ANOmalous connections of the **COR**onary arteries: place of PCI

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anoCor

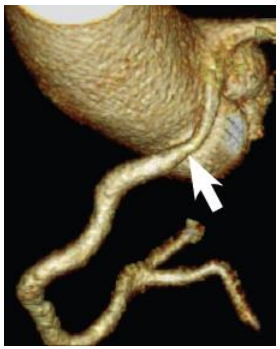
Conflict of interest: nothing to report

Anomalous connections of the coronary arteries

Global prevalence with cardiovascular imaging

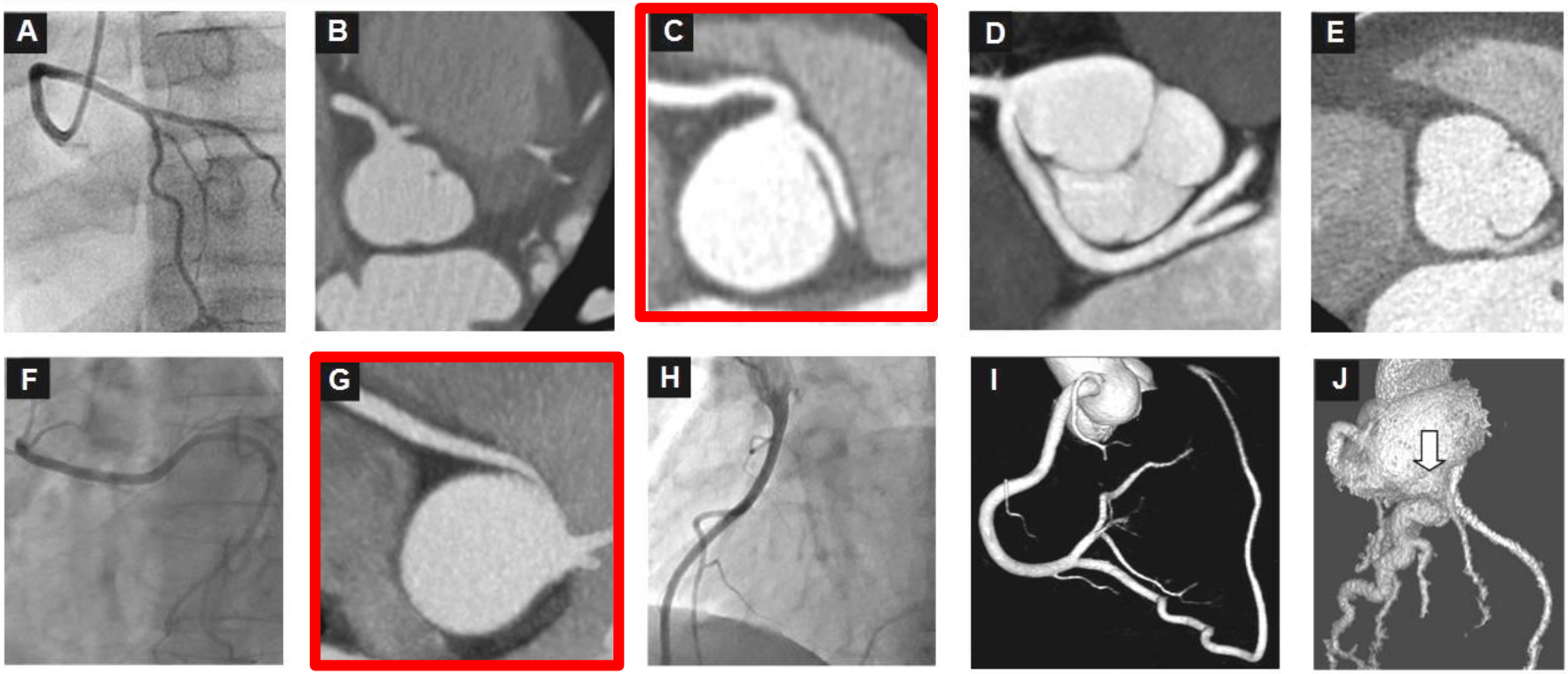
- Echocardiography 0.2%

- Selective angiography 0.8%

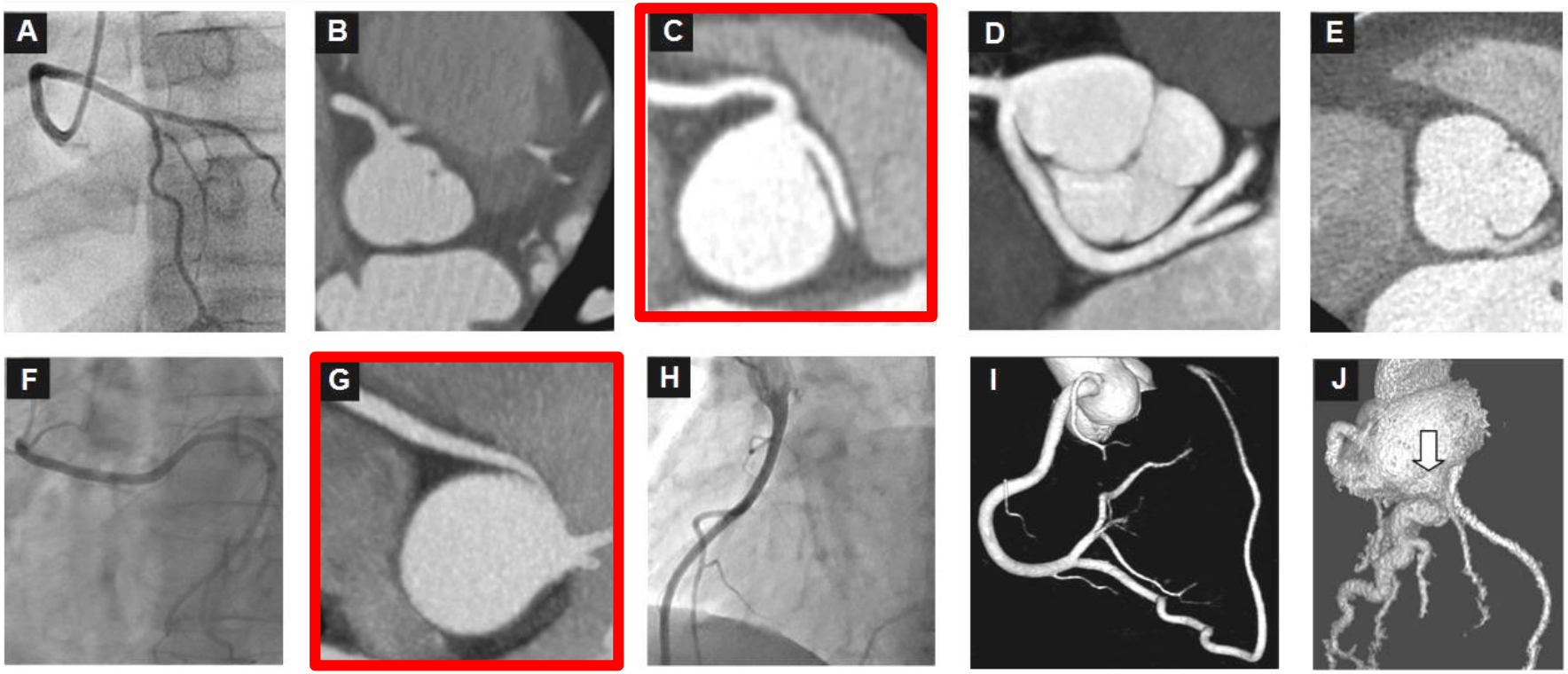


- CT scan 1.2%

Wide spectrum of anomalous connections

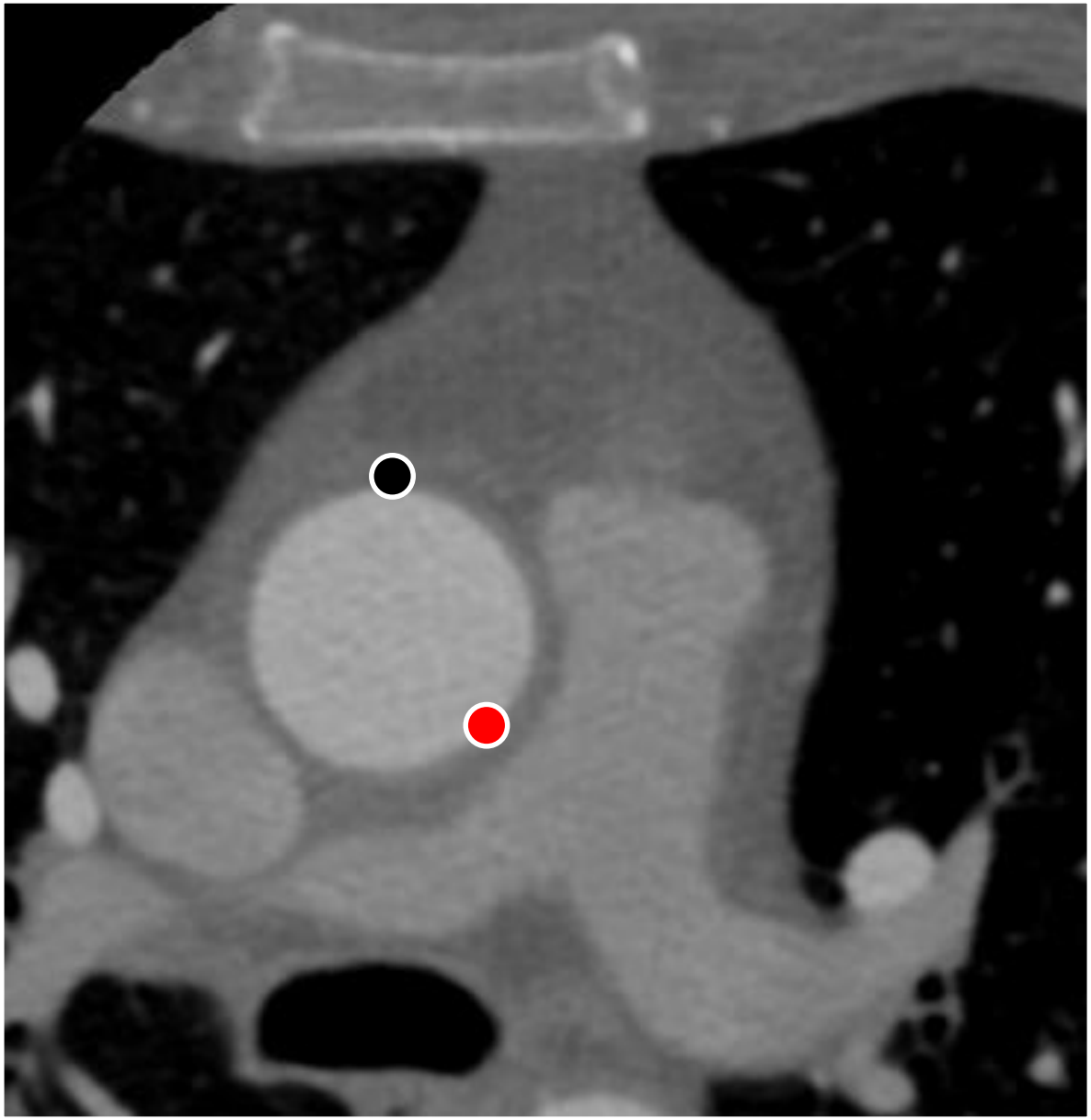


Wide spectrum of anomalous connections

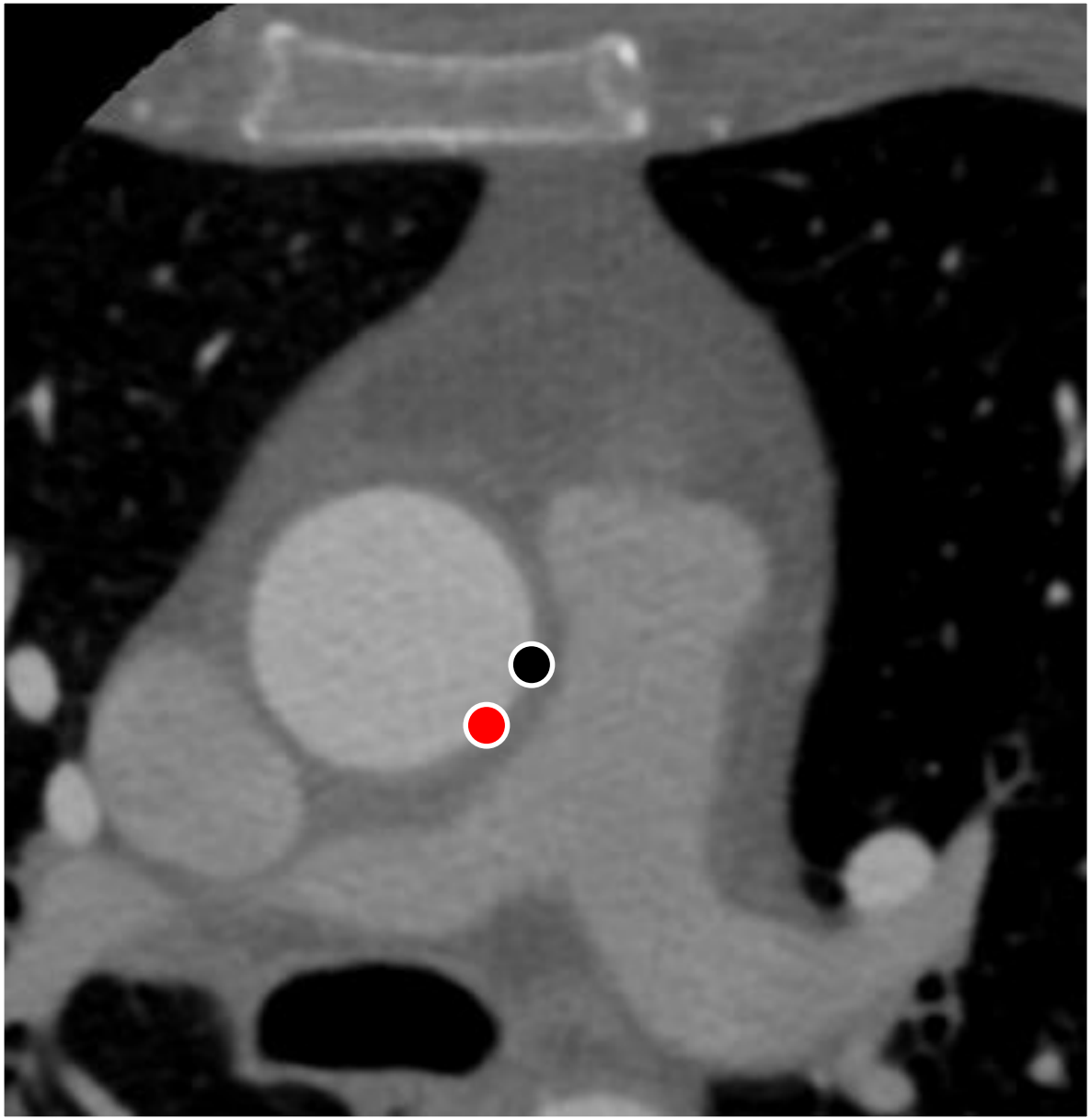


≈ 3/1000 in general population

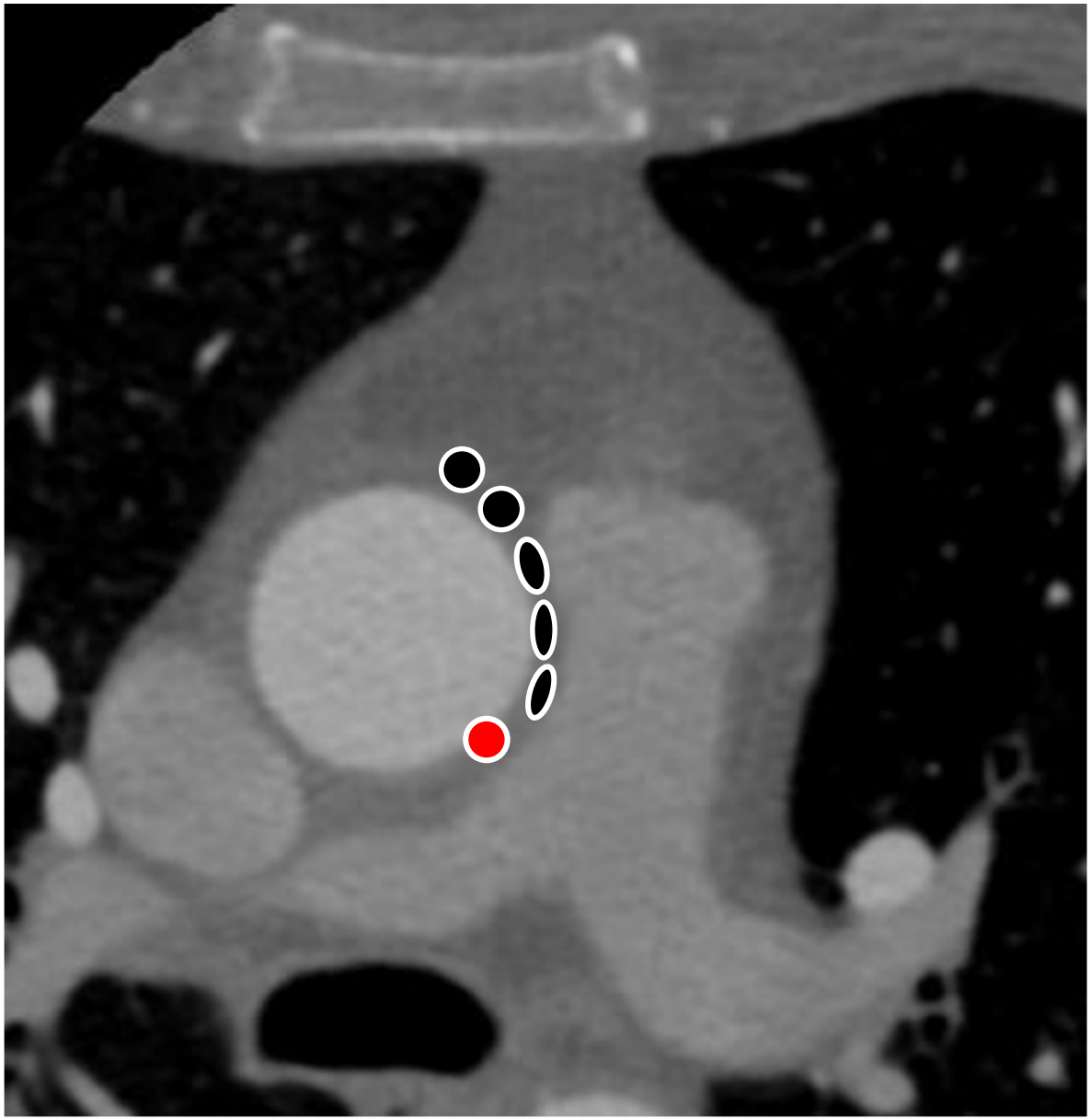
normal coronary connection

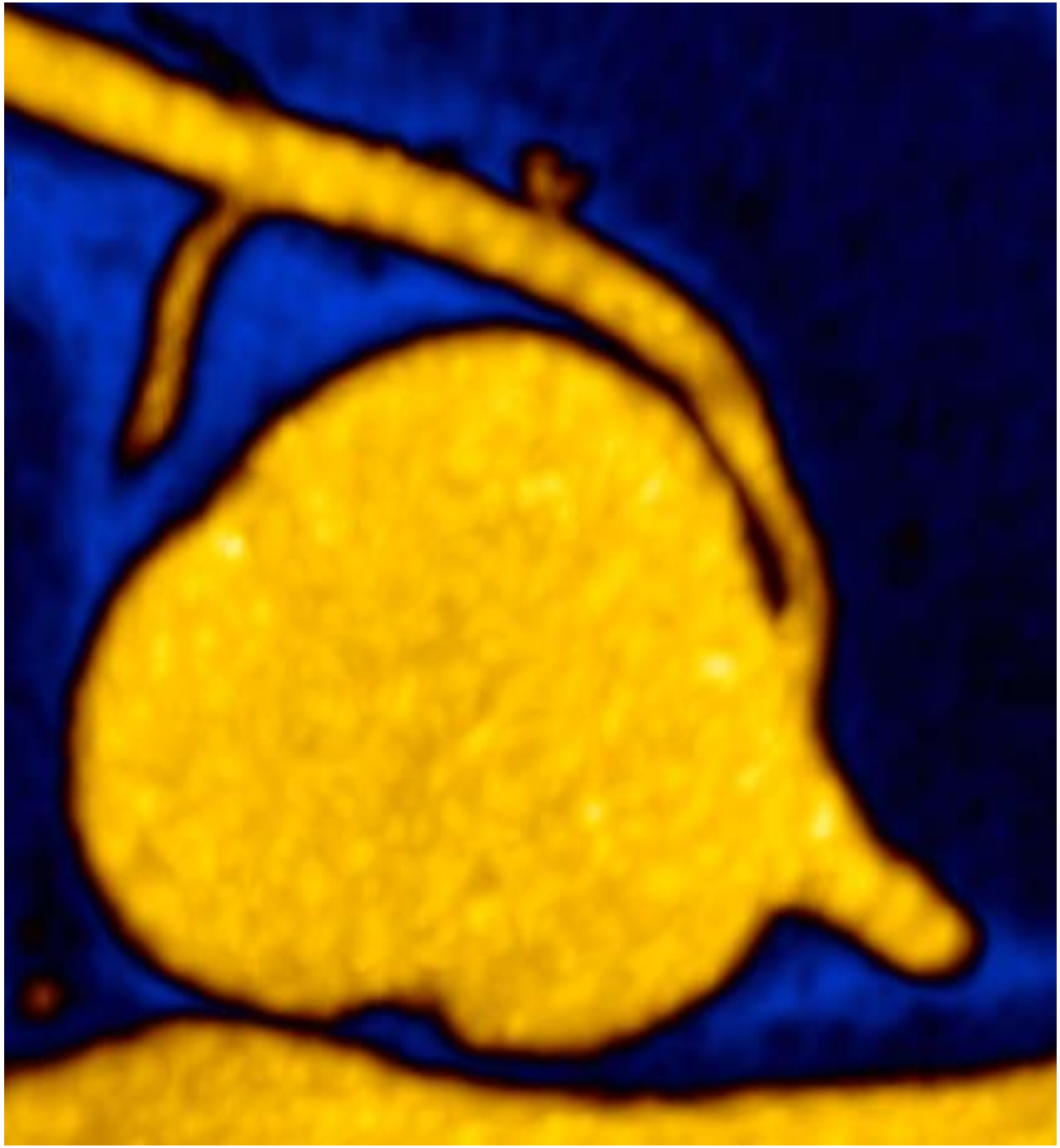


anomalous coronary connection



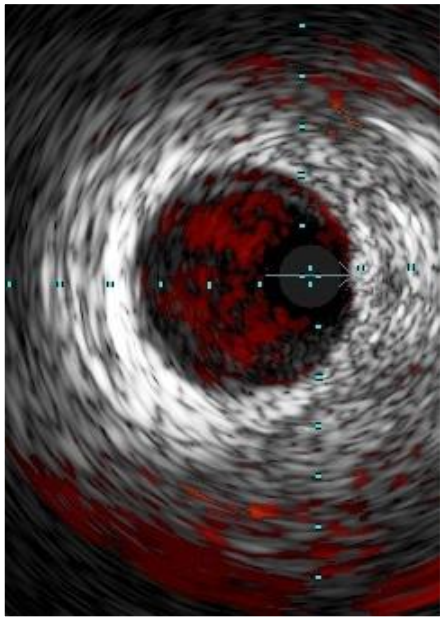
anomalous coronary connection



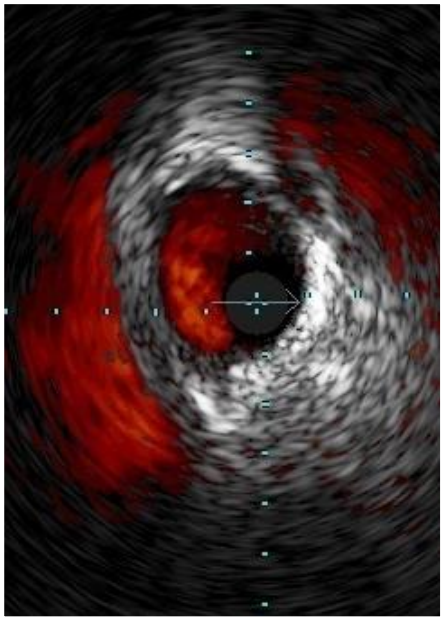


anomalous coronary connection (IVUS)

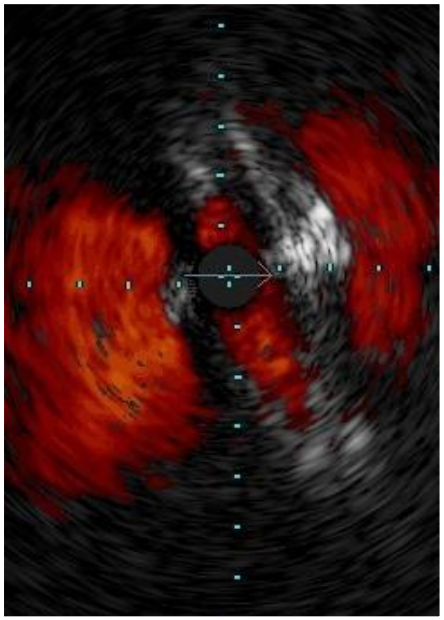
extramural



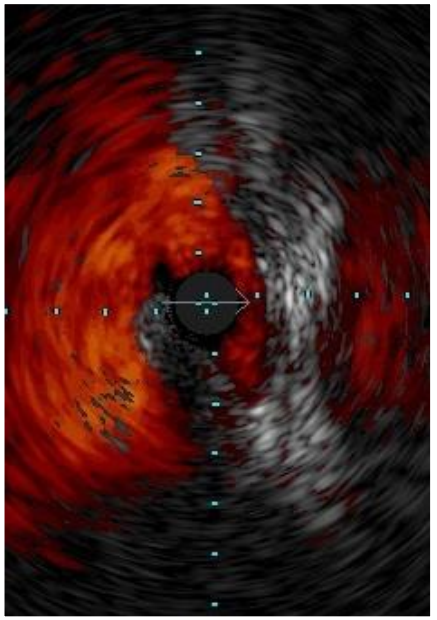
juxtamural



intramural



ostium



anomalous connections with interarterial course

- Not rare congenital anomaly
- Intramural pathway in most of cases
- Low risk of sudden death in young people
- Possible ischemia/symptoms in adults
- Management remains debated

ANOCOR Registry

TABLE 1 Demographic and angiographic characteristics of the ANOCOR cohort

Parameters	
Number of subjects, n	472
Mean age, y (SD)	63 (13)
Gender male, %	76.2
Invasive CA alone, n (%)	297 (62.9)
Computed tomography CA alone, n (%)	20 (4.3)
Invasive + computed tomography CA, n (%)	155 (32.8)
Total number of anomalous connections	496
Type of artery	
Left main, n (%)	60 (12.1)
Left anterior descending, n (%)	27 (5.4)
Circumflex, n (%)	235 (47.4)
Right, n (%)	165 (33.3)
Other, n (%)	9 (1.8)

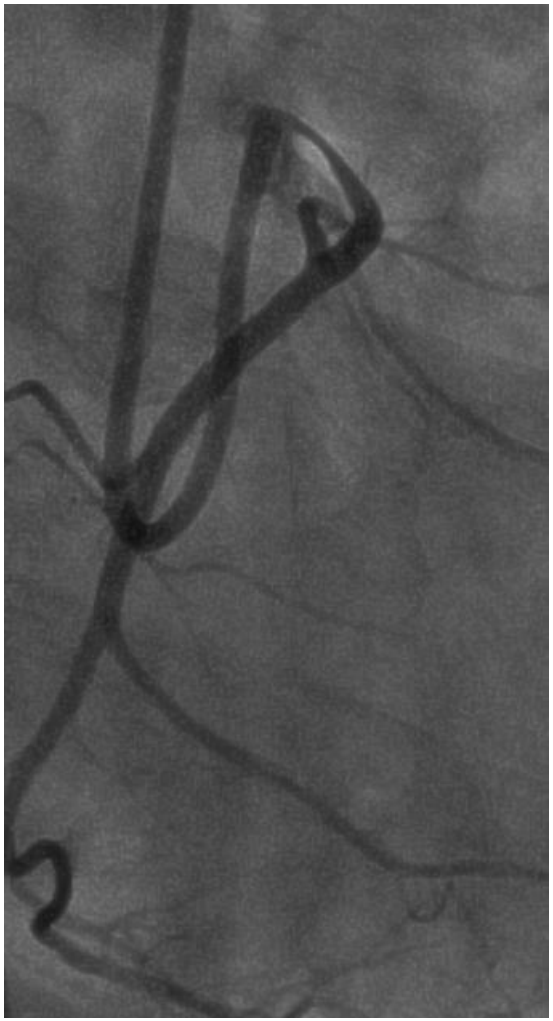
Koutsoukis A. Congenit Heart Dis 2017

anomalous connection of the coronary arteries

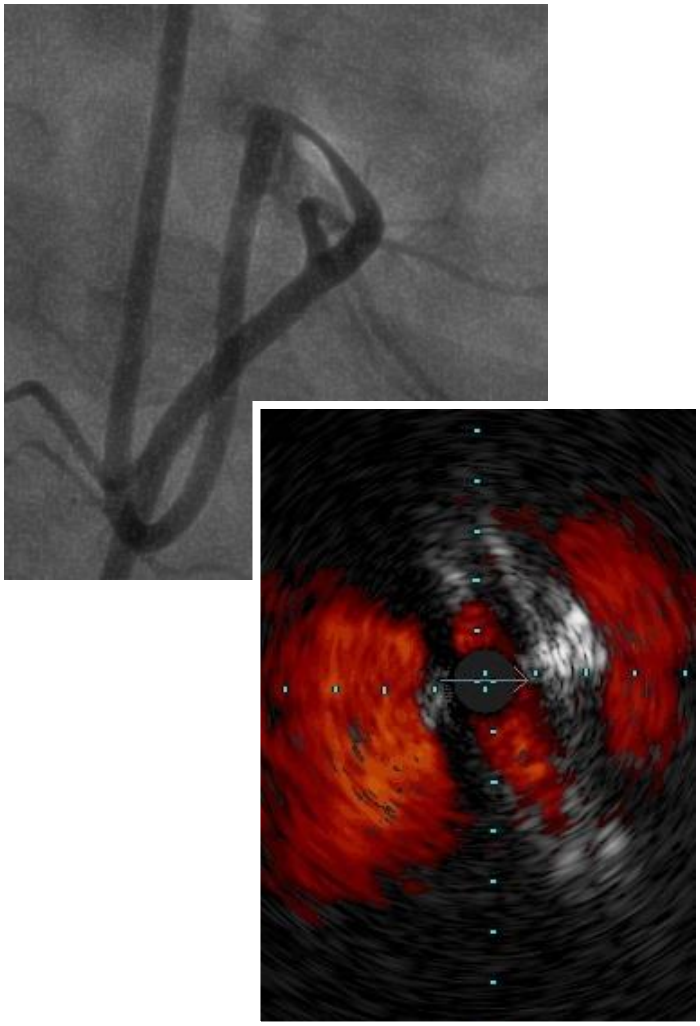
ISCHEMIA/SYMPTOMS

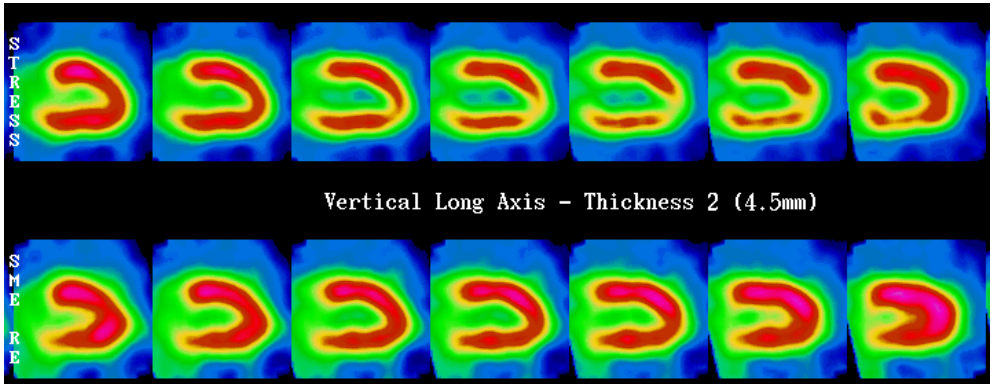
possible in patients >35 year-old

anomalous connection of the RCA with interarterial course



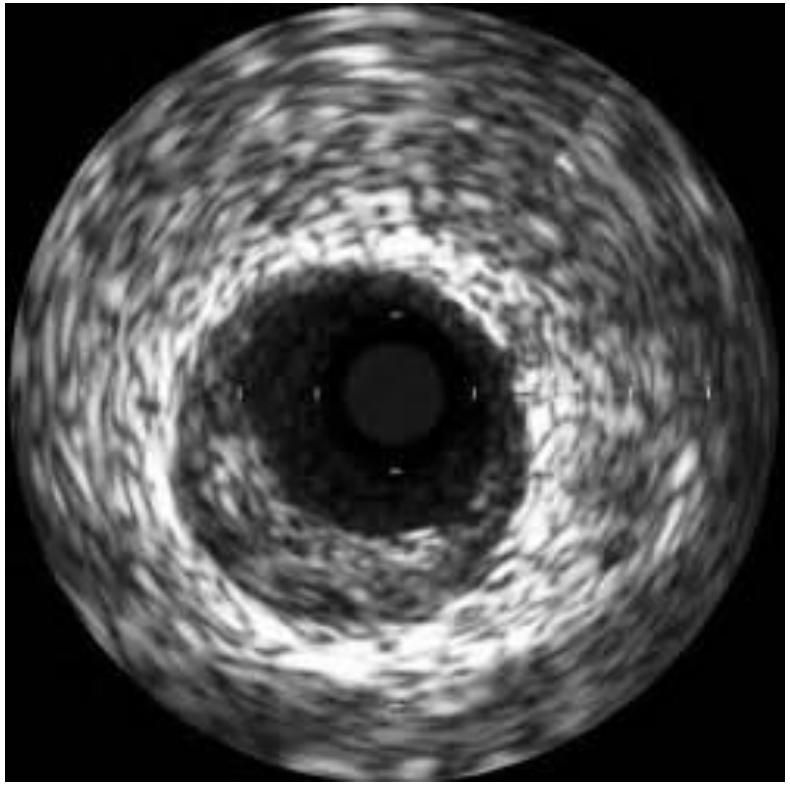
anomalous connection of the RCA with interarterial course



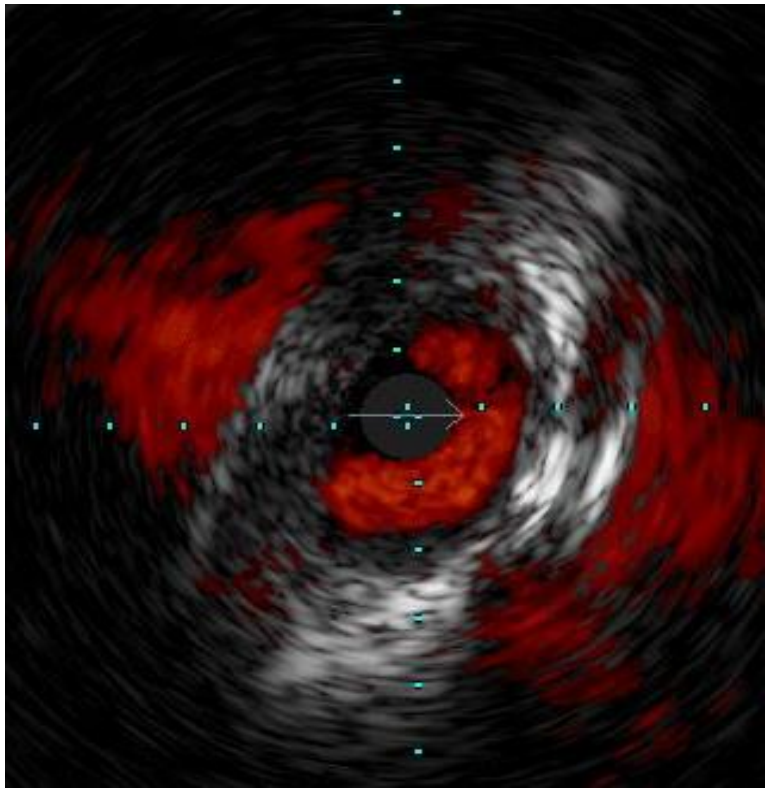


mechanism(s) of myocardial ischemia

CAD



R-ACAOS



ACC/AHA 2008 Guidelines for the Management of Adults With Congenital Heart Disease

8.5. Recommendations for Congenital Coronary Anomalies of Ectopic Arterial Origin

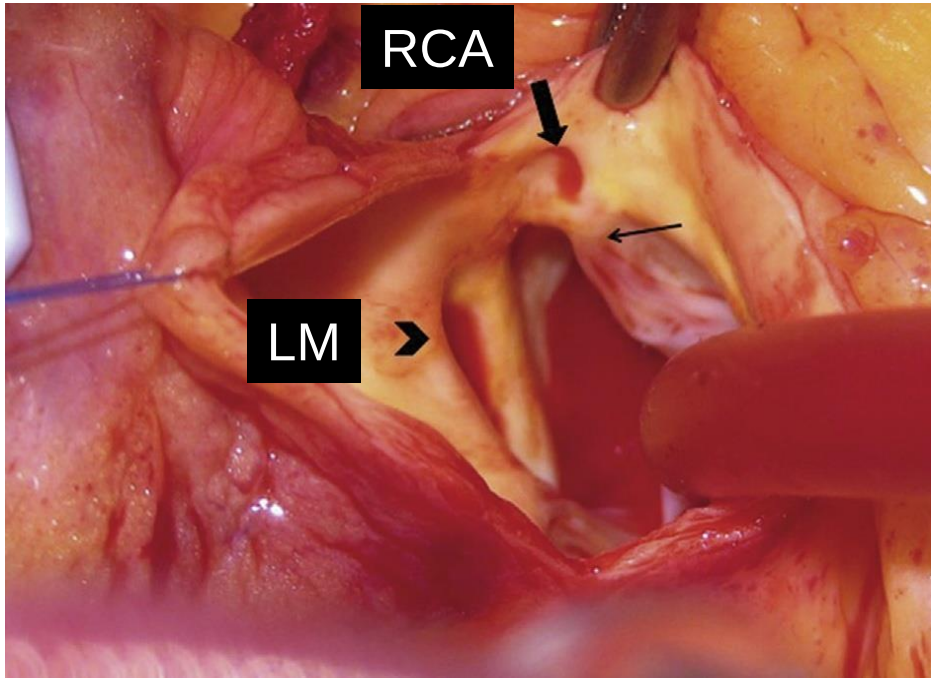
CLASS I

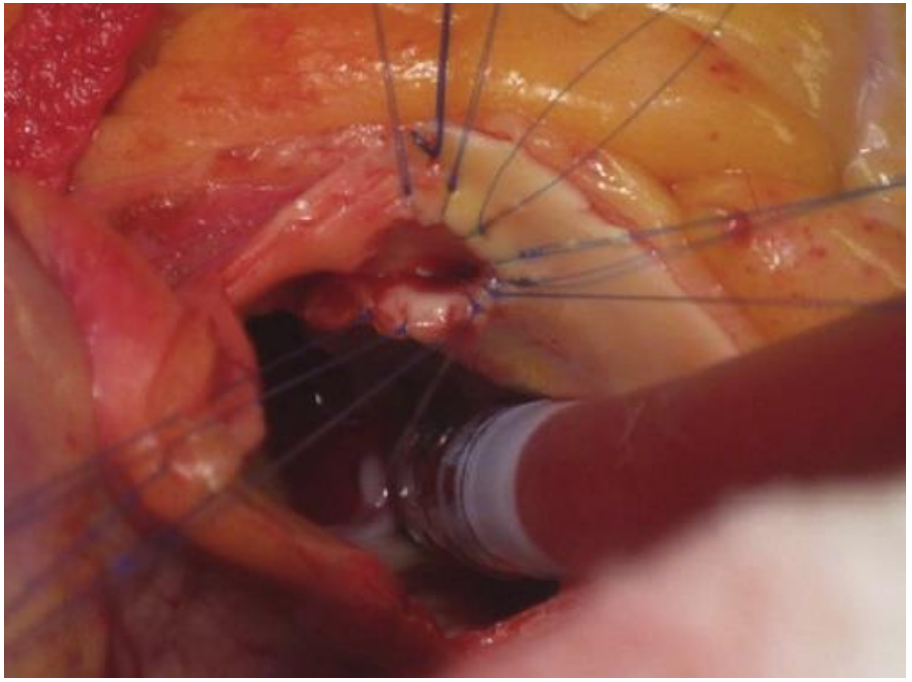
Circulation December 2, 2008

3. Surgical coronary revascularization should be performed in patients with any of the following indications:
   a. Anomalous left main coronary artery coursing between the aorta and pulmonary artery. (*Level of Evidence: B*)
   b. Documented coronary ischemia due to coronary compression (when coursing between the great arteries or in intramural fashion). (*Level of Evidence: B*)
   c. Anomalous origin of the right coronary artery between aorta and pulmonary artery with evidence of ischemia. (*Level of Evidence: B*)

anomalous connection of the RCA with interarterial course

Unroofing with creation of neo-ostium





Feins EN et al. Ann Thorac Surg 2016

Weaknesses of surgical repair

- Guidelines focused on young people
- No randomized controlled studies
- Lack of long-term data after correction
- Effects on sudden death risk?
- Possible failure (stenosis/aneurysm/thrombosis)

PCI in surgically treated patients

- Necker hospital
- 31 patients between 2005 and 2017
- Mean age 14 years (4-66)
- 9 ALCA and 22 ARCA
- Coronary reimplantation/ostioplasty
- No death
- 3 post-operative PCI
  - 2 for acute ischemia
  - 1 for late ischemia

By courtesy of Gaillard Maïra, 2017

http://dx.doi.org/10.1016/j.jtcvs.2016.06.066

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**.

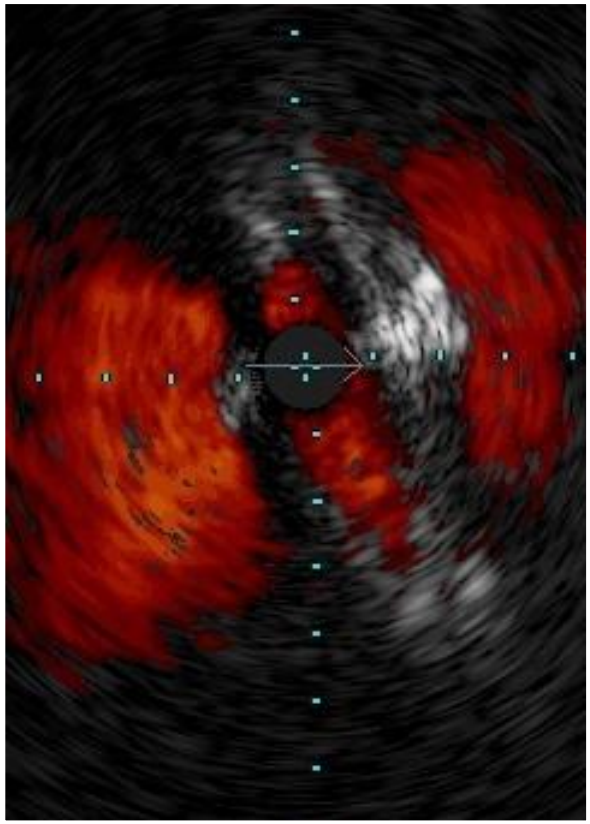
J Thorac Cardiovasc Surg 2017;153:1440-57

Rationale for PCI in AAOCA

- Guidelines focused on young people
- No randomized controlled studies
- Lack of long-term data after surgical correction
- Effects on sudden death risk
- Possible failure (stenosis/aneurysm/thrombosis) after surgery
- Population with lower risk of sudden death (>30 year-old)
- Population with ischemic chest pain (>50 year-old)

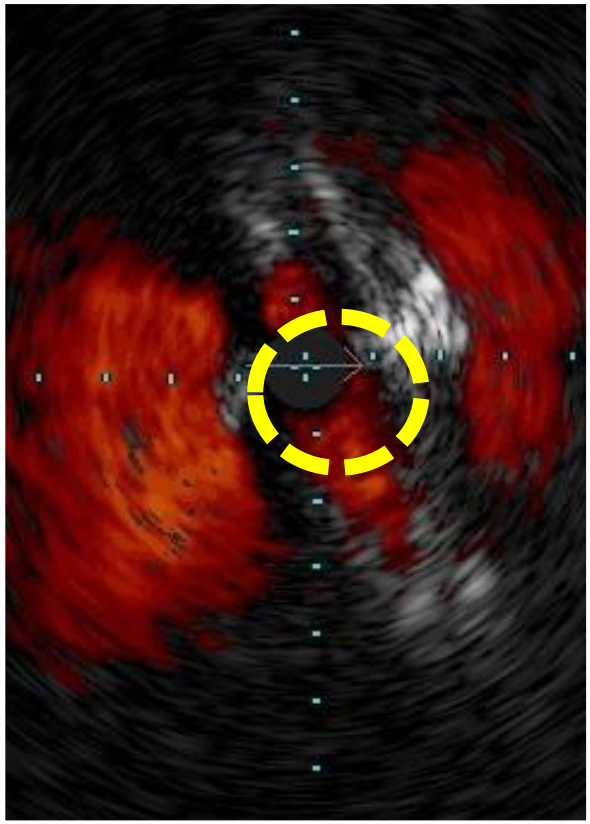
anomalous connections of the coronary arteries

stenting of intramural pathway



anomalous connections of the coronary arteries

stenting of intramural pathway



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

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

Doorey et al. Am J Cardiol 2000

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

Paolo Angelini,[1,2*] MD, Carlo Uribe,[2] MD, Jorge Monge,[2] MD, Jonathan M. Tobis,[3] MD, MacArthur A. Elayda,[4] MD, PhD, and James T. Willerson,[1] MD

- 42 patients with ARCA and interarterial intramural 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 DES
- Improved symptoms at one-year follow-up (30 patients)
- 13% restenosis rate at 5-year follow-up
- No AAOCA-related deaths during follow-up

Angelini et al. Cathet Cardio Interv 2015

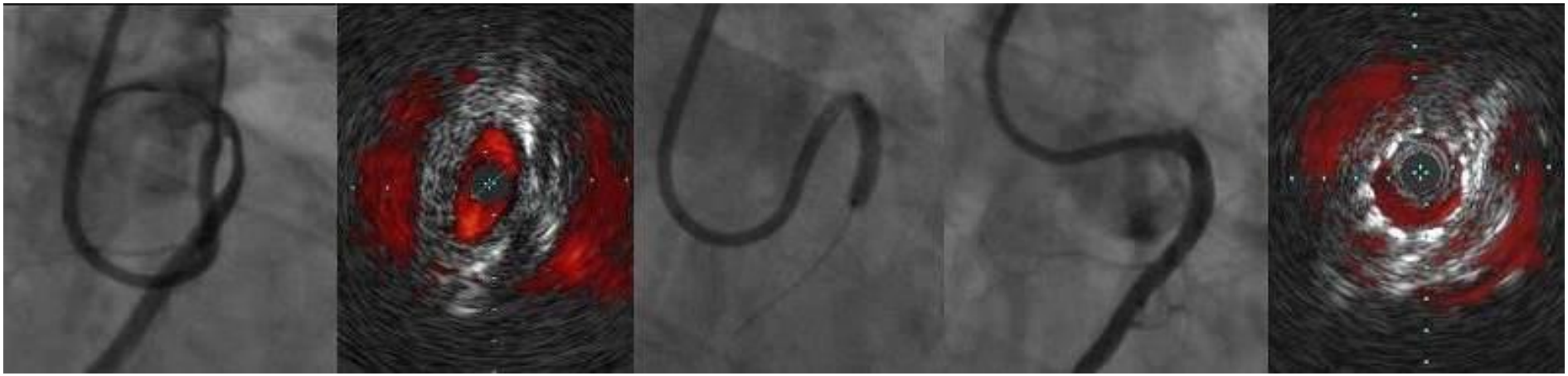
ANOCOR stenting registry

- ARCA with interarterial course
- Age >30 year-old
- No history of aborten sudden death
- Angina and/or documented ischemia

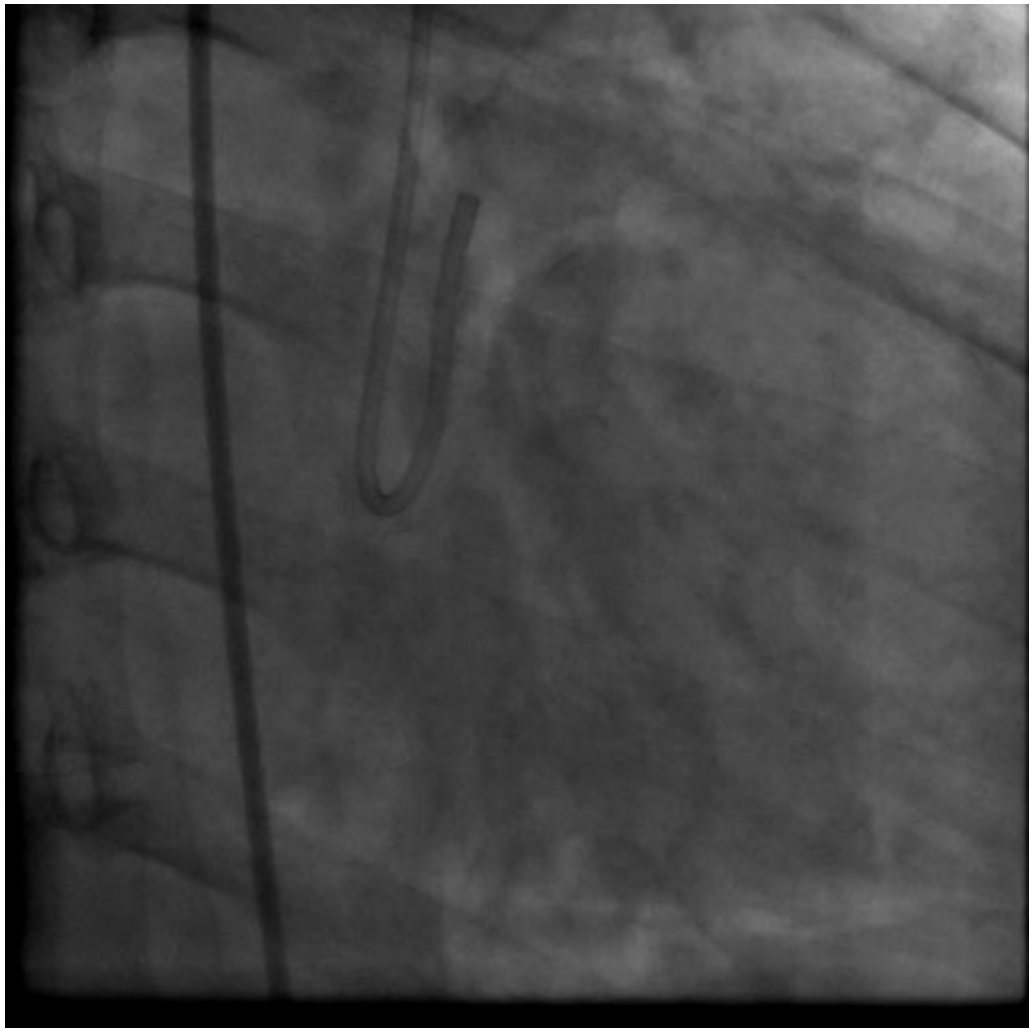
→ selected population

PCI in anomalous connections of the coronary arteries (ANOCOR)

stenting of ectopic right coronary artery



PCI in anomalous connections of the coronary arteries (ANOCOR)



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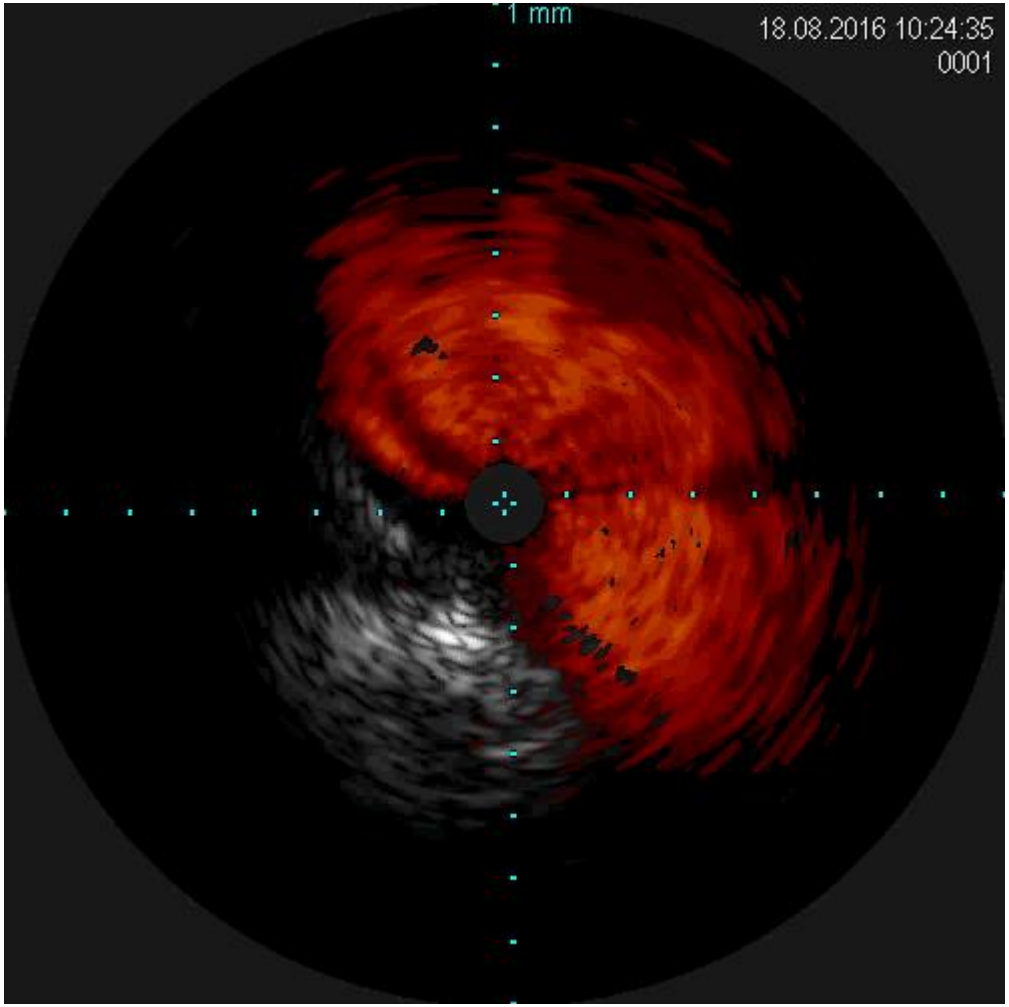
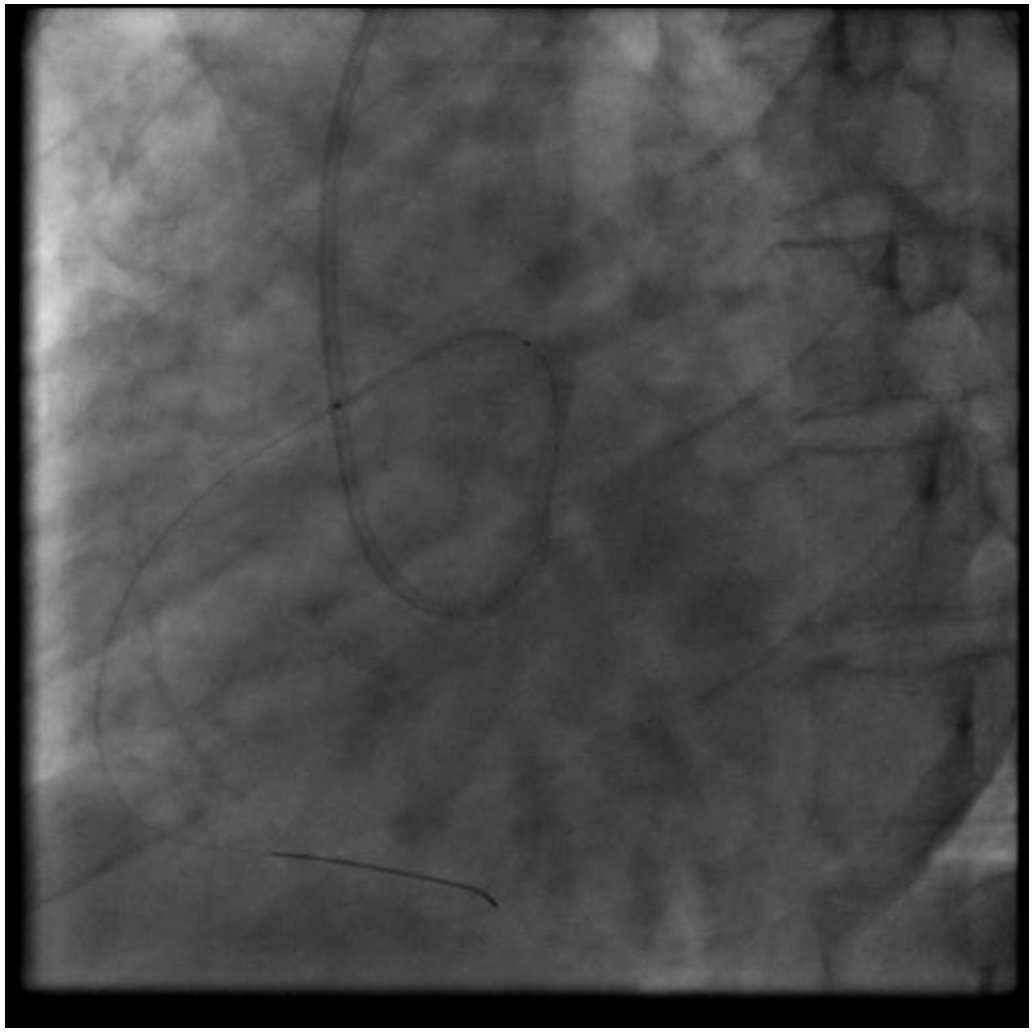
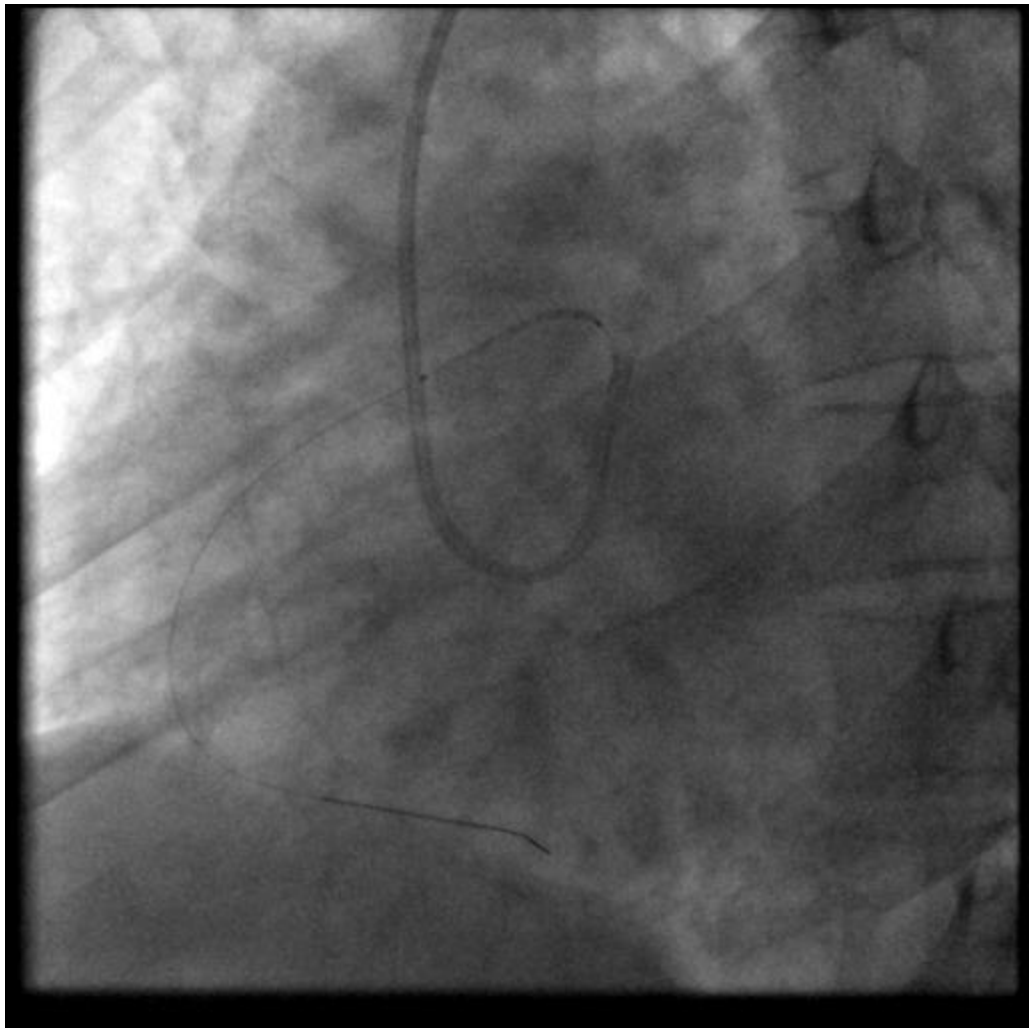


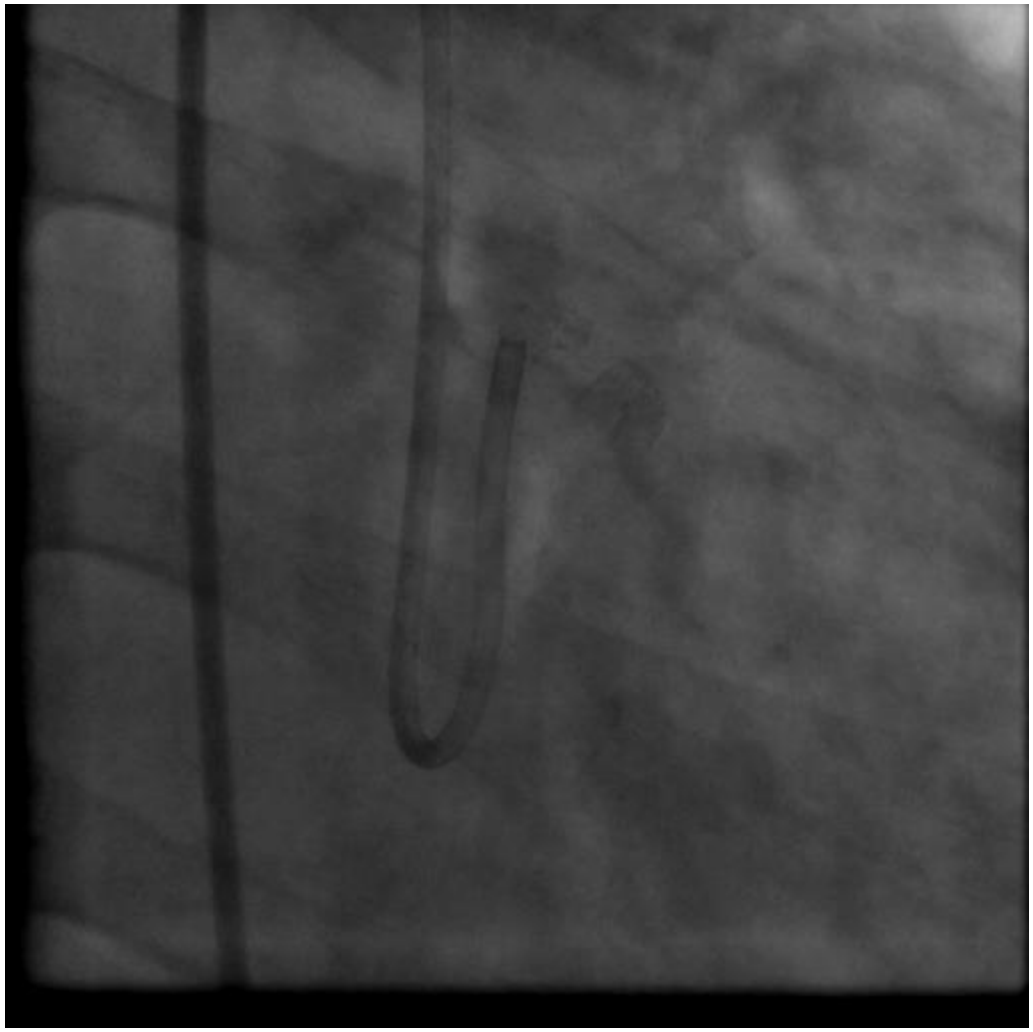
PCI in anomalous connections of the coronary arteries (ANOCOR)



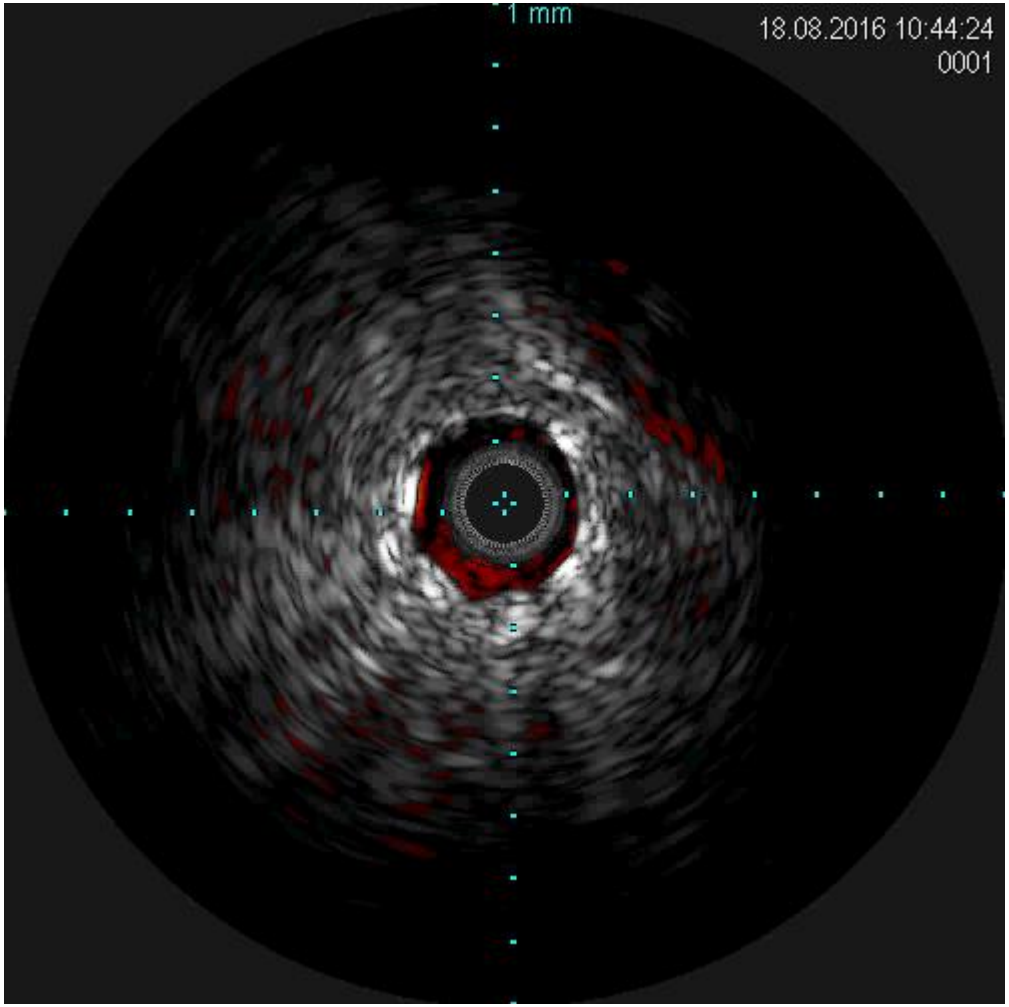
PCI in anomalous connections of the coronary arteries (ANOCOR)



PCI in anomalous connections of the coronary arteries (ANOCOR)



PCI in anomalous connections of the coronary arteries (ANOCOR)



Baseline characteristics

	N=11
Mean age (years)	54 (35-81)
Presentation	
ACS (%)	2 (18)
Stable angina (%)	6 (55)
Silent ischemia (%)	2 (18)
Syncope (%)	1 (9)
Intramural segment (%)	6 (55)

Degrell et al. TCT congress 2017, JACC 2017

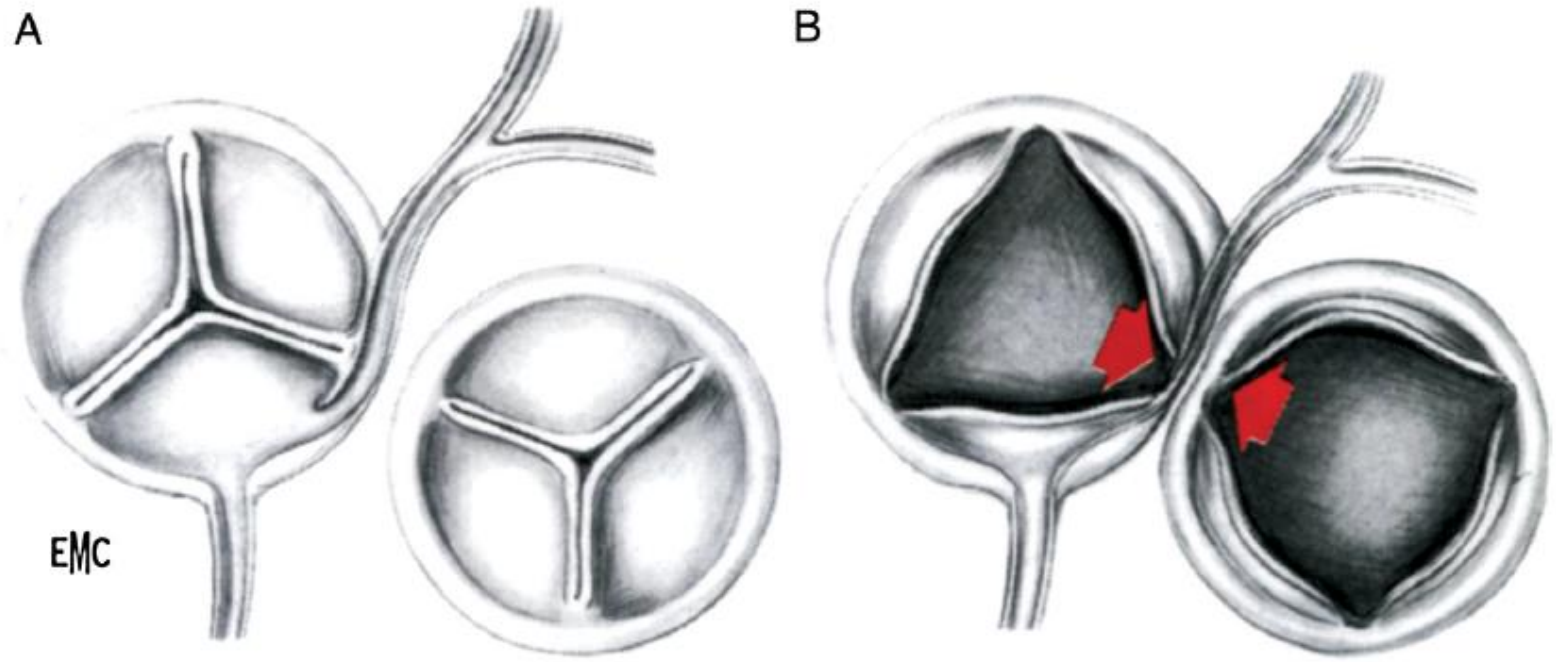
Results

	N=11
Successful stenting (%)	11 (100)
DES use (%)	10 (91)
Mean fluoroscopic time (min)	18
IVUS/OCT guidance (%)	8 (73)
Mean troponin (microg/L) at day 1	0.58
Periprocedural complications (%)	0 (0)
MACE at 6-month follow-up (%)	0 (0)

Degrell et al. TCT congress 2017, JACC 2017

anomalous connections of the coronary arteries

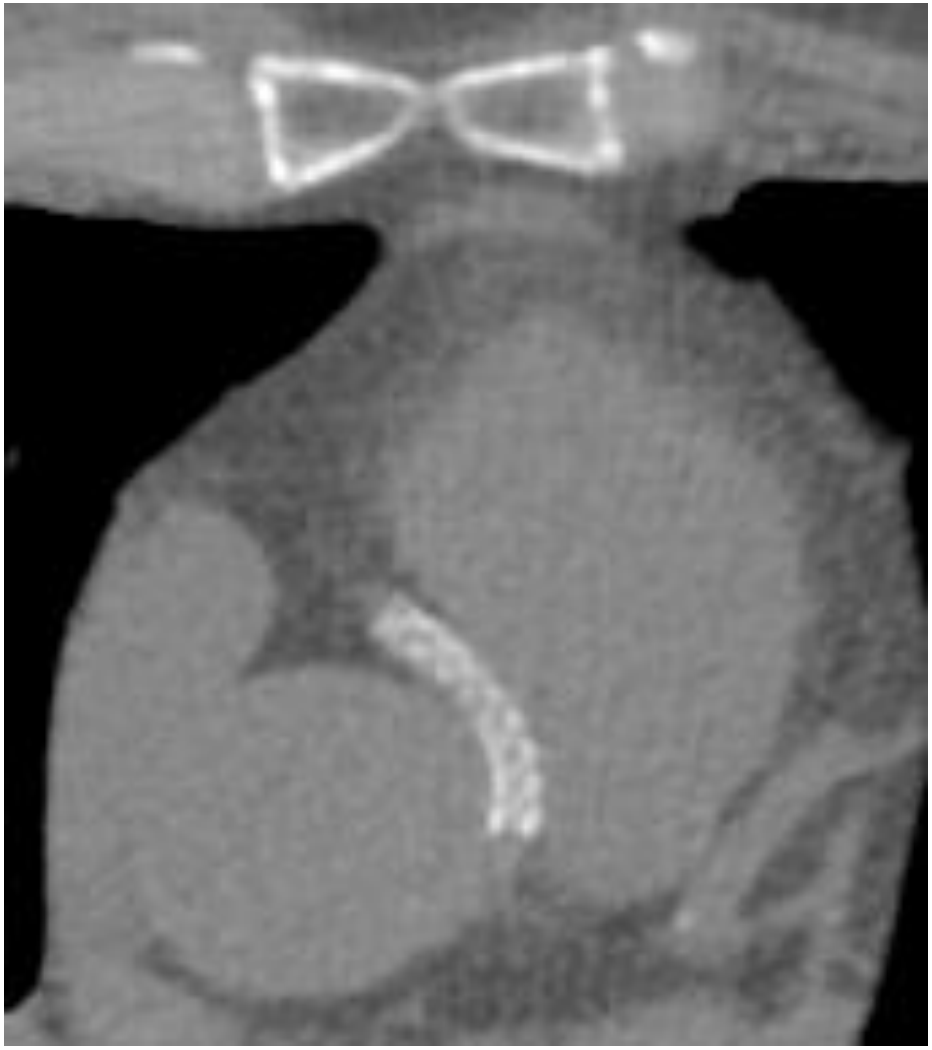
exertional dynamic compression



Raisky O, Vouhé P. EMC 2007

never demonstrated

CT scan at 6 months



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.

thank you

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