from on site to online

JESFC

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Coronary anomalies (CA)

When to offer surgery?

Insights from the ANOCOR registry

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Statement of Financial Interest

I currently have, or have had over the last two years, an affiliation or financial interests or interests of any order with a company or I receive compensation or fees or research grants with a commercial company :

Speaker's name : Pierre Aubry, Paris

☑ I do not have any potential conflicts of interest to report

ANOCOR Registry

Rationale

- Non rare anomalies (≈1/100 invasive angiography/CCTA)
- Benign anomaly or potentially fatal anomaly
- One-third of anomalies identified at risk
- Heterogeneous management in adults
- Lack of recommendations based on RCT
- Few large prospective cohort-based studies

ANOCOR Registry

Design

- Observational, prospective, multicentre cohort study
- Inclusion period: January 2010-January 2013
- Recruitment by adult interventional cardiologists (n=71)
- Population ≥15 years with at least one CA diagnosed invasive angiography and/or CTTA and without any structural congenital disease implicating the great vessels

Work supported by Groupe Athérome et Cardiologie Interventionnelle (GACI) - SFC

ANOCOR Registry

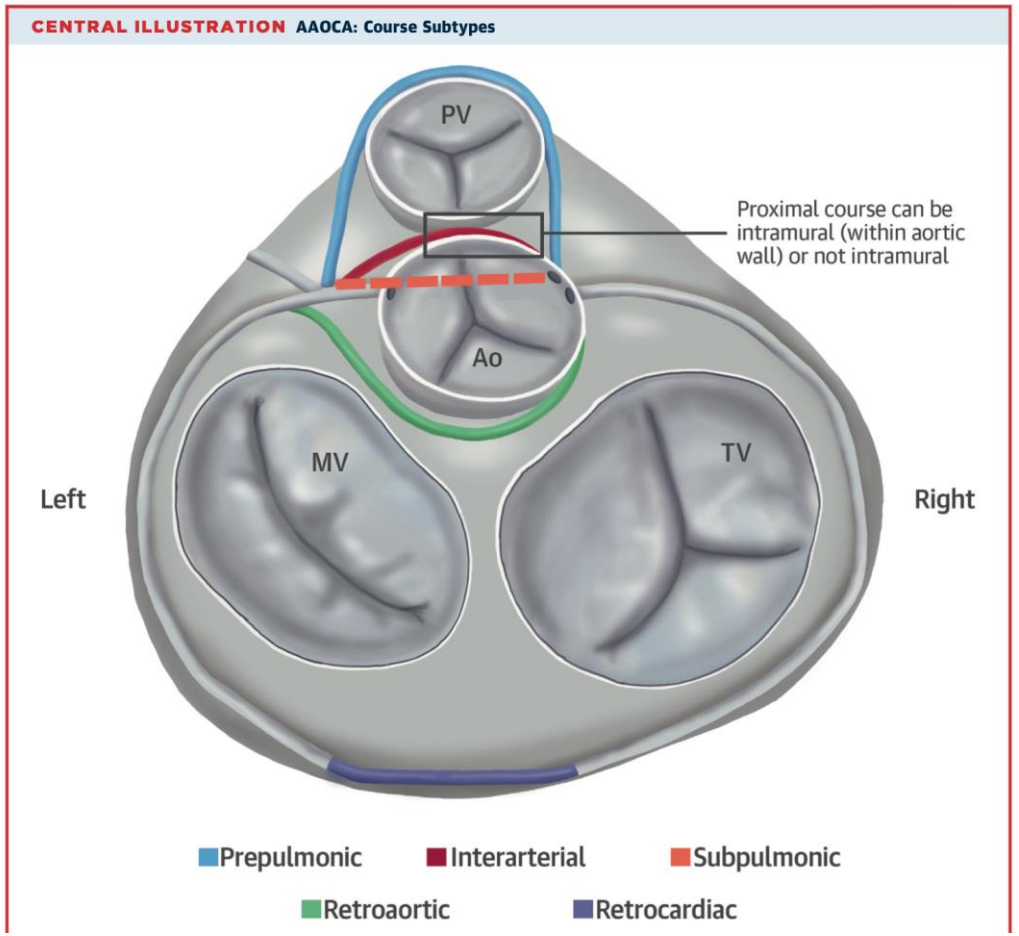
Methods

- CA were classified according to the ectopic course (prepulmonic, interarterial, subpulmonic and retroaortic)
- CA with an interarterial course were defined as high-risk anomalies
- First endpoint: to describe the initial strategy (absence from treatment, medical treatment, percutaneous or surgical revascularization)
- Secondary endpoint: to describe the outcomes up to 10 years

Coronary anomalies courses

Classification

1. Prepulmonic
2. Interarterial (preaortic)
3. Subpulmonic (septal)
4. Retroaortic



Cheezum MK et al. J Am Coll Cardiol. 2017.

ANOCOR Registry

ANOCOR cohort

472 patients ≥15 years (mean age 63 years) [15-95]

496 CA

CA at risk

154 (31%)

Interarterial course

other CA

342 (69%)

Other courses

Aborted sudden cardiac arrest: 12 (2.5%) – 3 related to CA (25%)

ANOCOR Registry

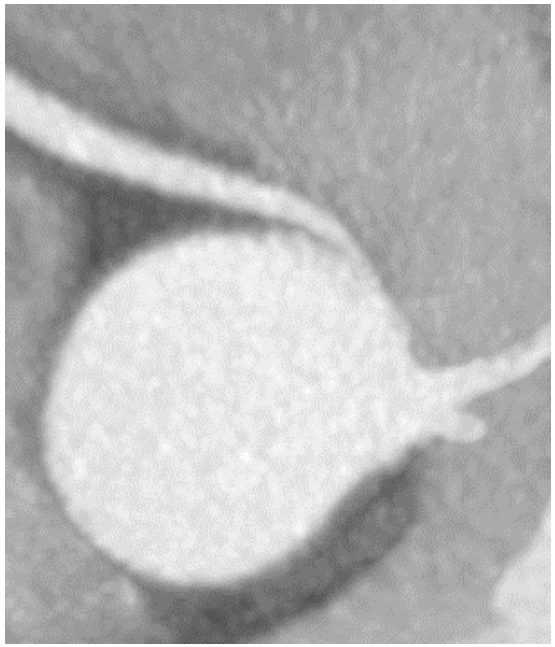
ANOCOR cohort

CA at risk

154 (31%)

R-ANOCOR

147 (95%)



L-ANOCOR

7 (5%)

ANOCOR Registry

Revascularisation (specific treatment)

CA at risk

154

Revascularisation

15 (10%)

Surgery

12 (80%)

PCI

3 (20%)

Interarterial course

other CA

342

Revascularisation

2 (0.6%)

Surgery

2 (100%)

Subpulmonic course

ANOCOR Registry

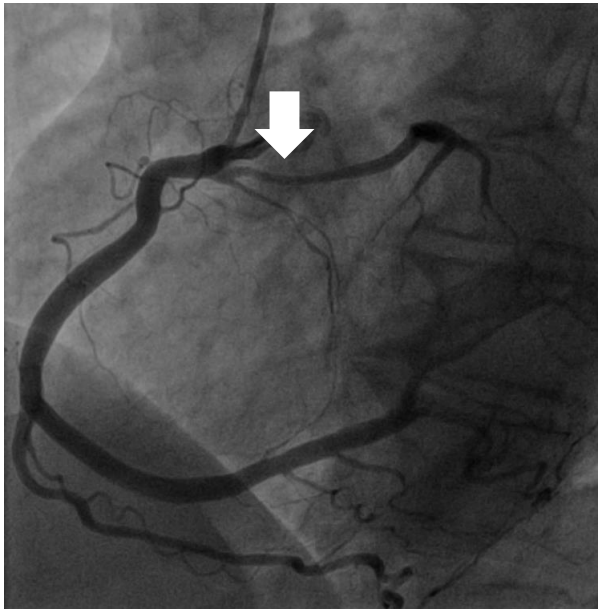
Revascularisation (specific treatment)

other CA

342

Revascularisation

2 (0.6%)



Surgery

2 (100%)

Subpulmonic course

ANOCOR Registry

Revascularisation (specific treatment)

R-ANOCOR at risk

147

Revascularisation

13 (10%)

Surgery

10 (77%)

PCI

3 (23%)

L-ANOCOR at risk

7

Revascularisation

2 (29%)

Surgery

2 (100%)

Management of CA at risk

Decision-making

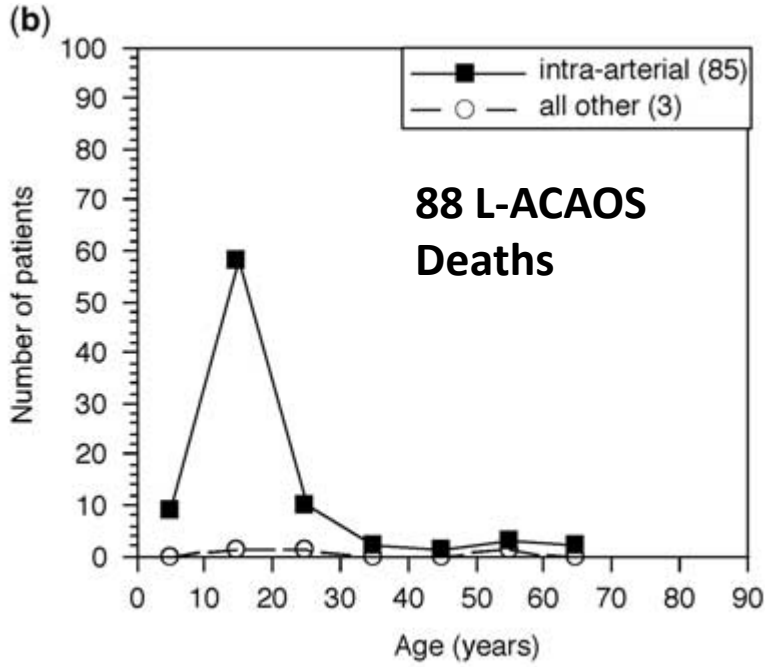
- Age < 35 or ≥ 35 years
- Left CA vs. Right CA
- History of aborted cardiac arrest
- Ischemic symptoms/relationship with exertion
- Induced myocardial ischemia with imaging
- Anatomic characteristics (CT scan/angio/IVUS/OCT)
- Physiological assessment (iFR, FFR)
- Sports profile/Patient choice

Surgery/PCI/Medical/Observation/Physical restriction

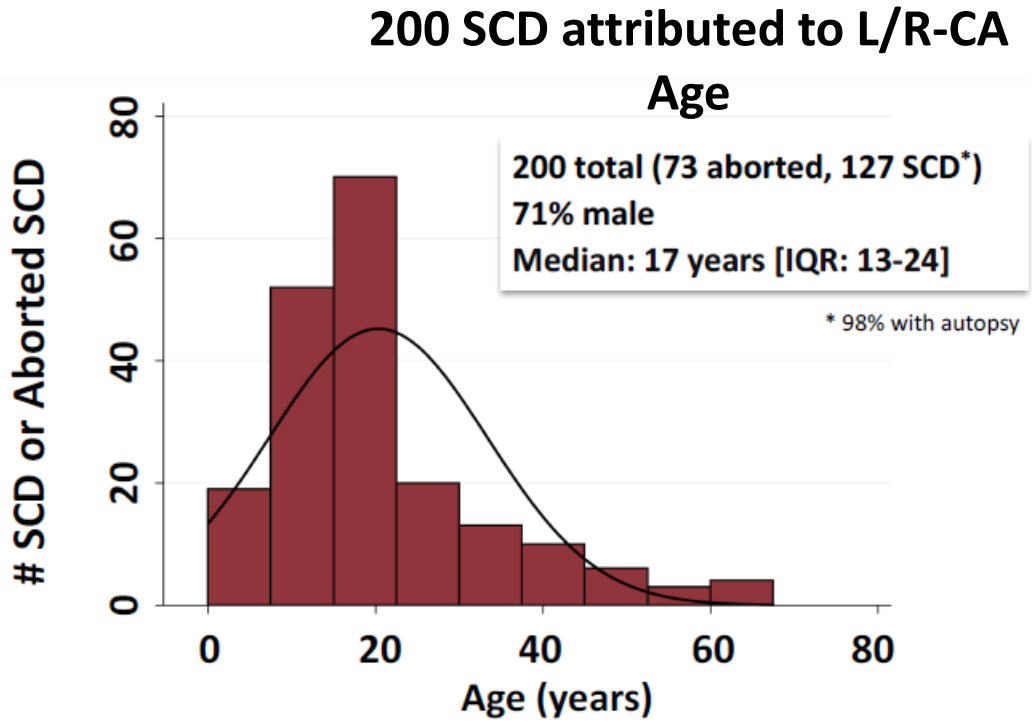
Management of CA at risk

Age

0-14	15-34	35-49	50-64	65-79



Hoffman JI. Cardiol Young. 2014.



Shiwani H. ACC sessions. 2018.

Management of CA at risk

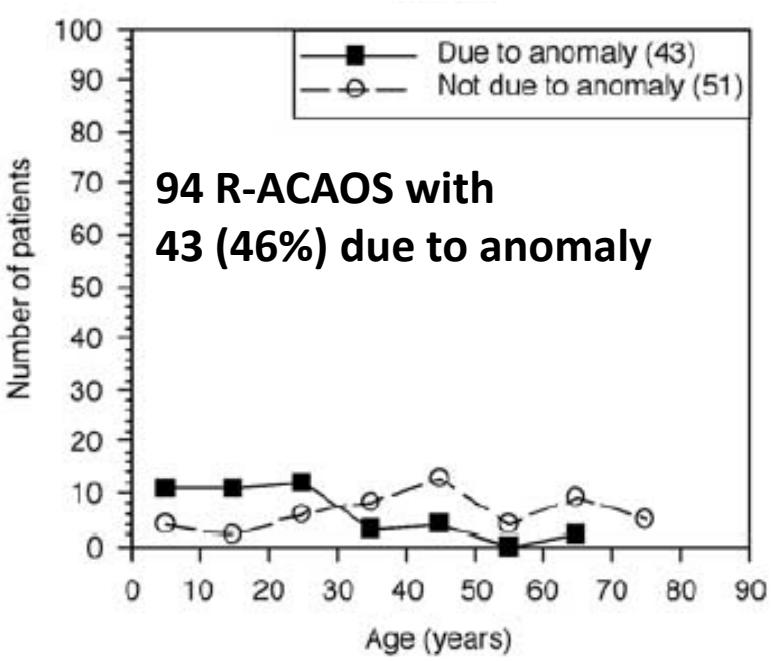
Type of coronary artery: left vs.right

Prevalence CA in young (cardiac MRI diagnosis)	SCD* in athlete (15-35 years) (individual annual risk)
Left CA at risk: 0.03%	Left CA at risk: 0.2%
Right CA at risk: 0.3%	Right CA at risk: 0.02%

* Sudden cardiac death

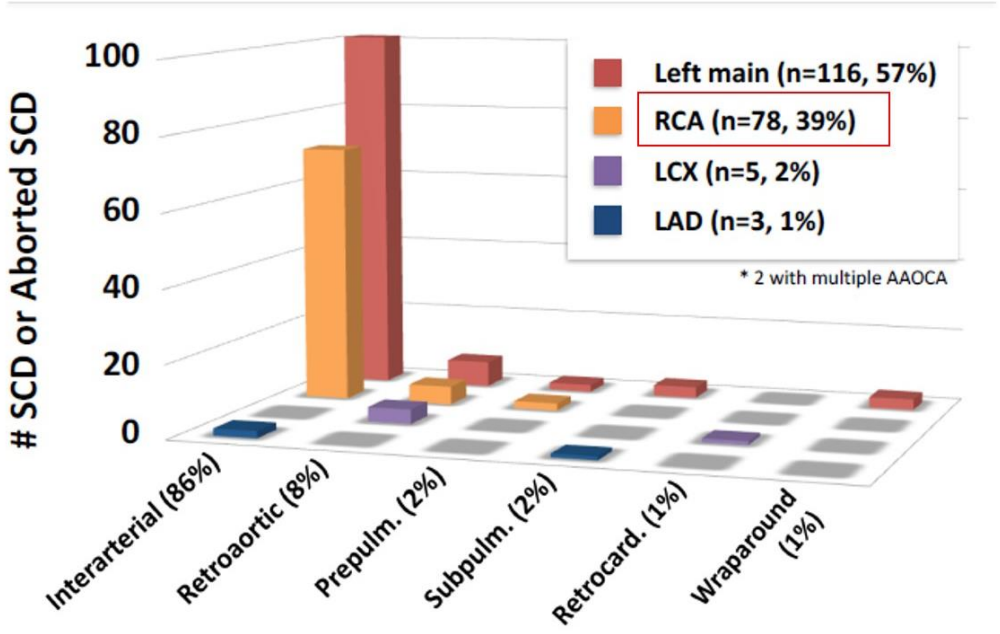
Management of CA at risk

Type of coronary artery: left vs.right



Hoffman JI. Cardiol Young. 2014.

202 SCD attributed to L/R-CA



Shiwani H. ACC sessions. 2018.

Recommendations

Prevention of sudden cardiac death

2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: Executive Summary

4.3. Surgery and Revascularization Procedures in Patients With Ischemic Heart Disease

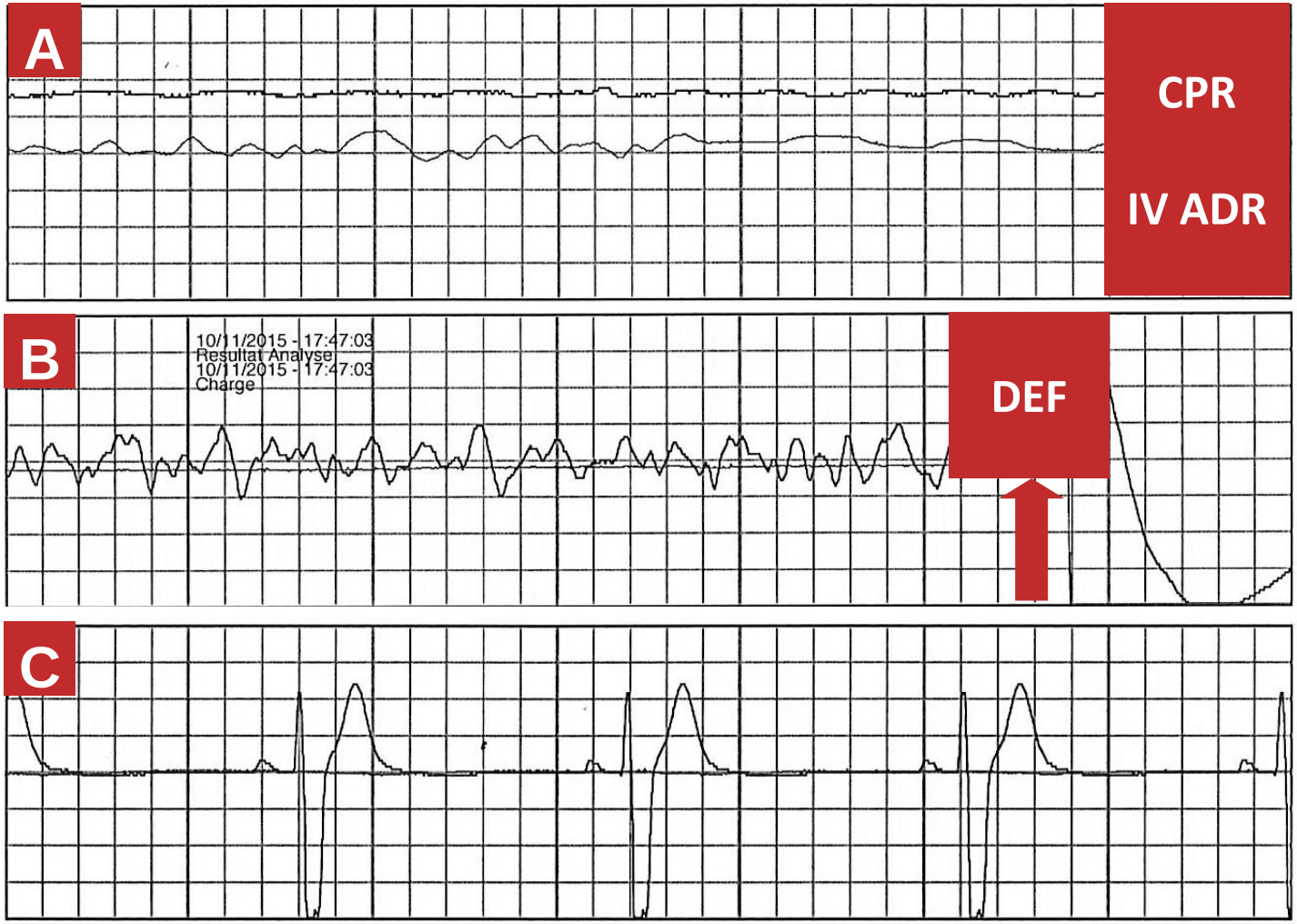
Recommendations for Surgery and Revascularization Procedures in Patients With Ischemic Heart Disease References that support the recommendations are summarized in Online Data Supplement 11.		
COR	**LOE**	**Recommendations**
I	B-NR	1. Patients with sustained VA and survivors of SCA should be evaluated for ischemic heart disease, and should be revascularized as appropriate (1-4).
I	C-EO	2. In patients with anomalous origin of a coronary artery suspected to be the cause of SCA, repair or revascularization is recommended.

Al-Khatib et al. Circulation. 2017.

Surgical repair after SCA

Sudden cardiac arrest – High school sports activities

15-year old boy – Left coronary anomaly



Recommendations

2020 Guidelines for adult congenital heart disease

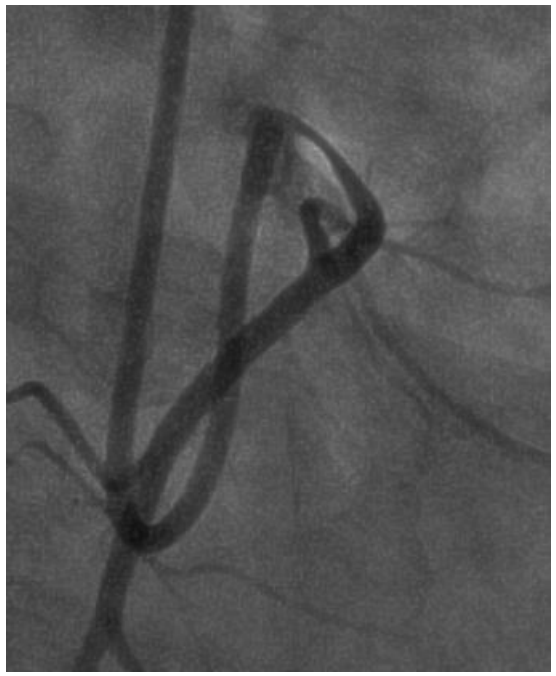
Anomalous aortic origin of the coronary artery		
Surgery is recommended for AAOCA in patients with typical angina symptoms who present with evidence of stress-induced myocardial ischaemia in a matching territory or high-risk anatomy.[c]	I	C
Surgery should be considered in *asymptomatic* patients with 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

[c]High-risk anatomy includes features such as an intramural course and orifice anomalies (slit-like orifice, acute-angle take-off, orifice >1 cm above the sinotubular junction).

Baumgartner H et al. Eur Heart J. 2020.

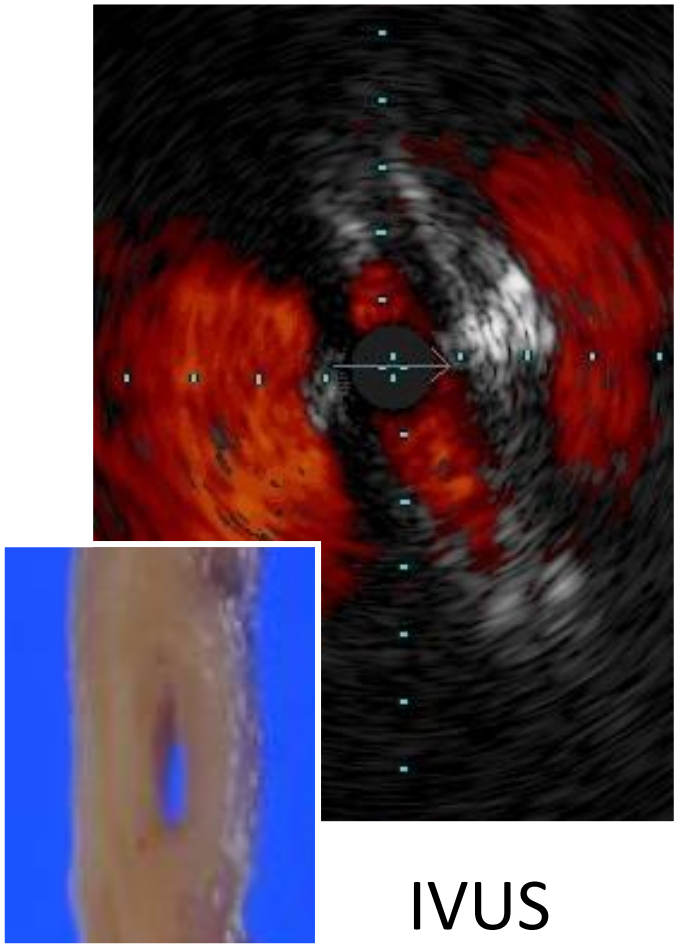
Intramural aortic course

Multimodal imaging – Right coronary anomaly



Angio

CT angio

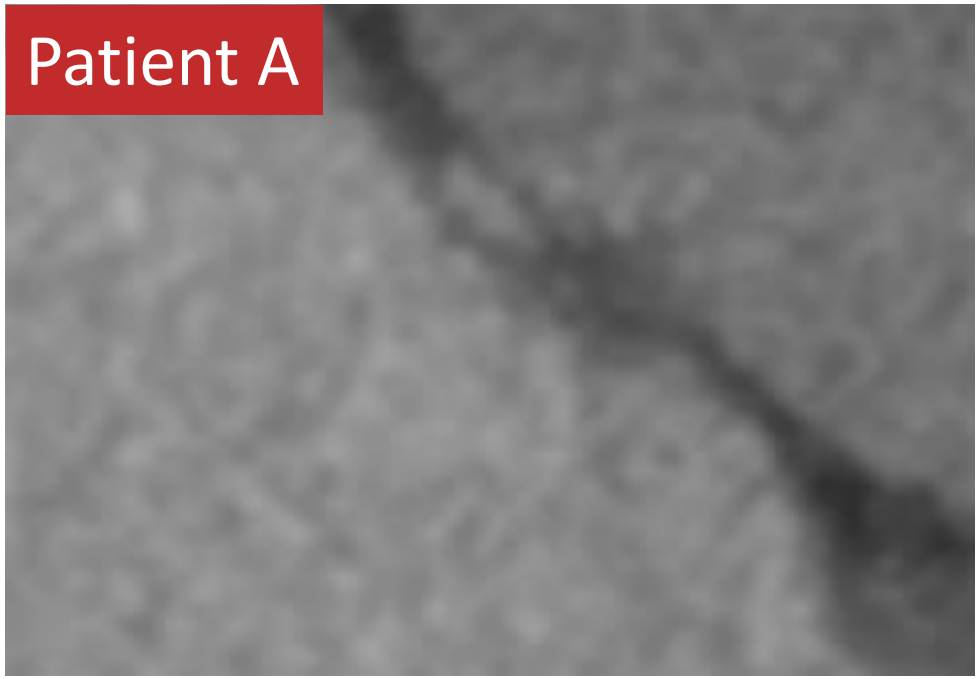


IVUS

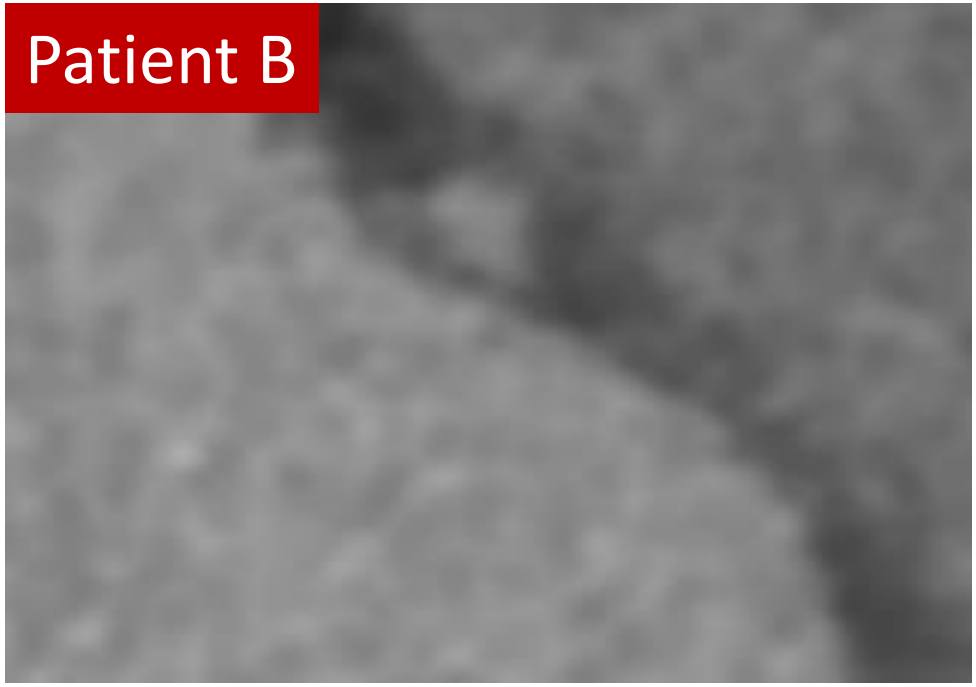
Hata Y et al. Cardiovasc Pathol 2014.

Anatomical assessment

High risk anatomy – Right coronary anomaly



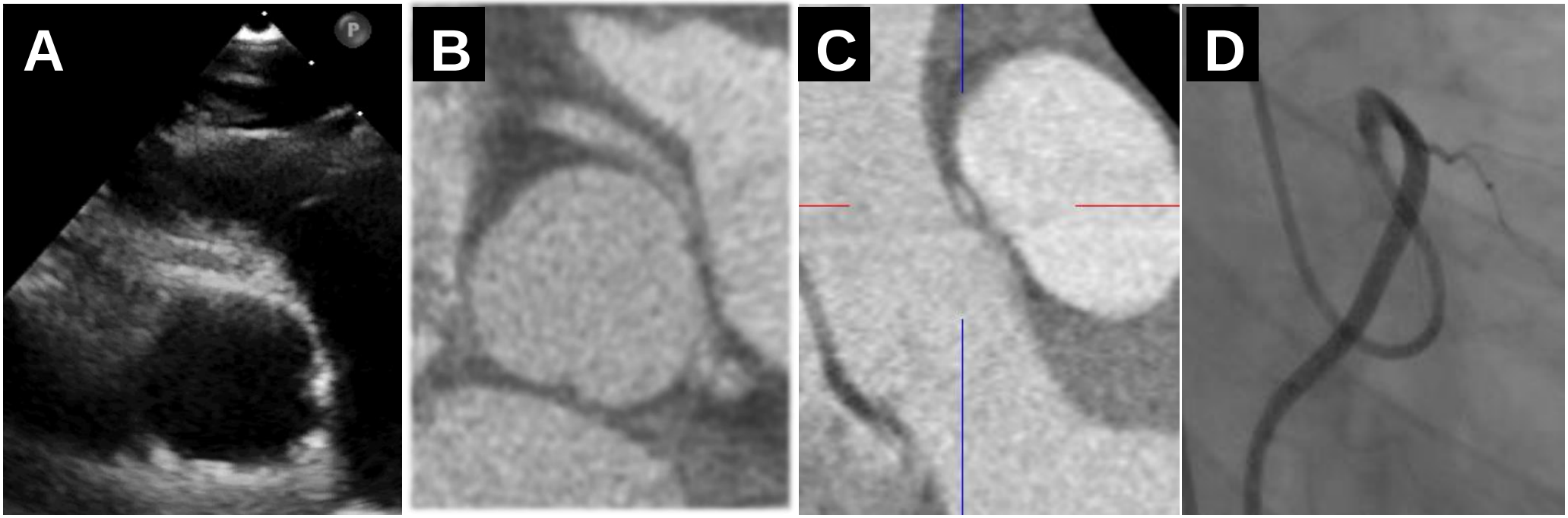
Intramural course



No intramural course

Surgical repair

Pre syncope post exertion in 17-year old boy



Recommendations

2020 Guidelines on sports cardiologie and exercice in patients with cardiovascular disease

Recommendations for exercise in young individuals/athletes with anomalous origins of coronary arteries

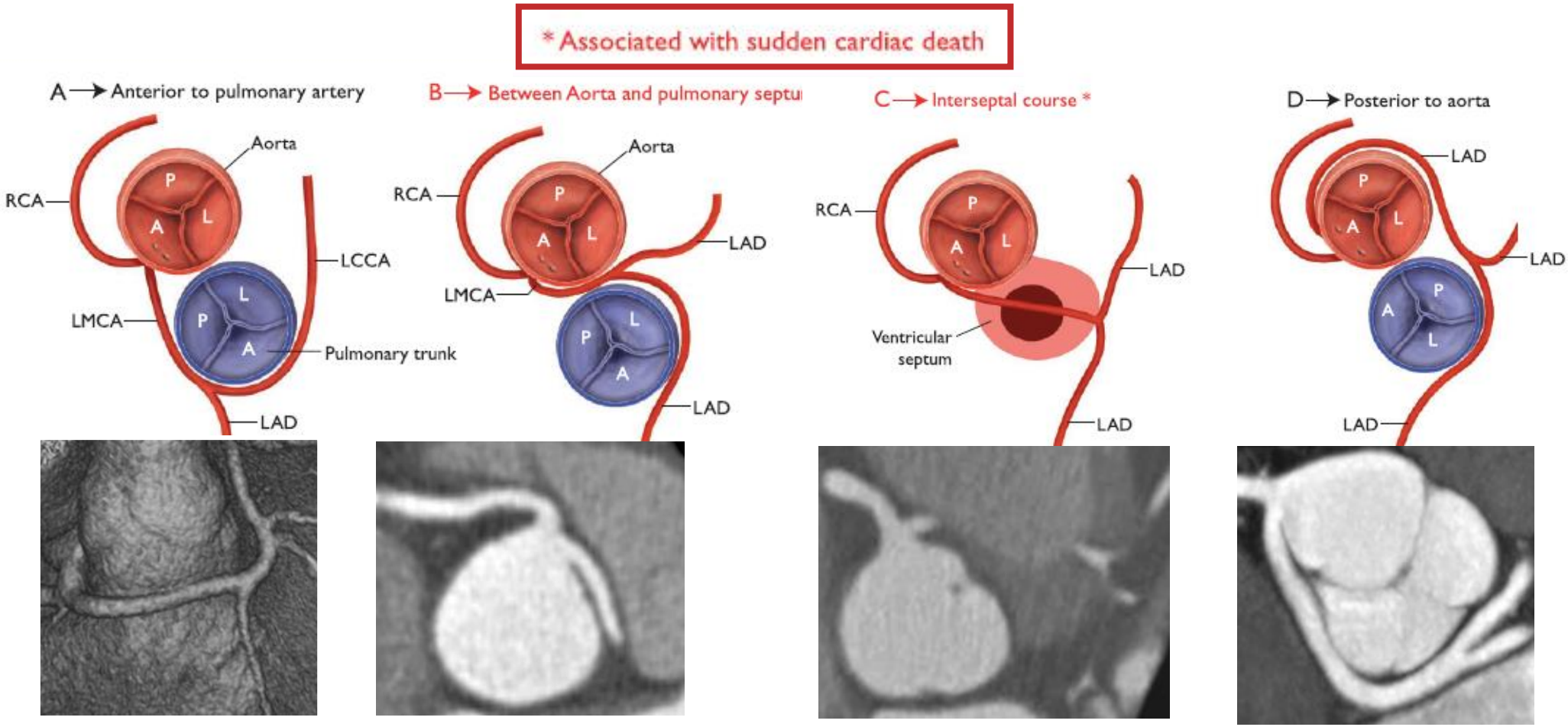
Recommendations	Class[a]	Level[b]
When considering sports activities, evaluation with imaging tests to identify high-risk patterns and an exercise stress test to check for ischaemia should be considered in individuals with AOCA.	IIa	C
In asymptomatic individuals with an anomalous coronary artery that does not course between the large vessels, does not have a slit-like orifice with reduced lumen and/or intramural course, competition may be considered, after adequate counselling on the risks, provided there is absence of inducible ischaemia.	IIb	C
After surgical repair of an AOCA, participation in all sports may be considered, at the earliest 3 months after surgery, if they are asymptomatic and there is no evidence of inducible myocardial ischaemia or complex cardiac arrhythmias during maximal exercise stress test.	IIb	C
Participation in most competitive sports with a moderate and high cardiovascular demand among individuals with AOCA with an acutely angled take-off or an anomalous course between the large vessels is not recommended.[c]	III	C

AOCA = anomalous origin of coronary arteries.
[a]Class of recommendation.
[b]Level of evidence.
[c]This recommendation applies whether the anomaly is identified as a consequence of symptoms or discovered incidentally, and in individuals <40 years of age.

Pelliccia A et al. Eur Heart J. 2020.

Recommendations

2020 Guidelines on sports cardiologie and exercice in patients with cardiovascular disease



Pelliccia A et al. Eur Heart J. 2020.

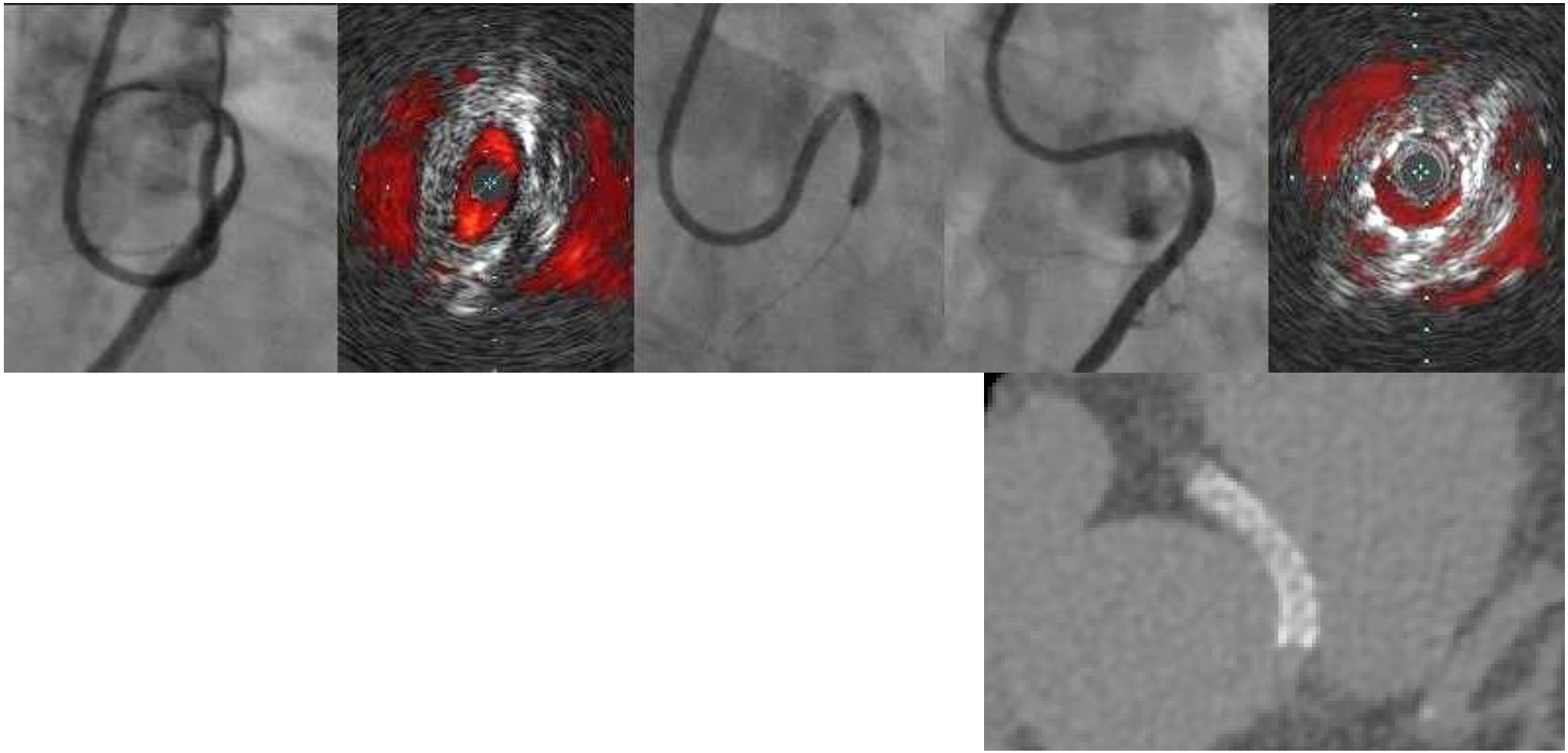
Surgical repair

Weaknesses

- Guidelines focused on young people
- Very few patients with history of sudden cardiac arrest
- No randomized controlled studies
- Lack of long-term data after correction
- Possible failure (stenosis/aneurysm/thrombosis)

PCI with stenting of CA

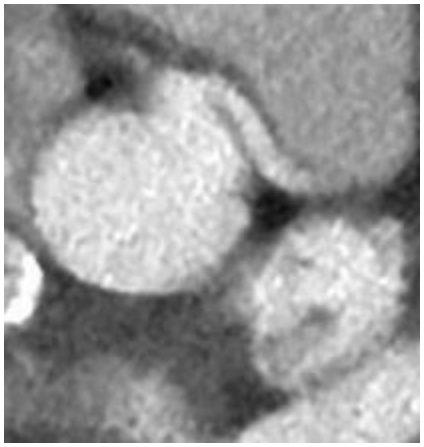
Right coronary anomaly with interarterial course



Management of CA at risk

Difficult decision-making

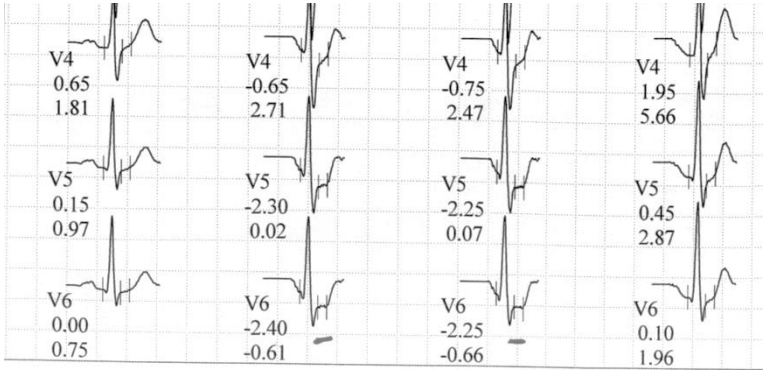
- 16-year old boy
- Football player
- Asymptomatic
- Pre screening: football training center
- TTE: poorly visualized left ostium
- CTCA: left coronary anomaly
- No induced myocardial ischemia

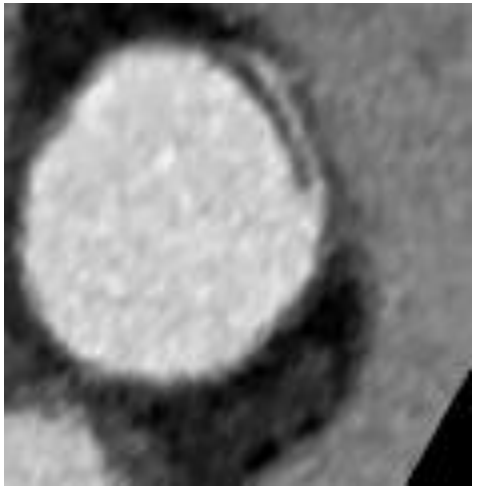


Management of CA at risk

Difficult decision-making

- 64-year old man
- Intensive sport activities (biking >100 km)
- Diziness during exercice following by syncope
- Exercice stress test: asymptomatic (250 watts)
- CTCA: right coronary anomaly





Conclusion

Much remains to be learn and understand

Thanks to the ANOCOR Group

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- Phalla Ou