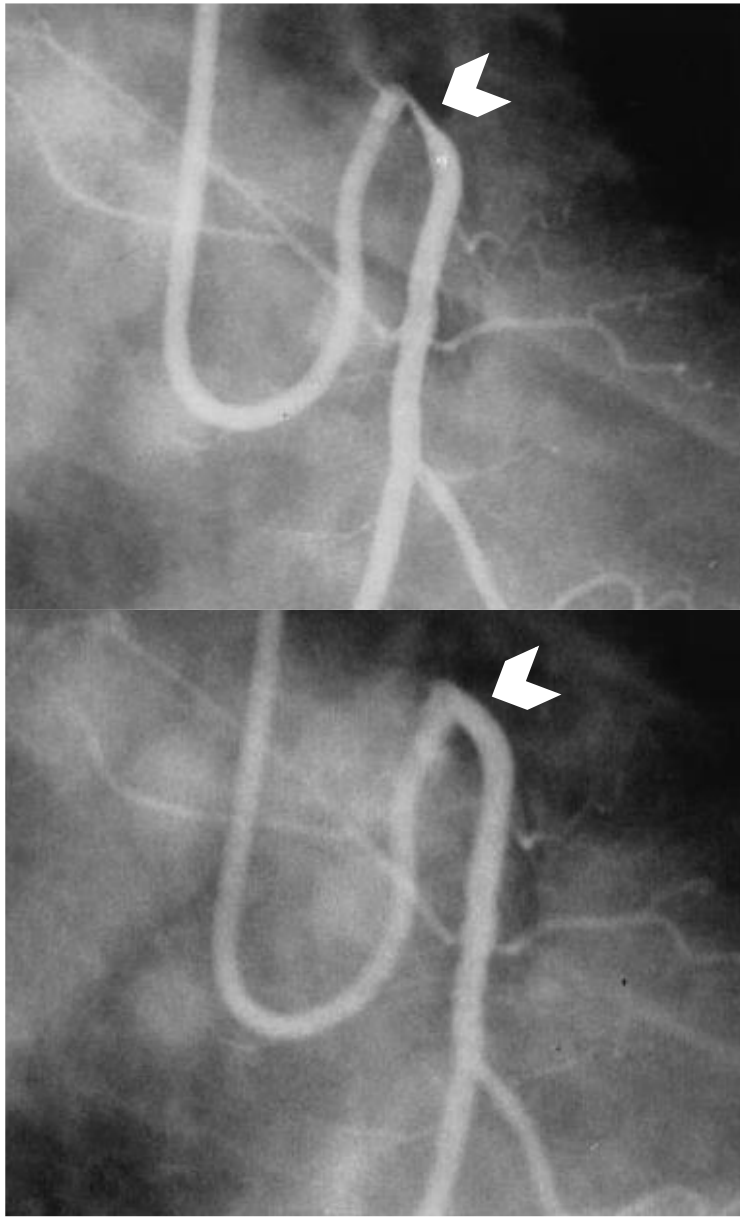
The role of stenting in AAOCA: Is it a viable option and how should it be performed?

Pierre Aubry, Hôpital Bichat, Paris, Centre Hospitalier, Gonesse, France
Philippe Degrell, INCCI, CHL, Luxembourg, Luxembourg
Yassine Ettagmouti, Clinique Européenne, Casablanca, Morocco

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

Andrew J. Doorey, MD, Michael J. Pasquale, MD, James F. Lally, MD, Gary S. Mintz, MD, Erik Marshall, MD, and David A. Ramos, MD

THE AMERICAN JOURNAL OF CARDIOLOGY® VOL. 86 SEPTEMBER 1, 2000



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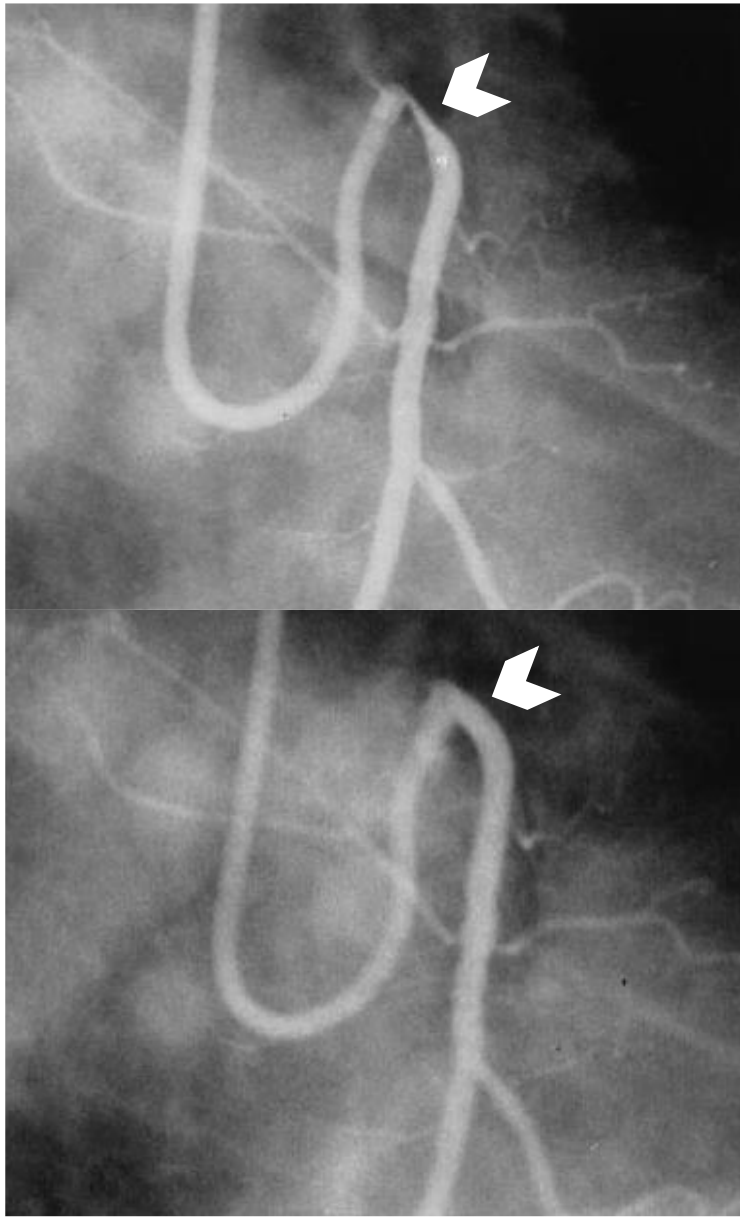
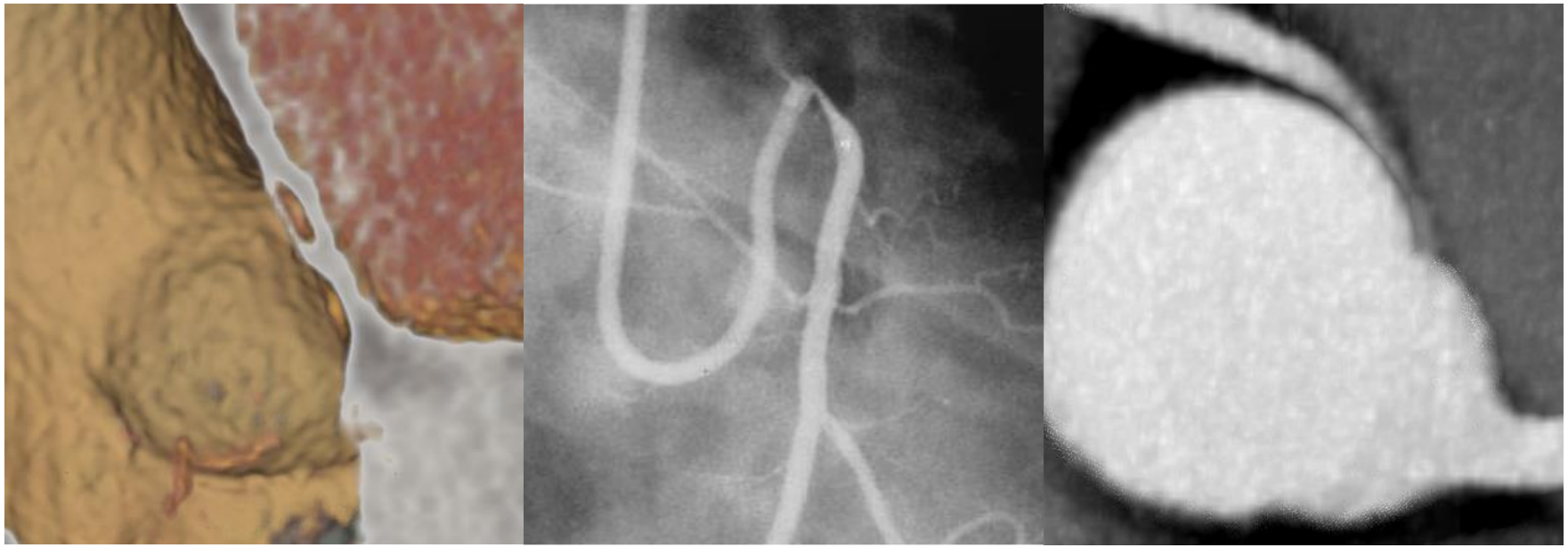
25 years ago

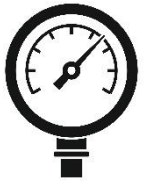


12 patients
3 L-AAOCA / 9 R-AAOCA
Mean age of 55 years [44-70]
Ischemic symptoms
Abnormal nuclear perfusion testing
Angiographic success: 100%
Bare metal stents
No complications
6-month follow-up
Normal myocardial functional tests

Stenting in AAOCA with intramural aortic course



Φ 3.0/4.0 mm



16/24 bars

Are you irresponsible???

What are the risks of aortic/coronary dissection?

Stenting in AAOCA

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

Doorey AJ et al. Am J Cardiol. 2000.

N=14

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

Angelini P et al. Cathet Cardio Interv. 2015.

N=42

Technical success and long-term outcomes after anomalous right coronary artery stenting with cardiac computed tomography angiography correlation

Darki A et al. Cathet Cardio Interv. 2020.

N=4

Place of Angioplasty for Coronary Artery Anomalies With Interarterial Course

Aubry P et al. Front Cardiovasc Med. 2021.

N=17

Stenting in AAOCA

TABLE 1 | Main characteristics of patients included in series of AAOCA treated by angioplasty with stenting.

References	AAOCA type and number	Mean age years	BMS/DES number	Angiographic success (%)	Mean follow-up years	In-stent restenosis number (%)	Stent compression number (%)	Sudden cardiac death number
Doorey et al. (33)	3 Left/9 Right	56	12/0	100	0.5	3 (25)	1 (8)	0
Angelini et al. (35)	42 Right	48	3/39	100	5.0	4 (10)	0	0
Degrell et al. (39)	17 Right	51	1/16	100	2.0	2 (12)	0	0
Darki et al. (36)	4 Right	64	0/4	100	8.5	NA	0	0

AAOCA, anomalous aortic origin of a coronary artery; BMS, bare metal stent; DES, drug eluting stent.

Aubry P et al. FCVM. 2021.

Guidelines

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

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.[S4.4.5.2-1–S4.4.5.2-3]
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.[S4.4.5.2-4–S4.4.5.2-6]
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 (eg, intramural course, fish-mouth-shaped orifice, acute angle).[S4.4.5.2-4–S4.4.5.2-6]

Stout KK et al. Circulation. 2019.

2020 ESC Guidelines for the management of adult congenital heart disease

Anomalous aortic origin of the coronary artery		
Surgery is recommended for AAOCA in patients with typical angina symptoms who present with evidence of stress-induced myocardial ischaemia in a matching territory or high-risk anatomy.[c]	I	C
Surgery should be considered in *asymptomatic* patients with AAOCA (right or left) and evidence of myocardial ischaemia.	IIa	C
Surgery should be considered in *asymptomatic* patients with AAOLCA and no evidence of myocardial ischaemia but a high-risk anatomy.[c]	IIa	C
Surgery may be considered for symptomatic patients with AAOCA even if there is no evidence of myocardial ischaemia or high-risk anatomy.[c]	IIb	C
Surgery may be considered for *asymptomatic* patients with AAOLCA without myocardial ischaemia and without high-risk anatomy[c] when they present at young age (<35 years).	IIb	C
Surgery is not recommended for AAORCA in asymptomatic patients without myocardial ischaemia and without high-risk anatomy.[c]	III	C

Baumgartner H et al. Eur Heart J. 2020.

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]

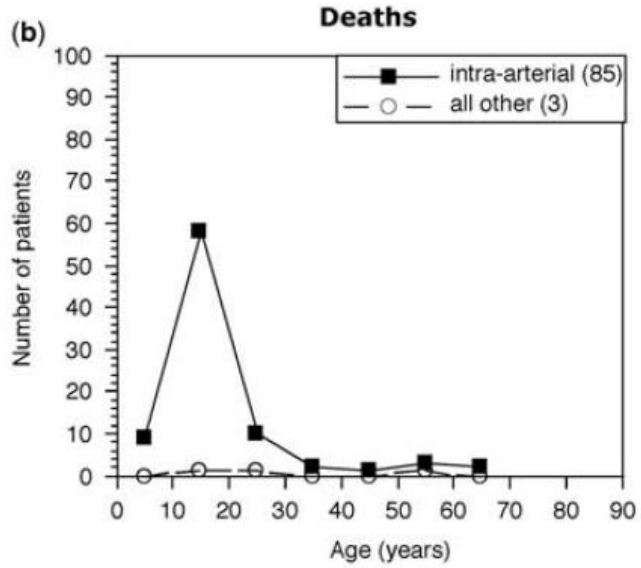
Percutaneous Coronary Intervention

Due to safety issues with stenting anomalous coronary arteries in growing children, this procedure is not advisable in the pediatric population, **but may be considered in select cases in the adult population**.

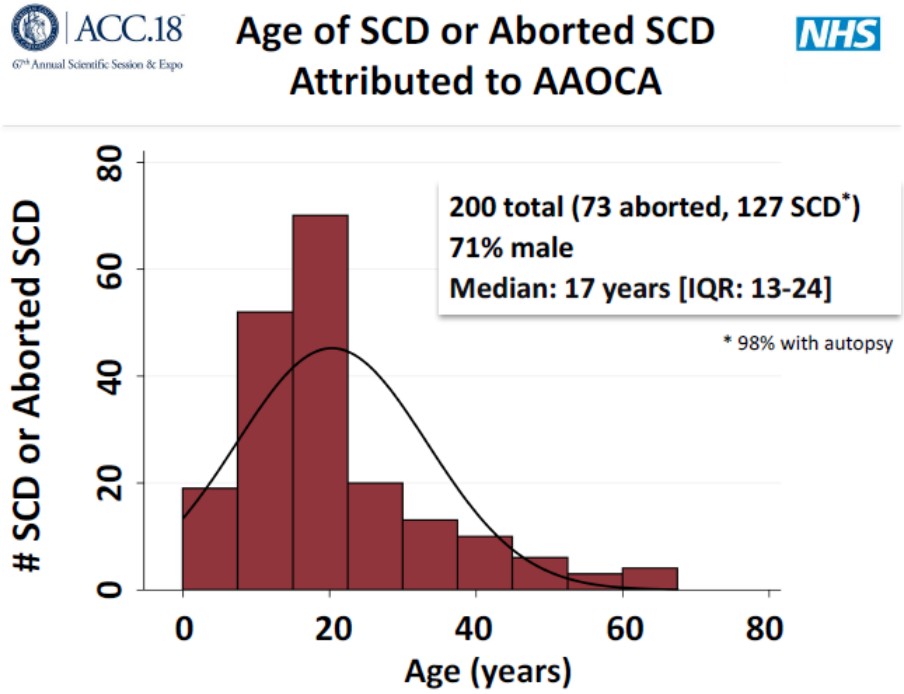
J Thorac Cardiovasc Surg 2017;153:1440-57

What is the rationale for stenting in AAOCA?

Age distribution of SCD due to L-AAOCA



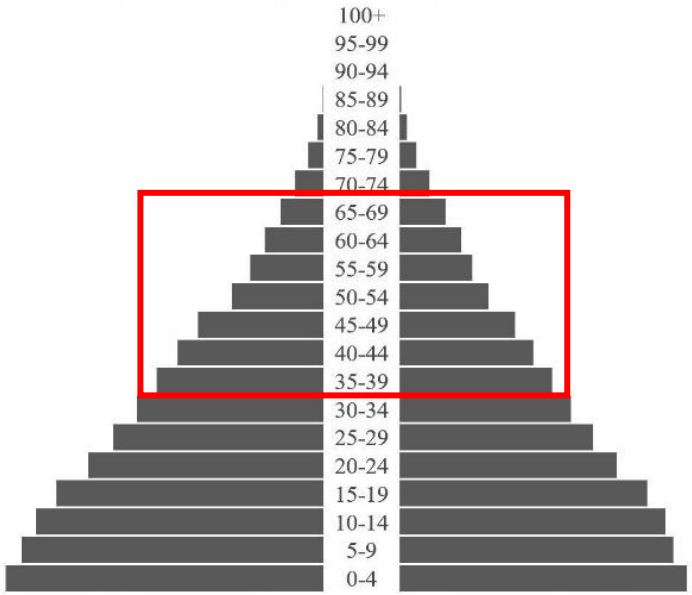
Hoffman JIE. Cardiol Young. 2014.



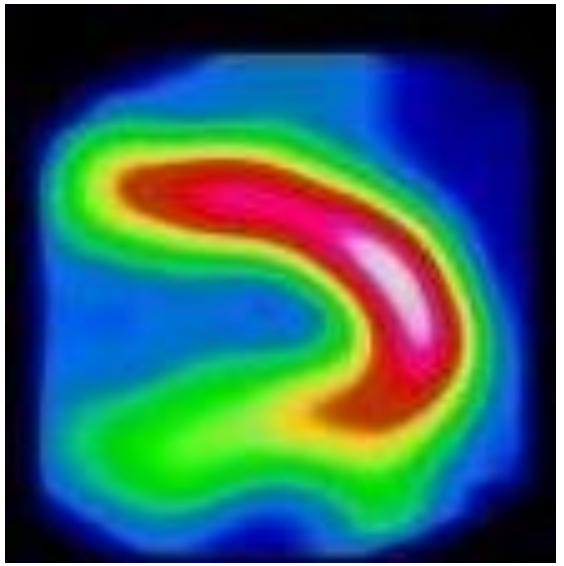
Shiwani H et al. ACC. 2018.

What is the rationale for stenting in AAOCA?

Ischemic symptoms



Myocardial ischemia

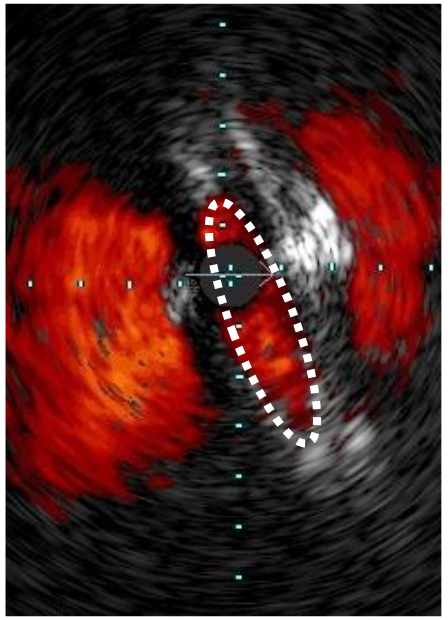


Middle-aged population (>35-year-old)

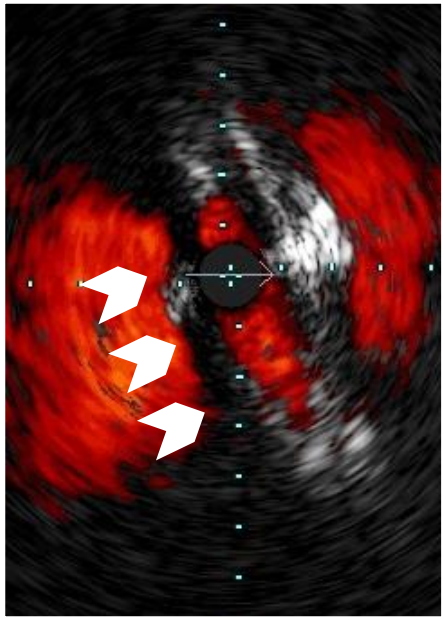
Mechanisms of ischemia in interarterial AAOCA with intramural course

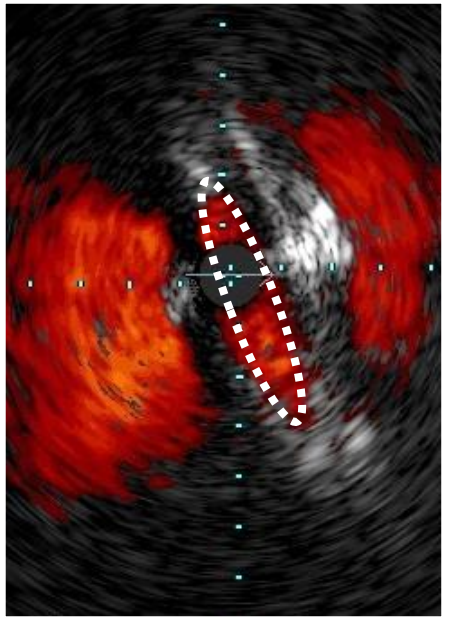
Two-Tier Concept

Fixed Component



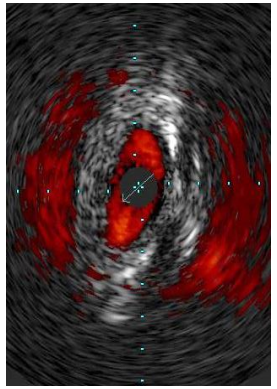
Dynamic Component

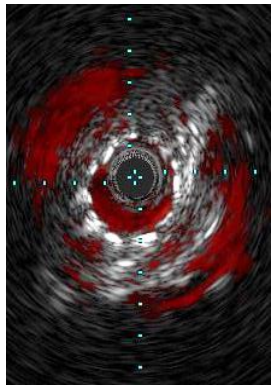




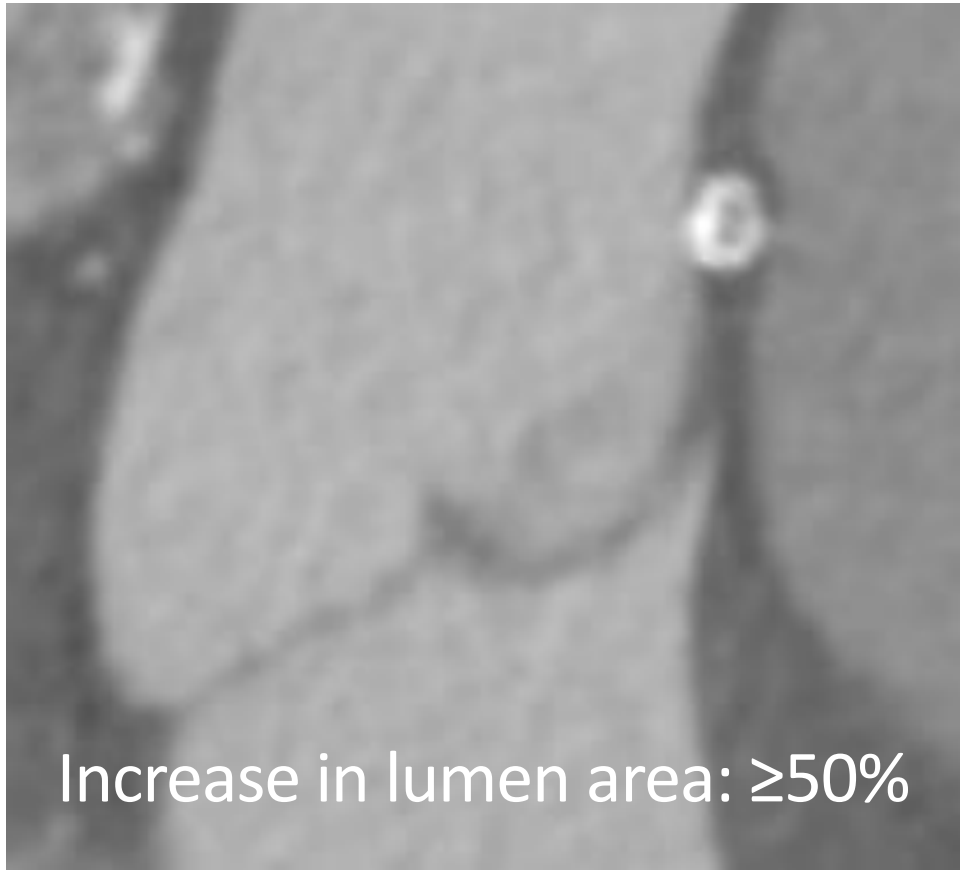
Bigler MR et al. Front Cardiovasc Med. 2021.

How can stenting work?



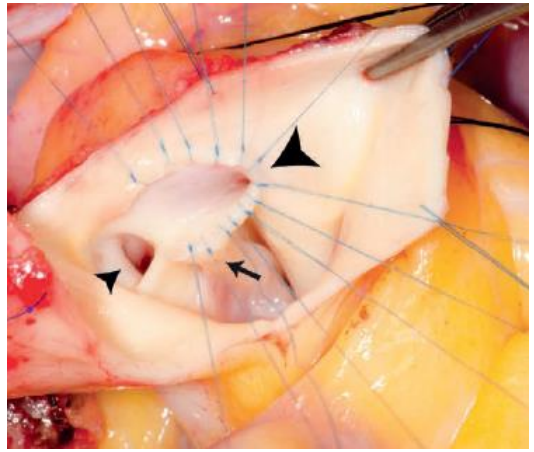


Fixed Component

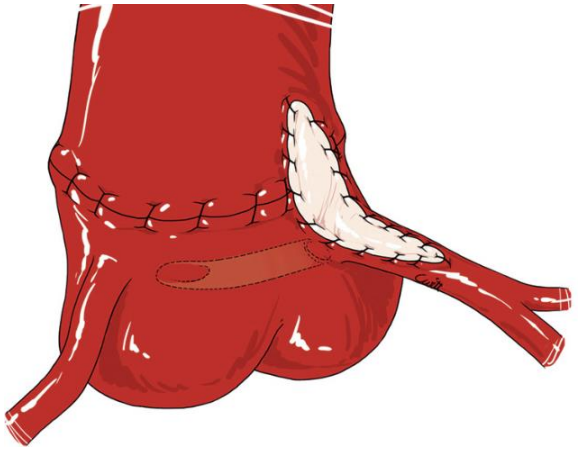


Dynamic Component

When can stenting be useful?



Molossi S et al.
MD Cardiovasc J. 2019.



Vouhé P.
Bul Aca Nat Méd. 2014.

Redo coronary intervention (PCI/surgery) ≈ 3-10%

Padalino MA et al. Eur J Cardiothorac Surg. 2019.
Gaillard M et al. Eur J Cardio Thorac Surg. 2020.
Jegatheeswaran A et al. J Thorac Cardiovas Surg. 2020.
Pregaldini F et al. Eur J Cardiothorac Surg. 2023.

ANOCOR STENTING Registry

- ANOCOR working group (Bichat Hospital - Paris - France)
- Multicenter prospective observational study
- 2014 - ongoing (47 patients included by December 31, 2025)
- Stenting in proximal course of a congenital anomalous coronary artery (ACA)
- De novo procedure or post-surgical failure
- Exclusion criteria: PCI for atherosclerosis stenosis in ectopic course

DIU cardiologie interventionnelle

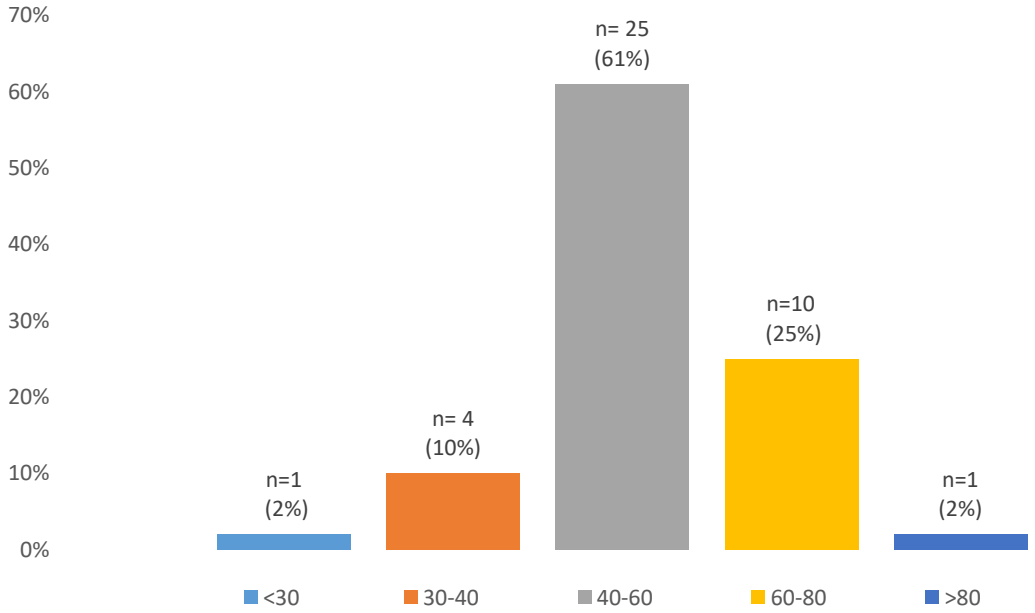
Angioplasty of anomalous coronary arteries: Procedural and in-hospital outcomes of the ANOCOR STENTING cohort

Docteur Yassine Ettagmouti (Casablanca, Morocco) - January 2025

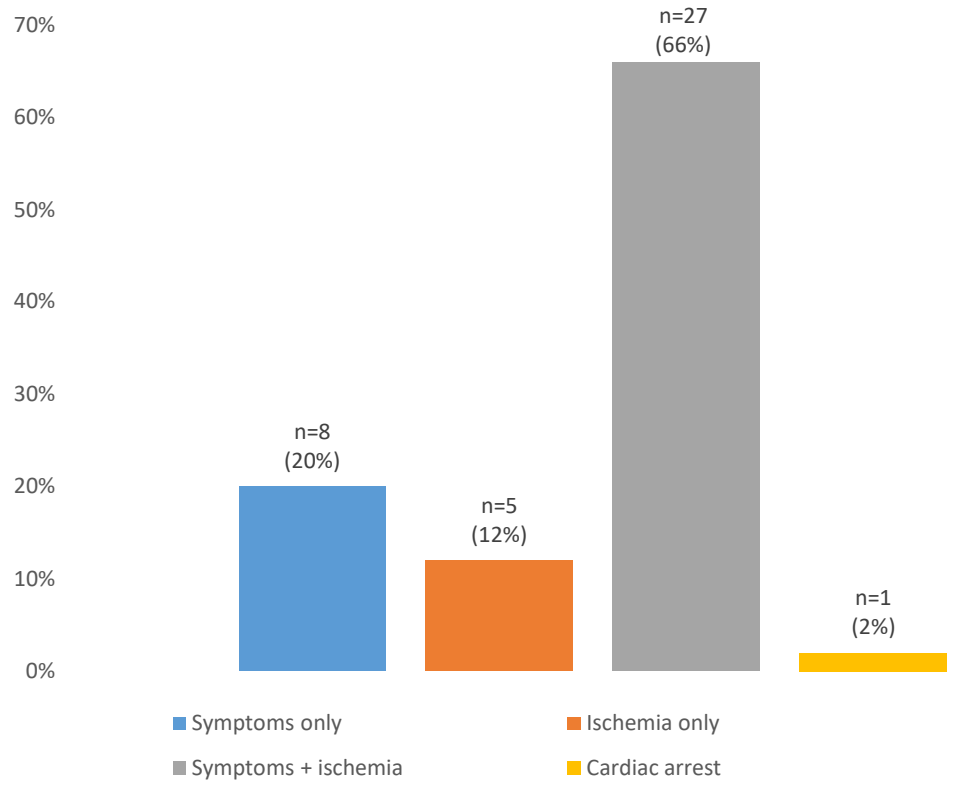
ANOCOR STENTING Registry

N=41

Male: 68% - Mean age: 54±10 years [29-82]

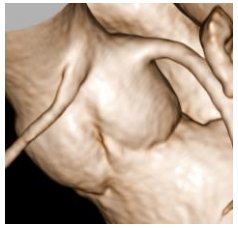
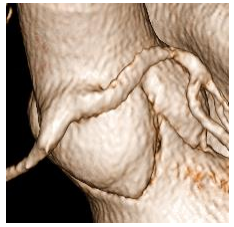
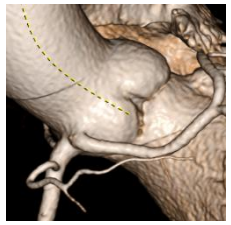


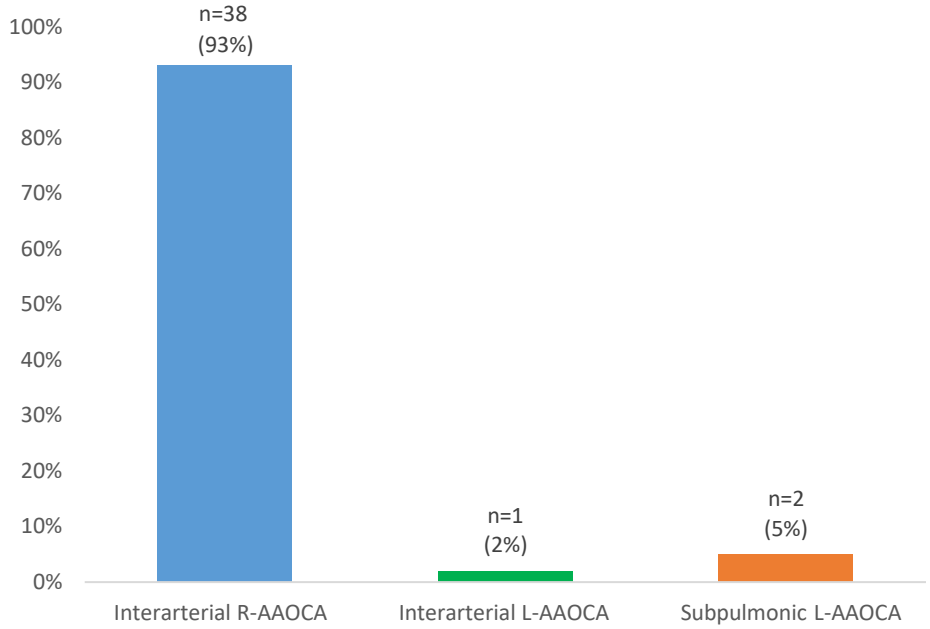
Age distribution (years)



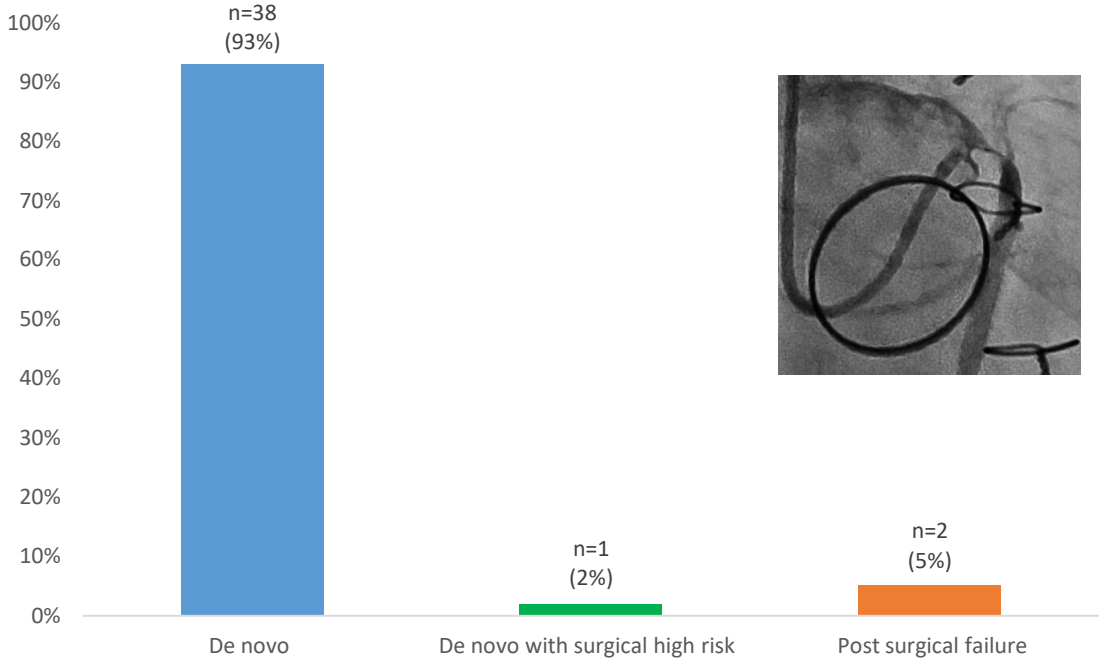
Initial presentation

ANOCOR STENTING Registry N=41



Anatomical distribution



Stenting indication

ANOCOR STENTING Registry N=41

Angiographic characteristics	N	%
No residual stenosis	34	83
Residual stenosis < 30%	7	17
TIMI 3 flow post stenting	41	100
Angiographic success	**41**	**100**

In-hospital outcomes	N	%
Death	0	
Myocardial infarction	0	
Recurrent angioplasty	0	
Emergent coronary surgery	0	
Coronary dissection	0	
Aortic dissection	0	
Major vascular adverse event	0	
Stroke	1	2
Clinical success	**40**	**98**

ANOCOR STENTING Registry N=41

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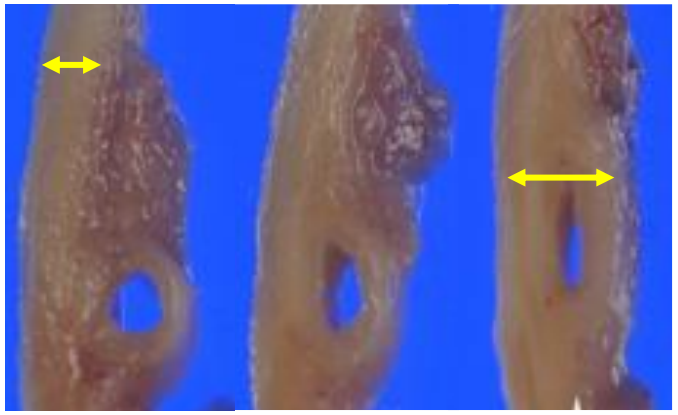

Hata Y et al. Cardiovasc Pathol. 2014.

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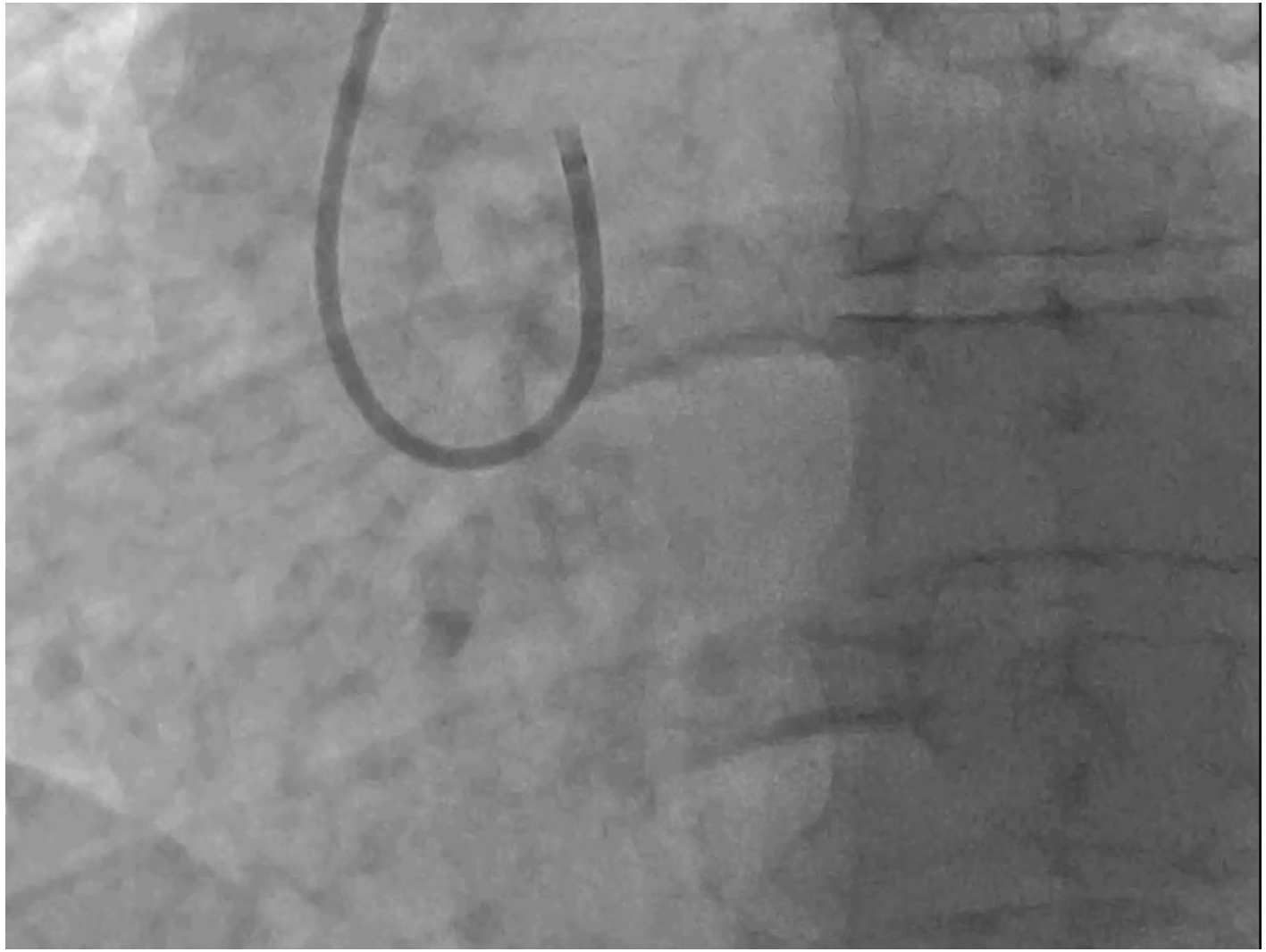
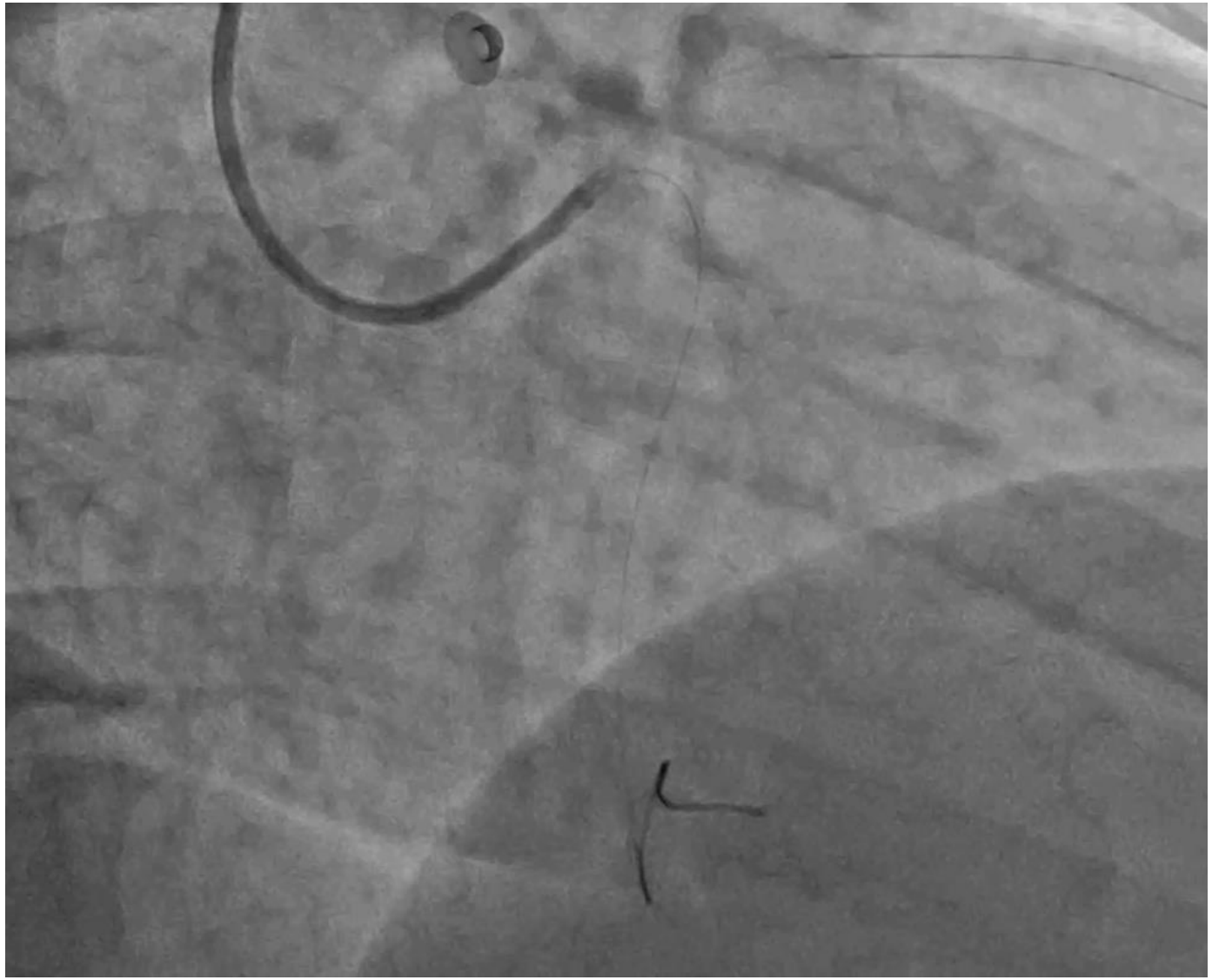
Angio

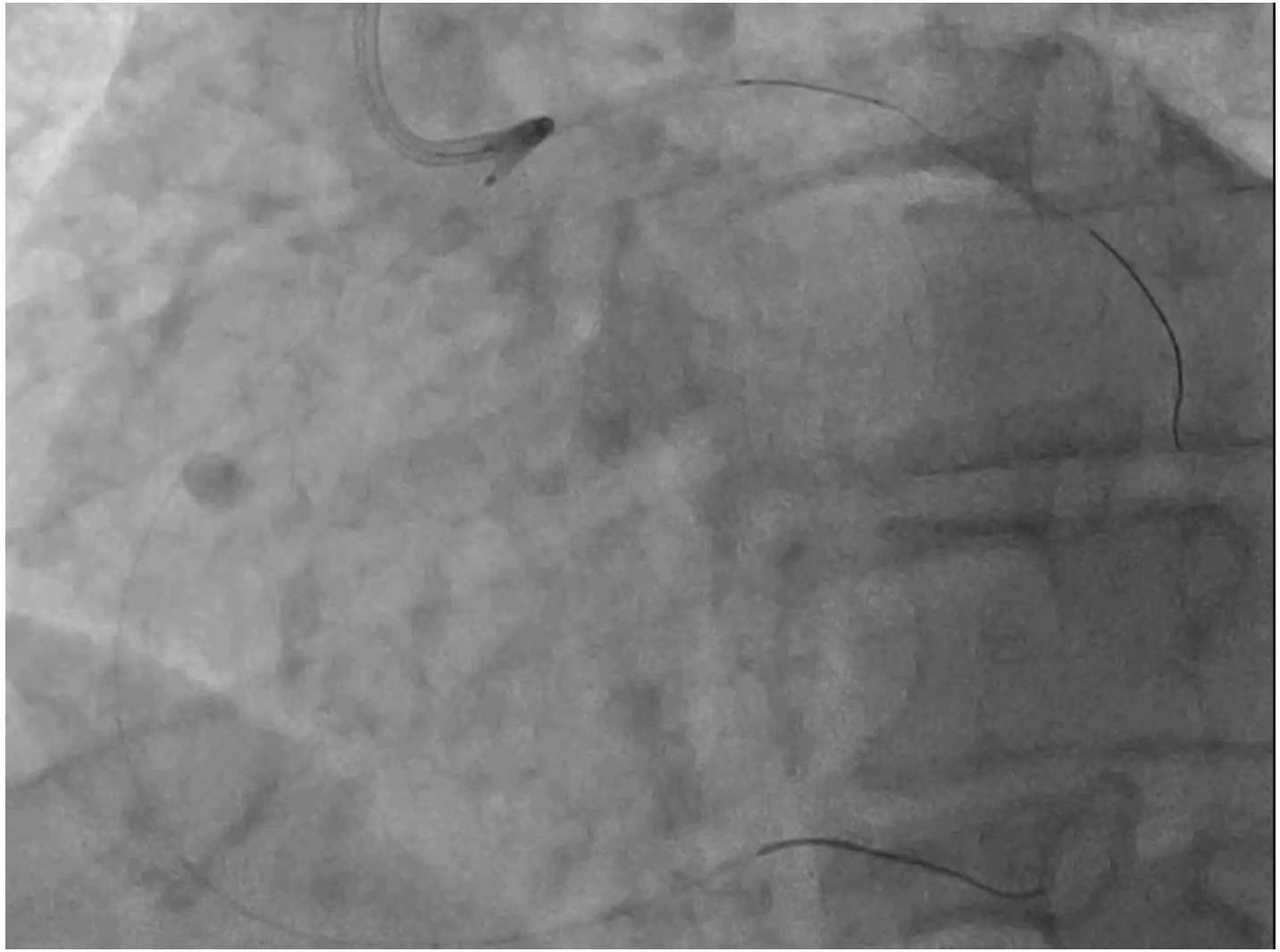


Angio

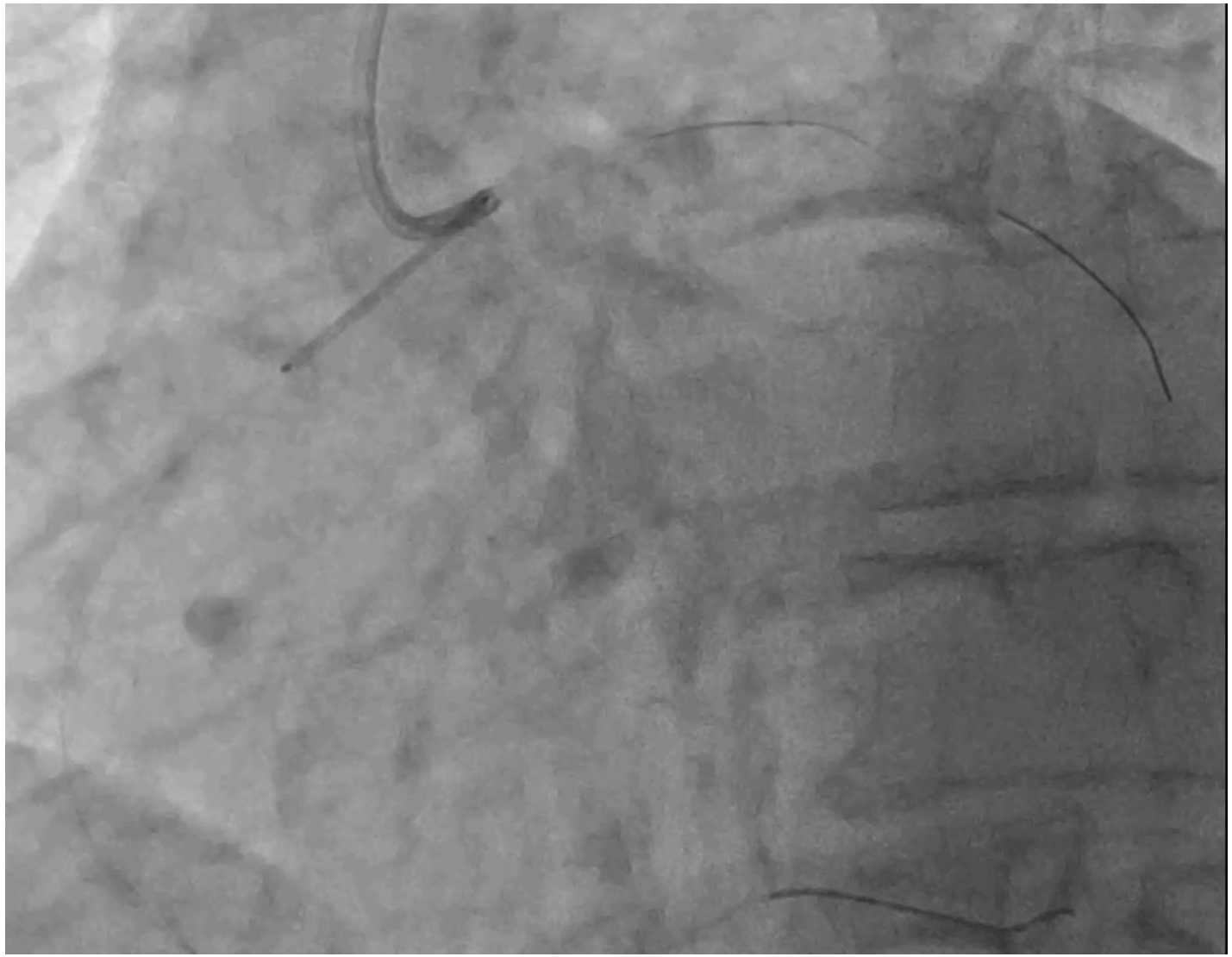
Angio



Stenting

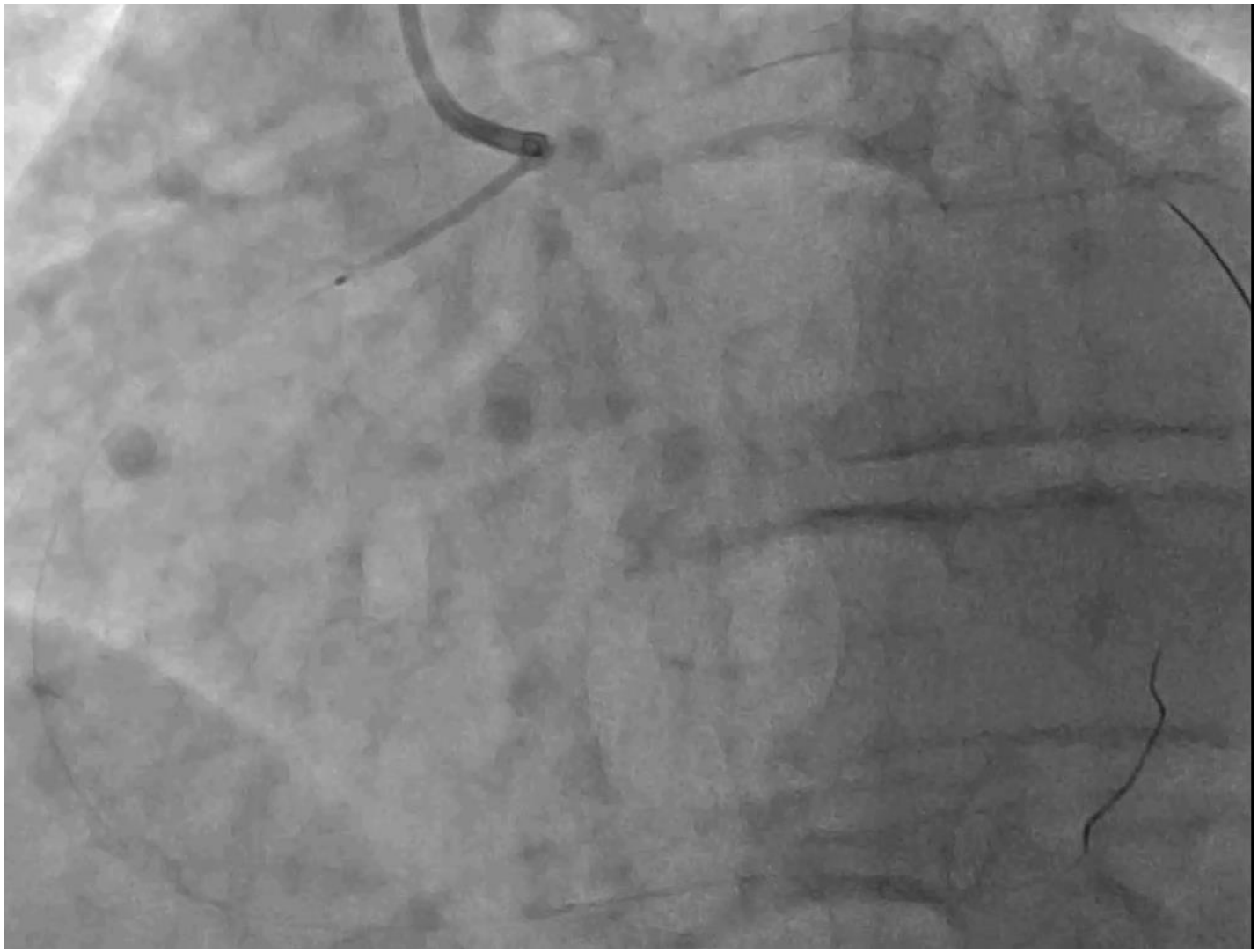


Stenting

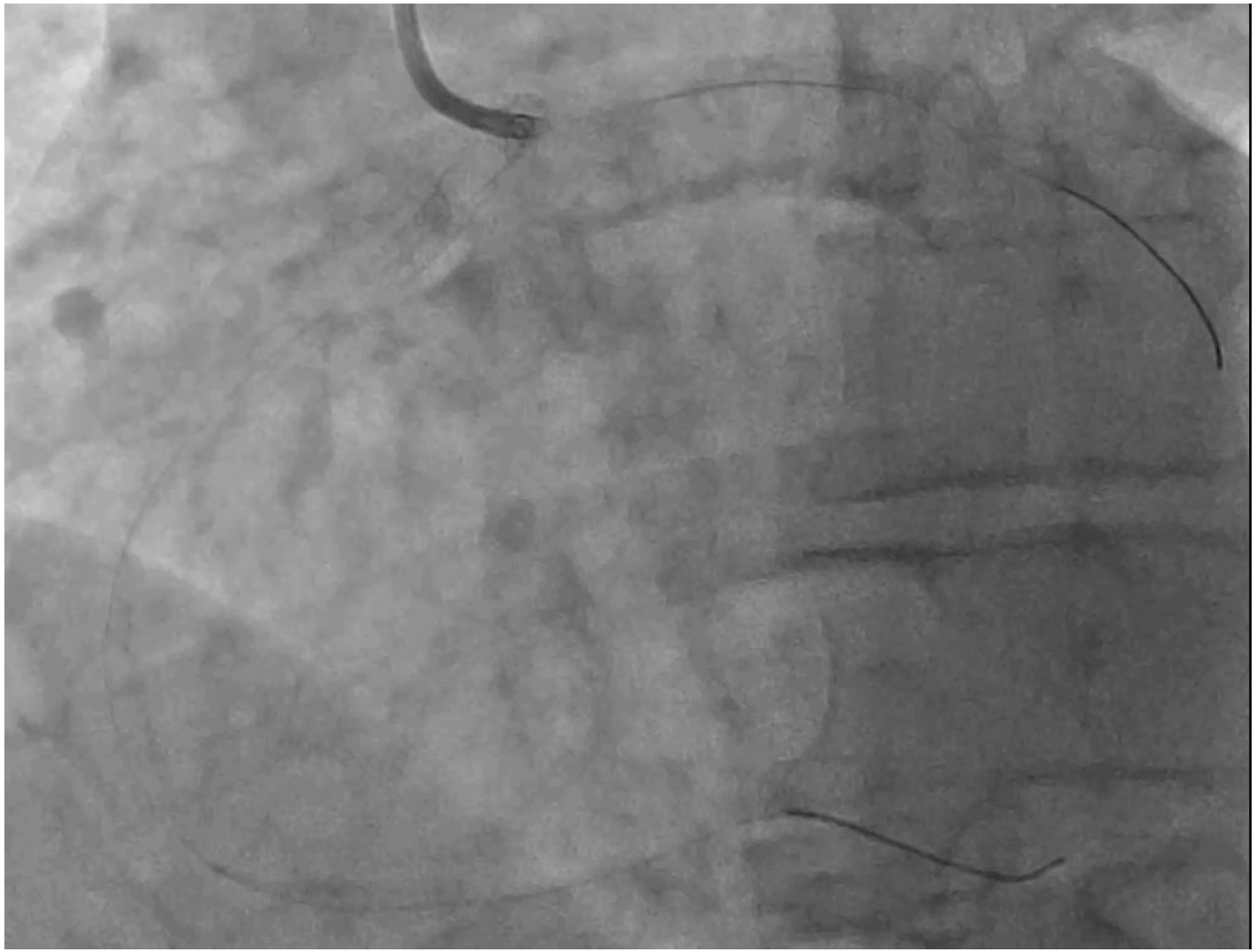


Stenting

Stenting



Control

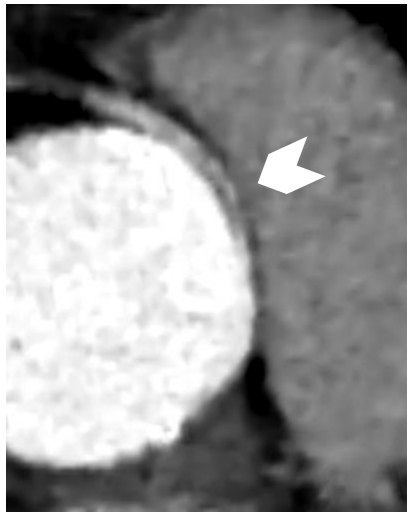


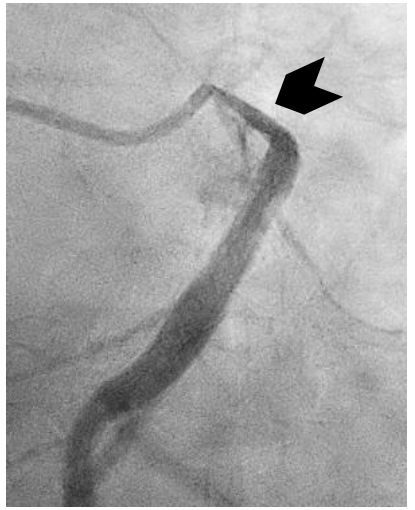
Control

12-month follow-up CT angiography

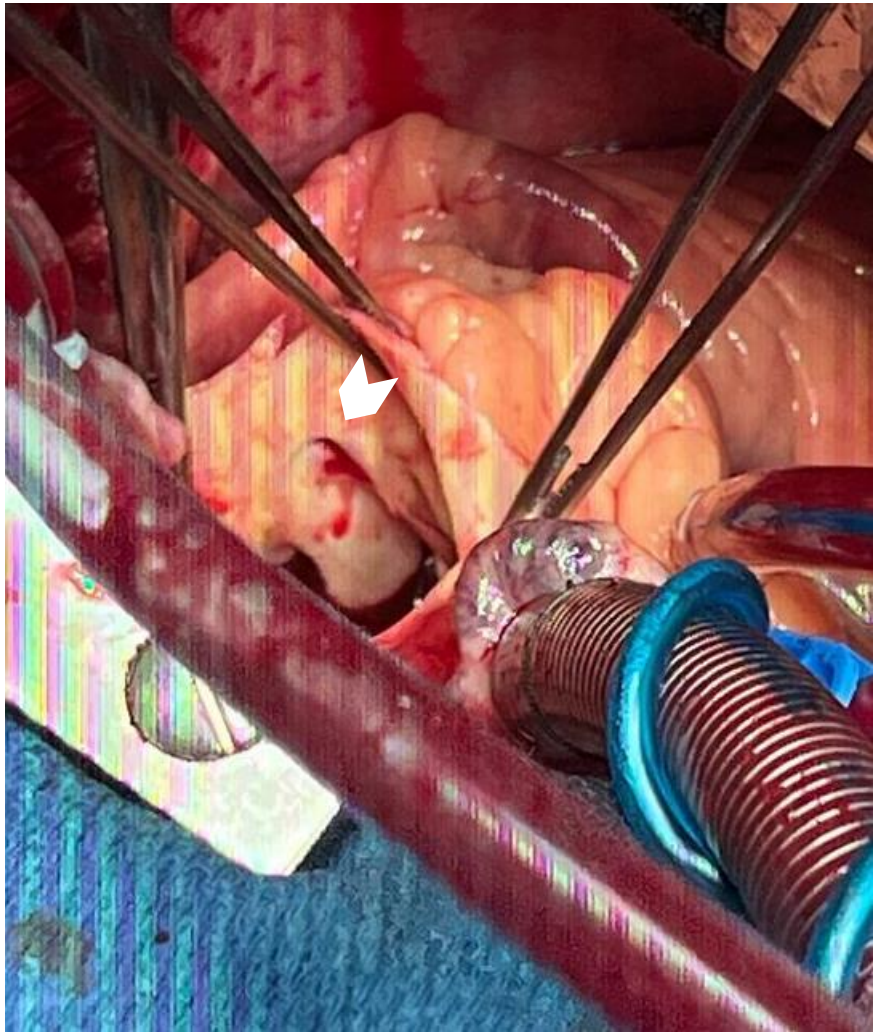
ANOCOR STENTING Registry
Surgical failure

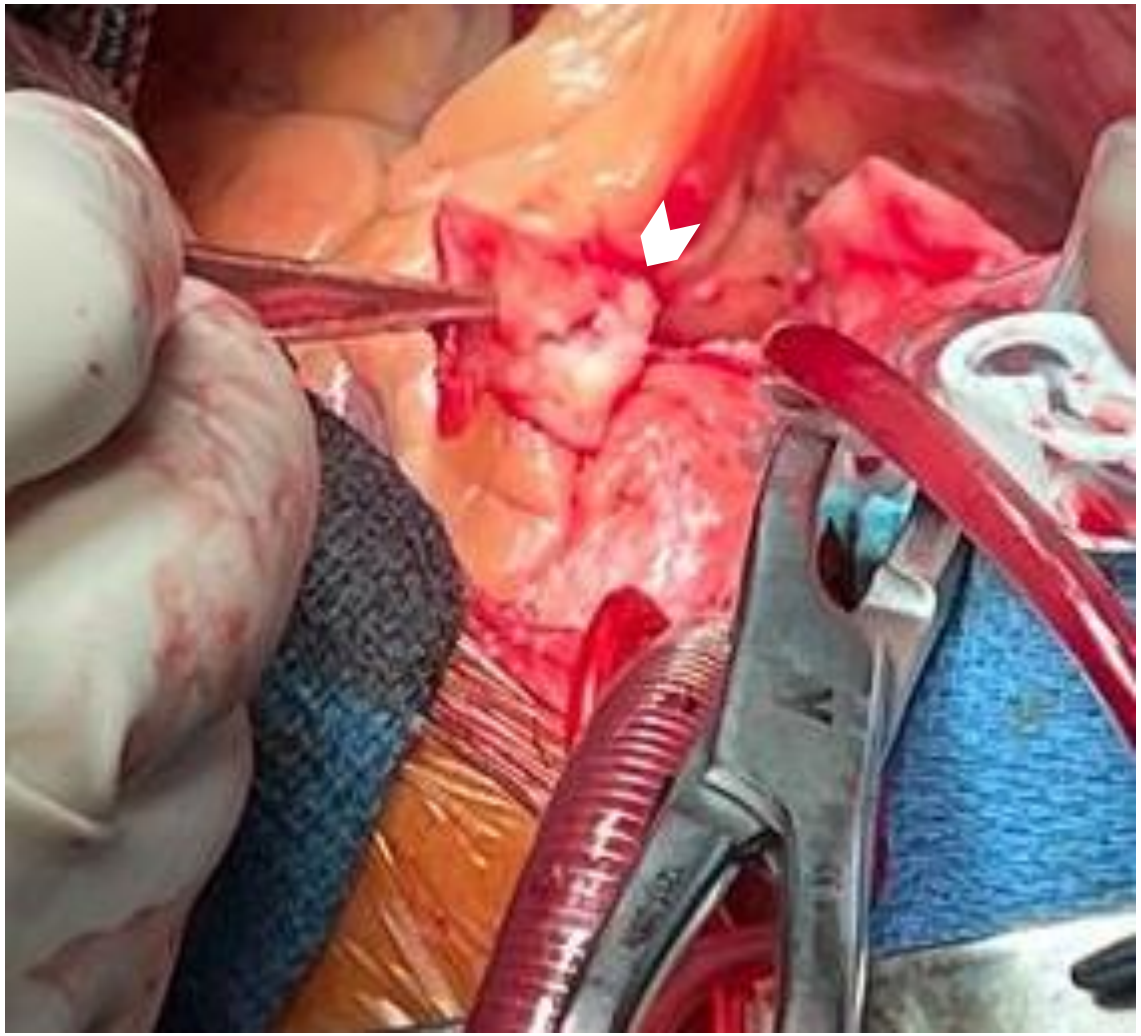
- 59-year-old woman
- NSTEMI with troponin elevation
- Thoracic aortic aneurysm: 55 mm
- CT angiography/Coronary angiography: Interarterial R-AAOCA
- Cardiac MRI: Inferior late gadolinium enhancement
- Strategy: aortic synthetic graft/coronary reimplantation/AVR



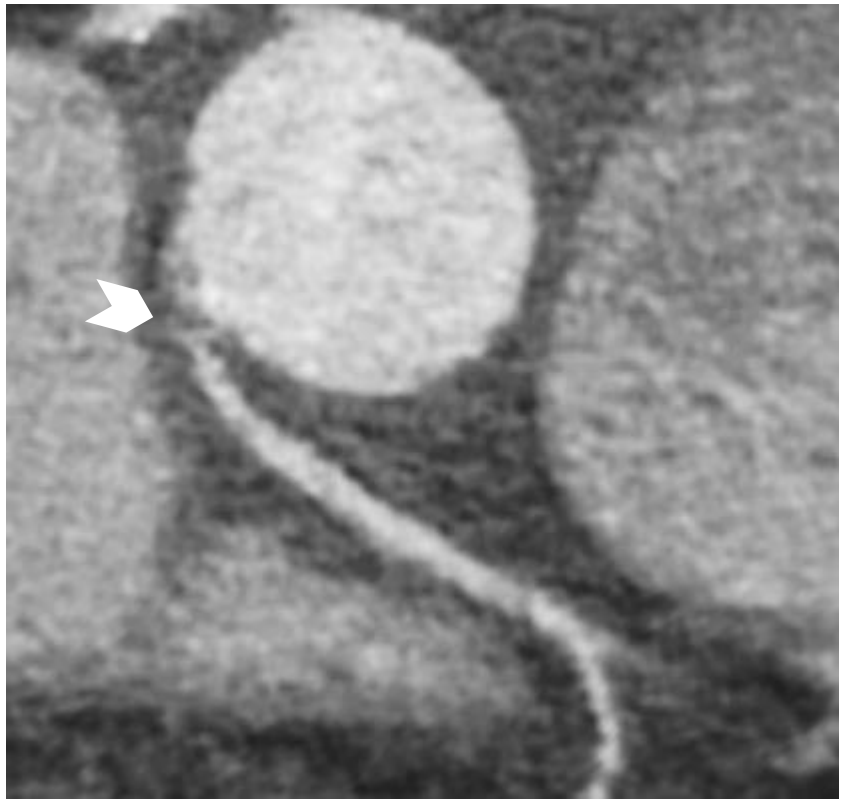


Intervention

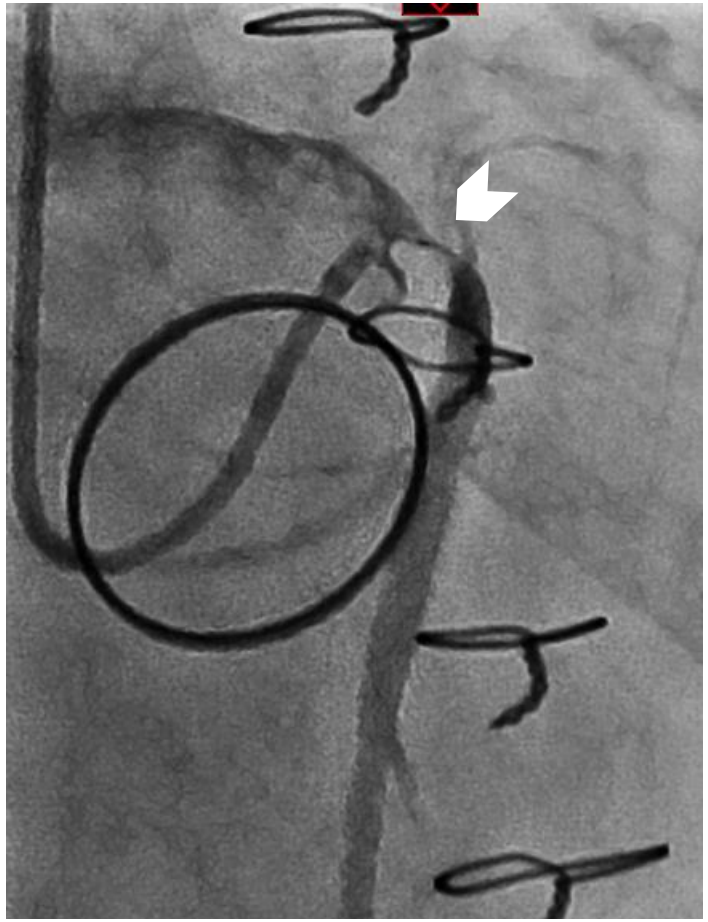


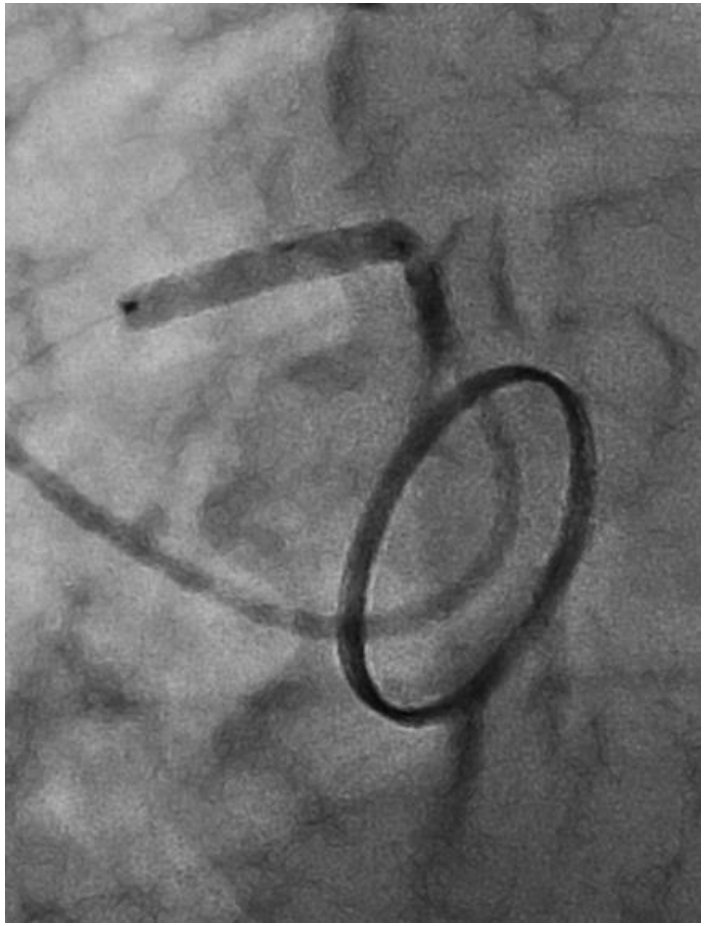


Postoperative coronary CT angiography

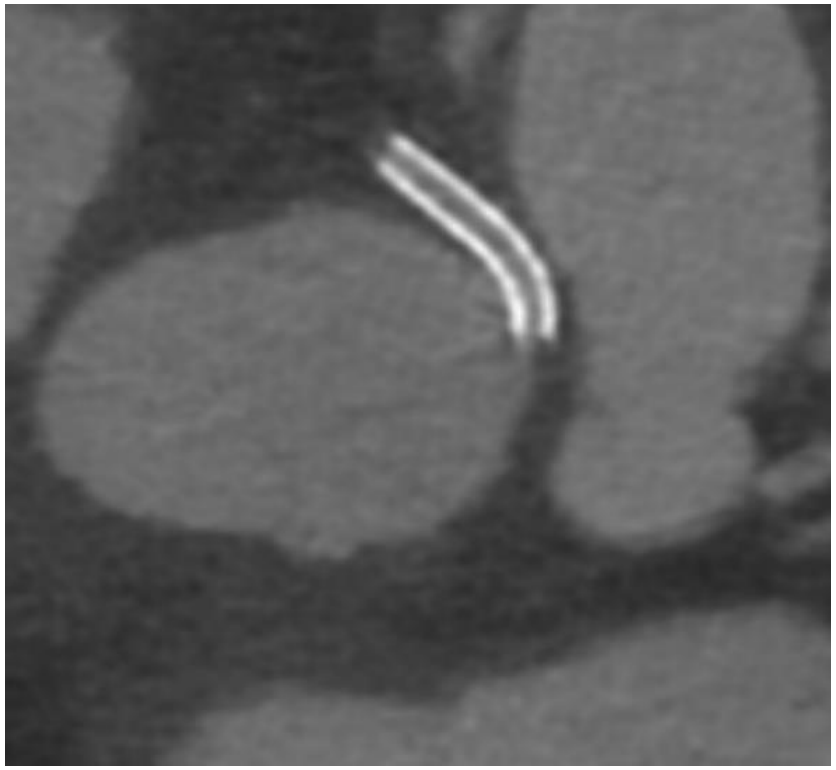


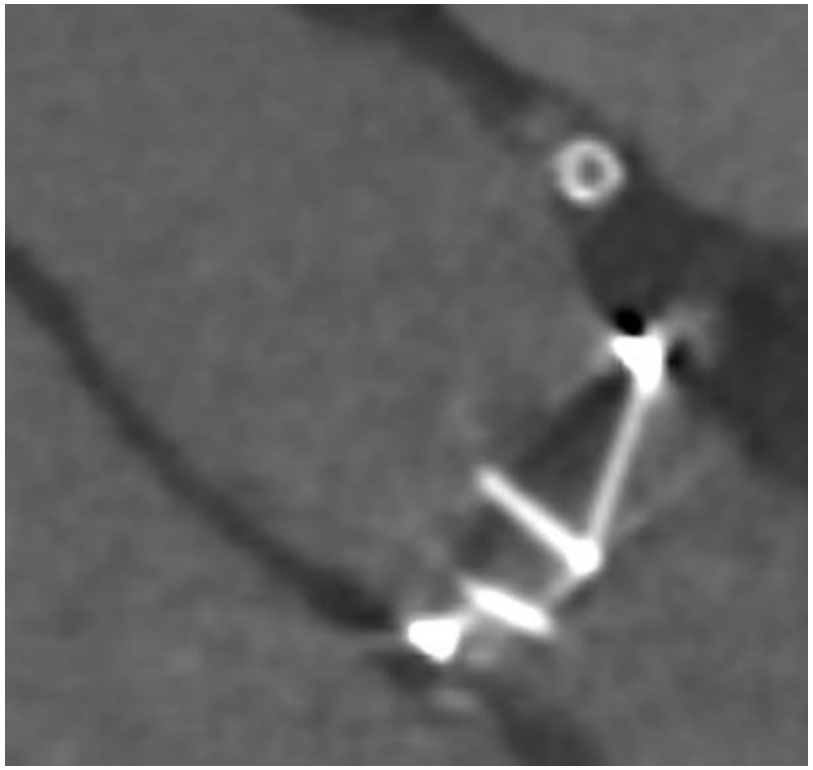
Stenting of AAOCA





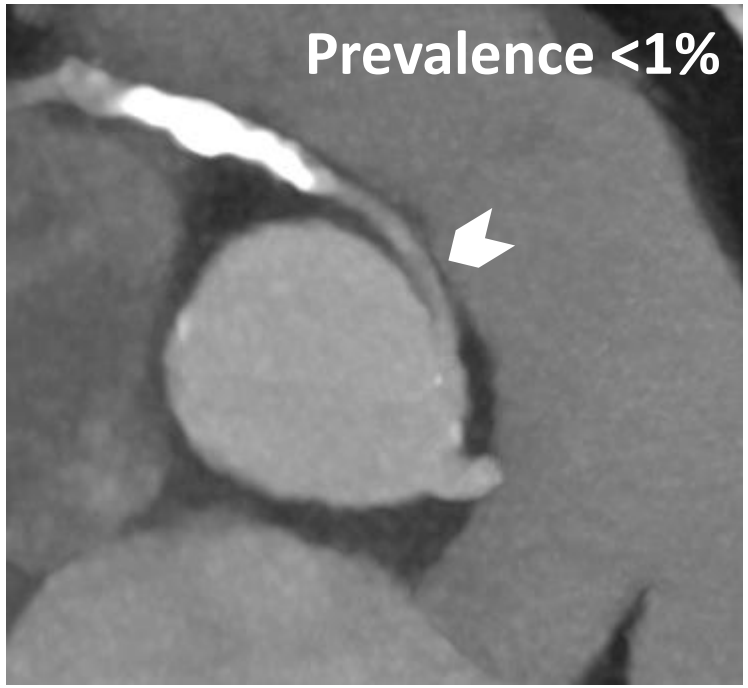
Post-PCI coronary CT angiography





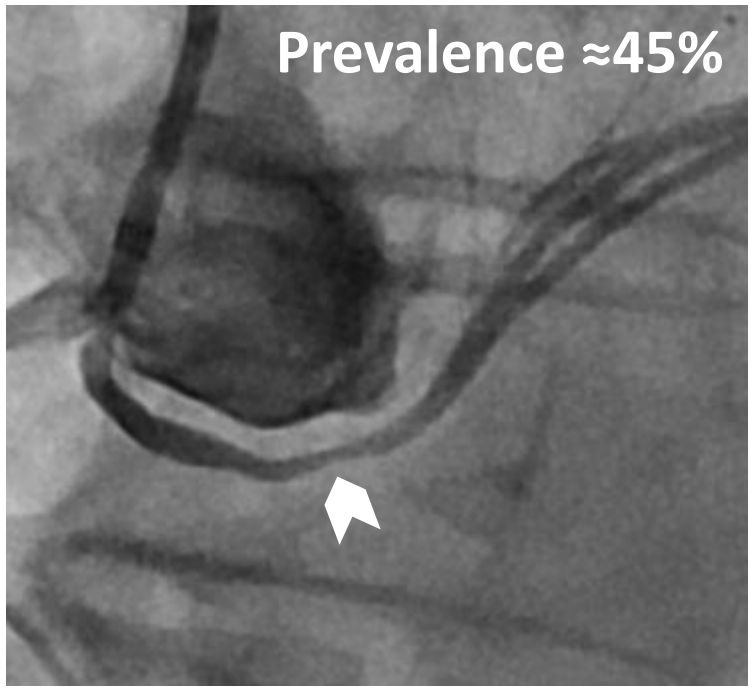
Prevalence and location of CAD in AAOCA

Right coronary artery



Interarterial course

Circumflex artery



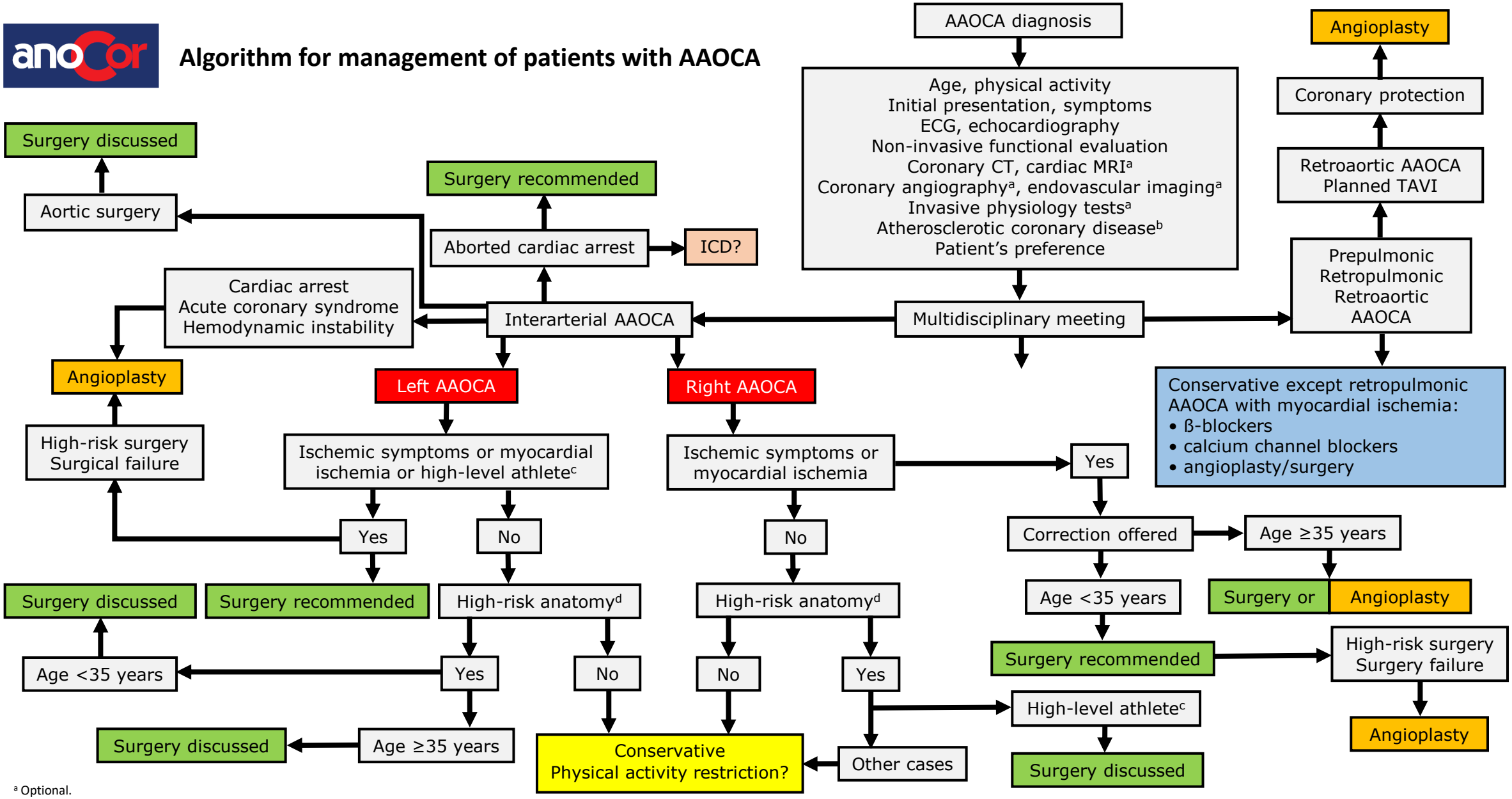
Retroaortic course

Atheroma disease

- Medical
- Stenting
- Surgery

Zendjebil S et al. Cor Art Dis. 2024.

Algorithm for management of patients with AAOCA



[a] Optional.
[b] Surgical technique adapted.
[c] Physical activity according to ESC guidelines.
[d] Takeoff angle ≤35°, slit-like ostium, diameter reduction ≥50%, or intramural aortic passage.

AAOCA : Anomalous aortic origin of a coronary artery. ANOCOR : Anomalies coronaires congénitales. CT: Computed tomography. ECG : Electrocardiogram. ICD: Implantable cardioverter-defibrillator. MRI: Magnetic resonance imaging. TAVI: transcatheter aortic valve implantation.

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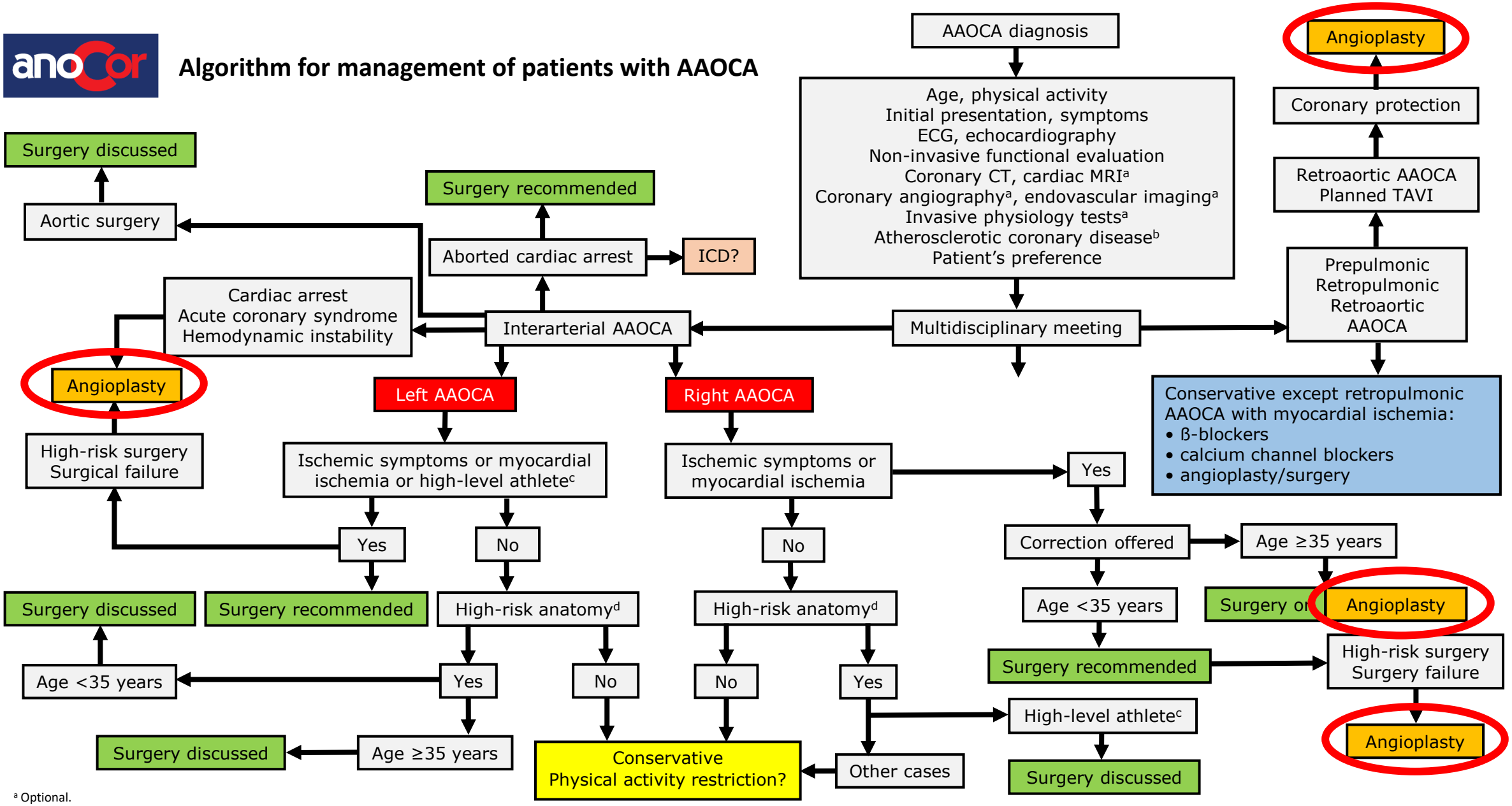

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Journal of the Society for Cardiovascular Angiography & Interventions 2 (2023) 100595

JSCAI

The official journal of the Society for Cardiovascular Angiography & Interventions

Comprehensive Review

Stent Angioplasty in Coronary Artery Anomalies With Intramural Course: When, Why, How, With What Results?

Paolo Angelini, MD *, Carlo Uribe, MD

The Texas Heart Institute Center for Cardiovascular Care, Houston, Texas

ICR3
Interventional Cardiology: Reviews, Research, Resources

EDITORIAL

Coronary

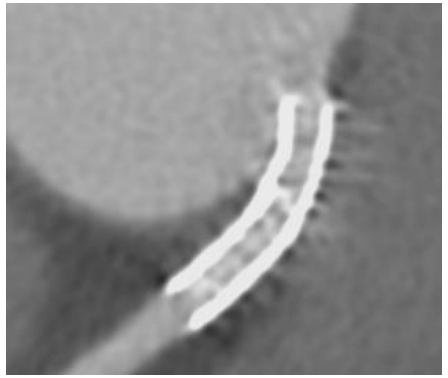
Percutaneous Coronary Intervention in Anomalous Right Coronary Artery: Ready to Implement in Clinical Routine?

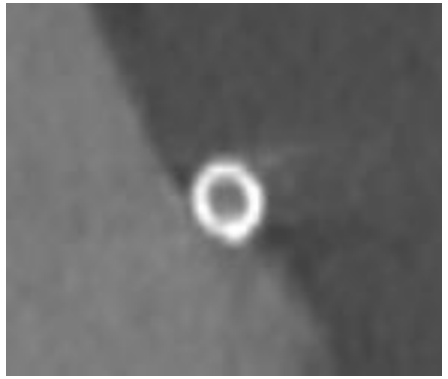
Anselm W Stark and Christoph Gräni

Department of Cardiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

Interventional Cardiology 2022;17:e15.

Nowadays, stenting in AAOCA in selected population should no longer be viewed with apprehension.





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Anomalies Coronaires Congénitales

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Groupe multidisciplinaire ANOCOR

Anomalies Coronaires Congénitales

Ce site est destiné aux professionnels de santé et aux patients, ainsi qu'à leur entourage, souhaitant obtenir des informations sur les Anomalies Coronaires Congénitales (ANOCOR). Les formes anatomiques sont très nombreuses, allant de la banale anomalie sans conséquence clinique aux anomalies pouvant être responsables de symptômes cardiaques graves dont l'arrêt cardiaque. Même si les techniques d'imagerie, surtout radiologiques, permettent le diagnostic de ces anomalies rares, leur compréhension reste incomplète et leur prise en charge n'est pas encore parfaitement codifiée. Le site ANOCOR a pour objectifs d'aider les professionnels de santé dans leur démarche de recherche et de transmettre aux patients nos connaissances actuelles. Bonne navigation.