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APPAC Ensemble, imaginons la cardiologie de demain

Connexion coronaires anormales : l'angioplastie coronaire a-t-elle une place ?

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pour le groupe ANOCOR

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Liens d’intérêt potentiels : aucun

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Quel rationnel ?

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]

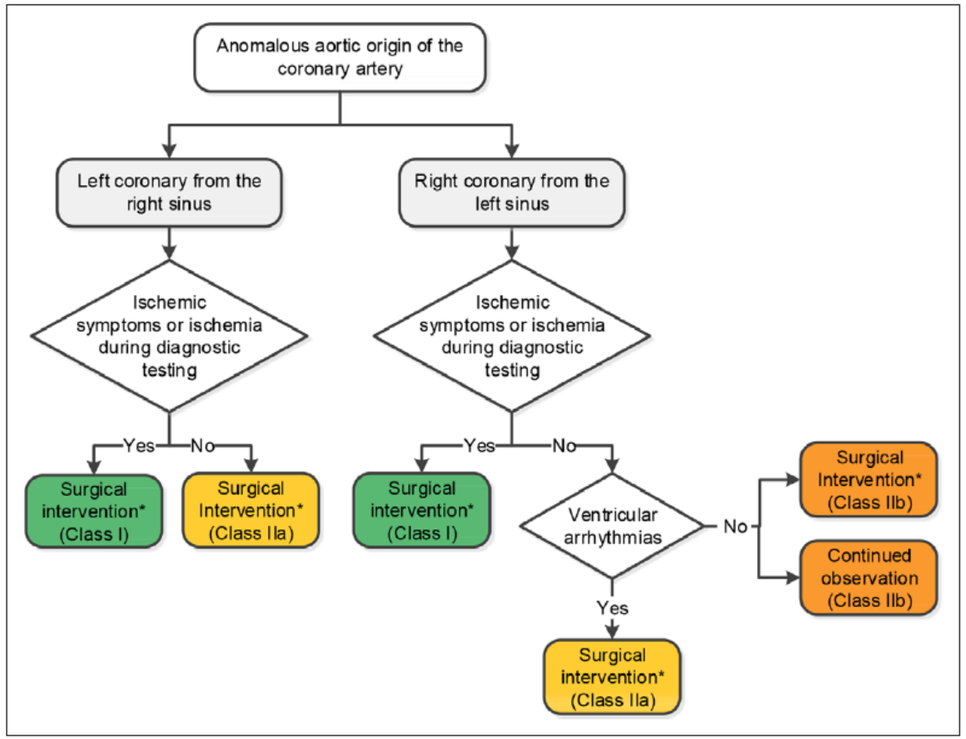

Figure 5. Anomalous aortic origin of the coronary artery.
*Surgical intervention to involve unroofing or coronary revascularization for patients with concomitant fixed obstruction.

Stout KK et al. Circulation 2019

Anomalies de connexion coronaire et chirurgie

- Recommandations : ciblées pour une population jeune.
- Décisions thérapeutiques : indiquées sans tenir compte de l'âge.
- Etudes randomisées contrôlées : aucune.
- Histoire naturelle et corrigée : mal connue à long terme.
- Correction chirurgicale : techniques spécialisées.
- Echecs chirurgicaux : anévrysme, sténose cicatricielle, thrombose précoce.

Surgery for anomalous aortic origin of coronary arteries: a multicentre study from the European Congenital Heart Surgeons Association†

Massimo A. Padalino[a,*], Nicola Franchetti[a], Mark Hazekamp[b], Vladimir Sojak[b], Thierry Carrel[c], Alessandro Frigiola[d], Mauro Lo Rito[d], Jurgen Horer[e], Regine Roussin[e], Julie Cleuziou[f], Bart Meyns[g], Jose Fragata[h], Helena Telles[h], Anastasios C. Polimenakos[i], Katrien Francois[j], Altin Veshti[k], Jukka Salminen[l], Alvaro Gonzalez Rocafort[m], Matej Nosal[n], Luca Vedovelli[o], Alvise Guariento[a], Vladimiro L. Vida[a], George E. Sarris[p], Giovanna Boccuzzo[q] and Giovanni Stellin[a]

1991-2018 = 27 years

14 centres

156 patients

0.4/patient/year/center

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European Journal of Cardio-Thoracic Surgery 0 (2019) 1–8
doi:10.1093/ejcts/ezz080

Table 1: Patient characteristics and preoperative presentation

	All (%)	AORCA (%)	AOLCA (%)	Other (%)	*P*-value
Total patients	156 (100)	105 (67.3)	35 (22.4)	16 (10.3)	NS
Female	72/156 (46.2)	47/105 (44.8)	18/35 (51.4)	7/16 (43.8)	NS
Anomalous course of coronary artery					NS
Interarterial	135/156 (86.5)	96/105 (91.4)	29/35 (82.9)	10/16 (62.5)	NS
Intramural	98/156 (62.8)	77/105 (73.3)[a]	18/35 (51.4)[b]	3/16 (18.8)[c]	0.022; 0.035; <0.0001
Intraseptal or retroaortic	4/156 (2.6)	1/105 (1.0)	2/35 (5.7)	1/16 (6.3)	NS
Anterior to pulmonary artery	1/156 (0.6)	0/105 (0)	0/35 (0)	1/16 (6.3)	NS
Other	16/156 (10.3)	8/105 (7.6)	4/35 (11.4)	4/16 (25.0)	NS
Symptoms at diagnosis	136/156 (87.2)	94/105 (89.5)[a]	30/35 (85.7)	12/16 (75.0)[b]	**0.010**
Symptoms at effort	103/156 (66.0)	72/105 (68.6)	22/35 (62.9)	9/16 (56.3)	NS
Chest pain	42/156 (26.9)	31/105 (29.5)	8/35 (22.9)	3/16 (18.8)	NS
Cardiac arrest/low cardiac output	21/156 (13.5)	15/105 (14.3)	5/35 (14.3)	1/16 (6.6)	NS
Dyspnoea	10/156 (6.4)	4/105 (3.8)	4/35 (11.4)	2/16 (12.5)	NS
Palpitations	7/156 (4.5)	2/105 (1.9)	3/35 (8.6)	2/16 (12.5)	NS
Syncope	14/156 (9.0)	5/105 (4.8)[a]	8/35 (22.9)[b]	1/16 (6.3)	NS
Fatigue	4/156 (2.6)	3/105 (2.9)	0/35 (0)	1/16 (6.3)	NS
Not specified	36/156 (23.1)	35/105 (33.3)[a]	1/35 (2.9)[b]	2/16 (12.5)[b]	**0.003; <0.001**
No symptoms	20/156 (12.8)	11/105 (10.5)[a]	5/35 (14.3)	4/16 (25.0)[b]	**0.010**
Preoperative sport activity	44/156 (28.2)	29/105 (27.6)	13/35 (37.1)	2/16 (12.5)	NS
Age at procedure (years)	39.5 (15–53)	41 (19–53)[a]	15 (12–44)[b]	46 (16–57)	0.070
Percutaneous/CABG	6/156 (3.8)	6/105 (5.7)	0/35 (0)	0/16 (0)	NS
Associated cardiac disease	33/156 (21.2)	23/105 (21.9)	11/35 (31.4)	5/16 (31.3)	NS
Atrial septal defect	4/156 (2.6)	4/105 (3.8)	0/35 (0)	0/16 (0)	NS
Aortic valve anomaly	12/156 (7.7)	4/105 (3.8)	5/35 (14.3)	3/16 (18.8)	NS
Mitral valve anomaly	7/156 (4.5)	5/105 (4.8)	2/35 (5.7)	0/16 (0)	NS
Other	10/156 (6.4)	3/105 (2.9)	4/35 (11.4)	2/16 (12.5)	NS

Numbers represent median (interquartile range) for continuous variables and *n* (%) for categorical variables.
Values in the same row that have different superscript letters are significantly different from each other.
AOLCA: aortic origin of left coronary artery; AORCA: aortic origin of right coronary artery; CABG: coronary artery bypass graft; NS, not significant.

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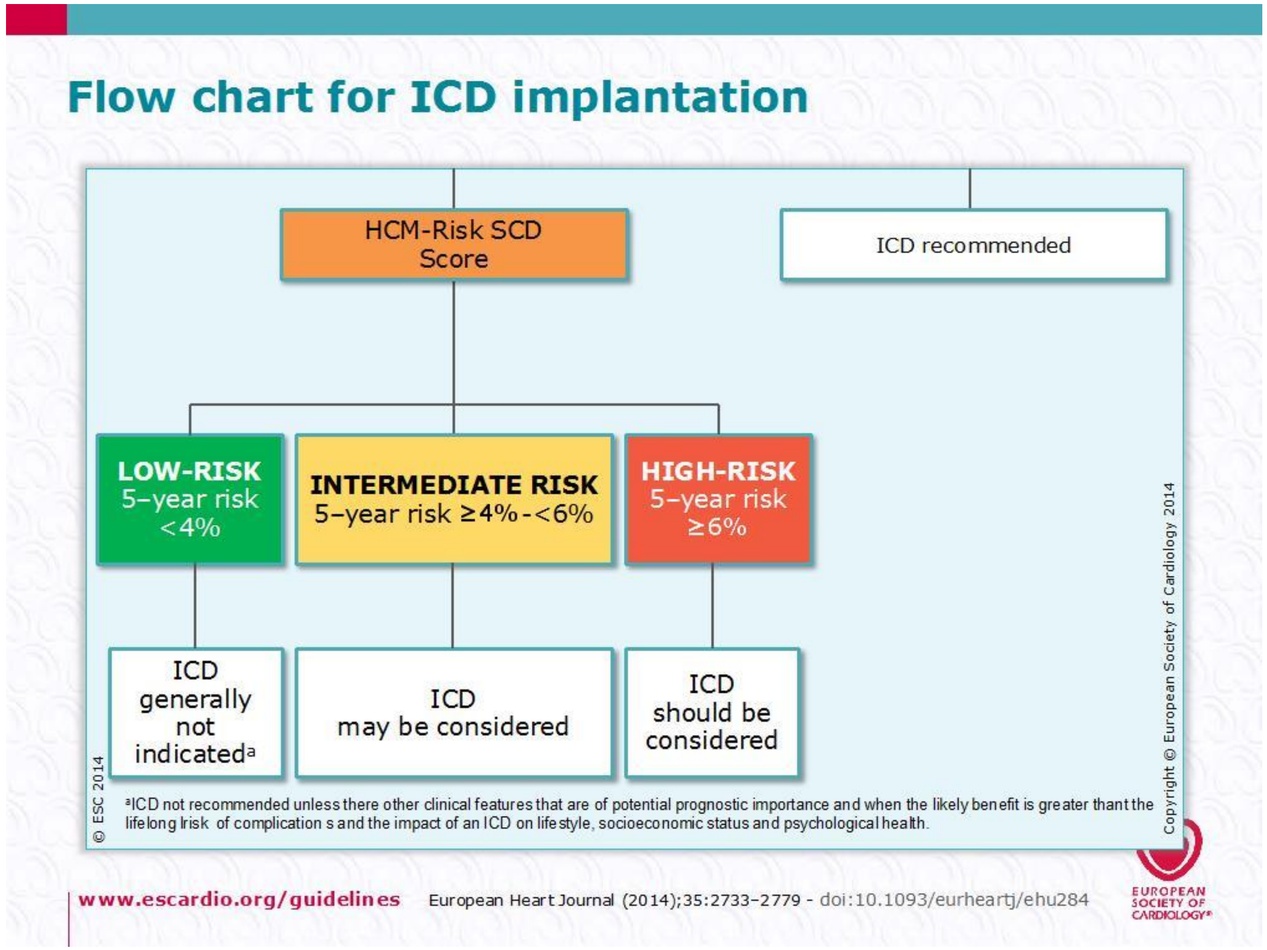
Padalino MA et al. Eur J Cardiovasc Surg 2019

Anomalies de connexion coronaire et mort subite

Annual risk of sudden cardiac death in population 12-35 years of age (estimation)

L-ACAOS	**0.3%**
R-ACAOS	**0.015%**

Brothers J. J Thorac Cardiovasc Surg 2010



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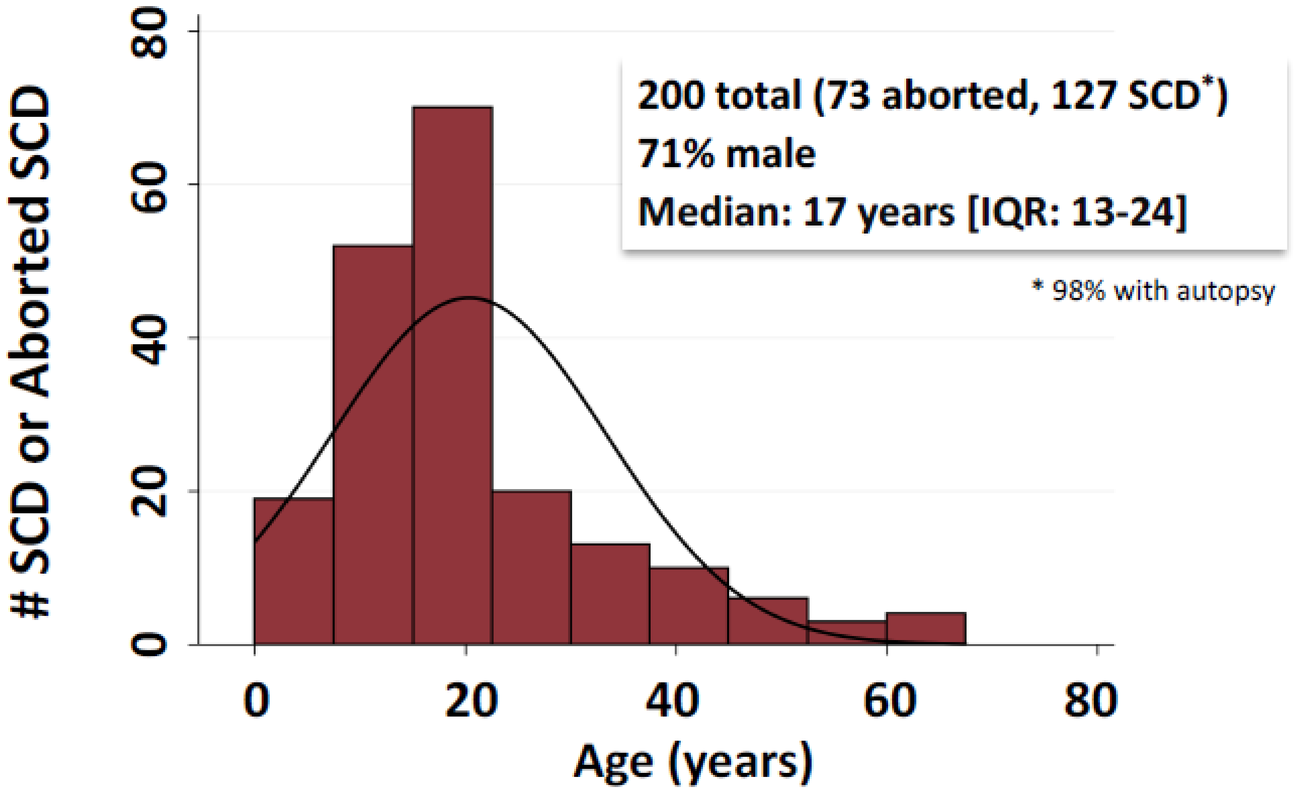
ACC.18 67th Annual Scientific Session & Expo

Age of SCD or Aborted SCD Attributed to AAOCA

NHS



Shiwani H et al. ACC 2018

Anomalous connections of coronary artery, SCD and prevalence

CONGENITAL HEART DISEASE	SCD cases / 1 000 / year
Catecholaminergic polymorphic ventricular tachycardia	15
Hypertrophic cardiomyopathy	10-20
Brugada syndrome	10
Long QT syndrome	5-10
Idiopatic dilated cardiomyopathy	5-10
Arrhythmogenic right ventricular cardiomyopathy	5-10
Anomalous connection of left coronary artery	3
Wolf-Parkinson-White syndrome	1
Anomalous connection of right coronary artery	0.15

Anomalous connections of coronary artery, SCD and prevalence

CONGENITAL HEART DISEASE	SCD cases / 1 000 / year
Catecholaminergic polymorphic ventricular tachycardia	15
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Arrhythmogenic right ventricular cardiomyopathy	5-10
Anomalous connection of left coronary artery	3
Wolf-Parkinson-White syndrome	1
Anomalous connection of right coronary artery	0.15

CONGENITAL HEART DISEASE in general population	cases per 1 000
Anomalous connection of right coronary artery	**3**
Hypertrophic cardiomyopathy	2
Wolf-Parkinson-White syndrome	1.5
Long QT syndrome	0.5
Anomalous connection of left coronary artery	0.4
Idiopatic dilated cardiomyopathy	0.4
Arrhythmogenic right ventricular cardiomyopathy	0.4
Brugada syndrome	0.2
Catecholaminergic polymorphic ventricular tachycardia	0.1

Table 2: Intraoperative and postoperative data

	All (%)	AORCA (%)	AOLCA (%)	Other (%)	*P*-value
Type of surgical procedure*	Median age at procedure*				
Unroofing[a]	88/156 (56.4)32 years (IQR 14–50; range 0.5–67)	66/105 (62.9)	19/35 (54.3)	3/16 (18.8)	NS
Coronary reimplantation[a]	30/156 (19.2)37 years (IQR 16.5–47; range 0.5–64)	26/105 (24.8)	2/35 (5.7)	2/16 (12.5)	NS
CABG[b]	24/156 (15.4)58.5 years (IQR 47–66; range 1–70)	8/105 (7.6)	7/35 (20.0)	9/16 (56.3)	NS
Other[a]	14/156 (9.0)32.5 years (IQR 15–43; range 3–63)	5/105 (4.8)	7/35 (20.0)	2/16 (12.5)	NS
CPB time (min)	73 (54–103)	68 (52–91)	84 (68–116)	88 (47–137)	NS
CC time (min)	47 (35–69)	43 (34–66)	53 (41–70)	58 (37–78)	NS
ICU (days)	1 (1–2)	1 (1–2)	1 (1–2)	2 (1–3)	NS
Major postoperative complications					
Low cardiac output syndrome	9/156 (5.8)	2/105 (1.9)[a]	5/35 (14.3)[b]	2/16 (12.5)	**0.010**
Early reintervention	7/156 (4.5)	3/105 (2.9)	3/35 (8.6)	1/16 (6.3)	NS
Right coronary stenting	2/156 (1.3)	2/105 (1.9)	0/35 (0)	0/16 (0)	NS
Balloon dilatation of pulmonary stenosis	1/156 (0.6)	0/105 (0)	1/35 (2.9)	0/16 (0)	NS
Removal of thrombus from left main coronary	1/156 (0.6)	0/105 (0)	1/35 (2.9)	0/16 (0)	NS
Coronary artery bypass graft	1/156 (0.6)	1/105 (1.0)	0/35 (0)	0/16 (0)	NS
Heart transplant	1/156 (0.6)	0/105 (0)	1/35 (2.9)	0/16 (0)	NS
Sinus Valsalva aneurysm resection	1/156 (0.6)	1/105 (1.0)	0/35 (0)	0/16 (0)	NS
Other	1/156 (0.6)	0/105 (0)	0/35 (0)	1/16 (6.3)	NS
Mechanical support	**6/156 (3.8)**	**1/105 (1.0)[a]**	**3/35 (8.6)[b]**	**2/16 (12.5)[b]**	**0.050; 0.050**
ECMO	2/156 (1.3)	0/105 (0)	1/35 (2.9)	1/16 (6.3)	NS
Intra-aortic balloon pump	2/156 (1.3	0/105 (0)	1/35 (2.9)	1/16 (6.3)	NS
Ventricular assist device	1/156 (0.6)	0/105 (0)	1/35 (2.9)	0/16 (0)	NS
Impella device	1/156 (0.6)	1/105 (1.0)	0/35 (0)	0/16 (0)	NS
Hospital deaths	**2/156 (1.3)**	**0/105 (0)**	**1/35 (2.9)**	**1/16 (6.3)**	**NS**
Minor postoperative complications					
Pericardial/pleural effusion	6/156 (3.8)	5/105 (4.8)	0/35 (0)	1/16 (6.3)	NS
Arrhythmia	4/156 (2.6)	2/105 (1.9)	1/35 (2.9)	1/16 (6.3)	NS
Sepsis/infection	3/156 (1.9)	3/105 (2.9)	0/35 (0)	0/16 (0)	NS
Respiratory insufficiency	2/156 (1.3)	1/105 (1.0)	1/35 (2.9)	0/16 (0)	NS
Aortic insufficiency (mild-moderate)	2/156 (1.3)	2/105 (1.9)	0/35 (0)	0/16 (0)	NS

Padalino MA et al. Eur J Cardiovasc Surg 2019

Activité chirurgicale 2017en France

atih
AGENCE TECHNIQUE DE L'INFORMATION SUR L'HOSPITALISATION

Base Nationale Publique et Privée - 2018 (mise à jour hebdomadaire)
Répartition des GHM pour l'acte CCAM

DDEA001 : Réimplantation d'une artère coronaire pour anomalie congénitale d'origine, par thoracotomie avec CEC

CMD	GHM	Libellé	Effectif	DMS
05	05C062	Autres interventions cardiothoraciques, âge supérieur à 1 an, ou vasculaires quel que soit l'âge, avec circulation extracorporelle, niveau 2	29	8,97
05	05C061	Autres interventions cardiothoraciques, âge supérieur à 1 an, ou vasculaires quel que soit l'âge, avec circulation extracorporelle, niveau 1	19	8,89
05	05C074	Autres interventions cardiothoraciques, âge inférieur à 2 ans, avec circulation extracorporelle, niveau 4	9	36,11
05	05C064	Autres interventions cardiothoraciques, âge supérieur à 1 an, ou vasculaires quel que soit l'âge, avec circulation extracorporelle, niveau 4	6	33,83
05	05C073	Autres interventions cardiothoraciques, âge inférieur à 2 ans, avec circulation extracorporelle, niveau 3	4	18,25
05	05C063	Autres interventions cardiothoraciques, âge supérieur à 1 an, ou vasculaires quel que soit l'âge, avec circulation extracorporelle, niveau 3	4	18,00
05	05C072	Autres interventions cardiothoraciques, âge inférieur à 2 ans, avec circulation extracorporelle, niveau 2	1	15,00
05	05C071	Autres interventions cardiothoraciques, âge inférieur à 2 ans, avec circulation extracorporelle, niveau 1	1	7,00
			73	

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Connexion coronaires anormales : l'angioplastie coronaire a-t-elle une place ?

Est-ce possible?

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Anomalous connections of coronary artery and PCI

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

- First and short series of 14 patients
- 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

Doorey et al. Am J Cardiol 2000

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Doorey AJ 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

- 42 patients with ARCA and interarterial intramural proximal course
- Mean age 48±12 years (12-73)
- Symptomatic, positive stress test, VUS surface reduction >50%)
- IVUS-guided PCI
- 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

Angelini P et al. Cathet Cardio Interv 2015

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Est-ce risqué ?

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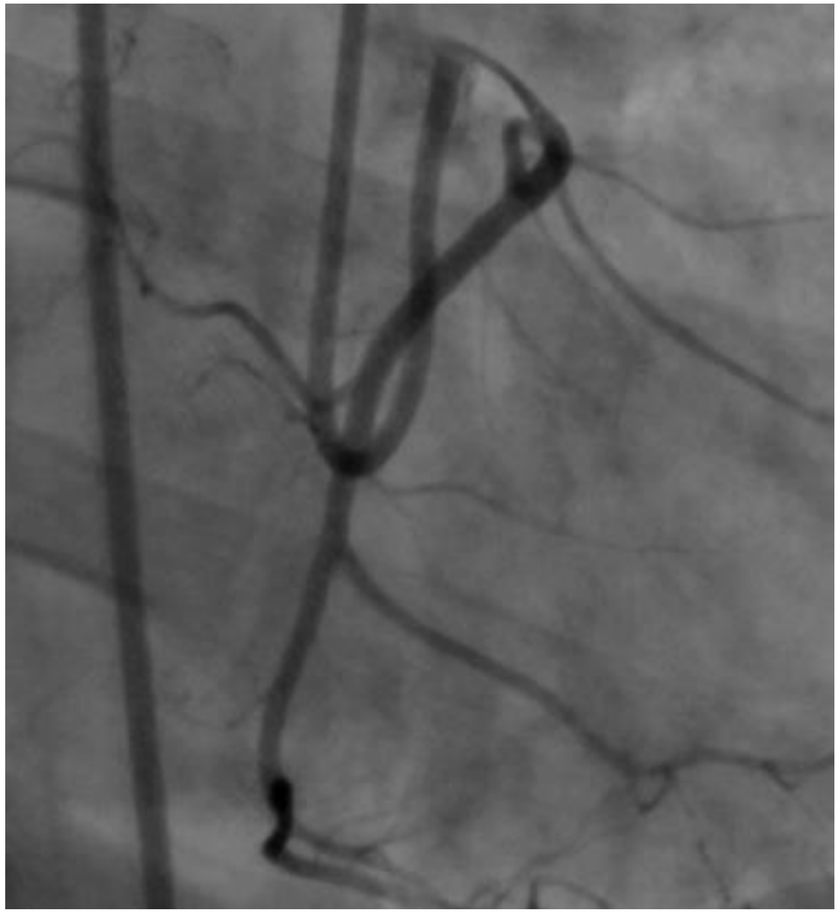
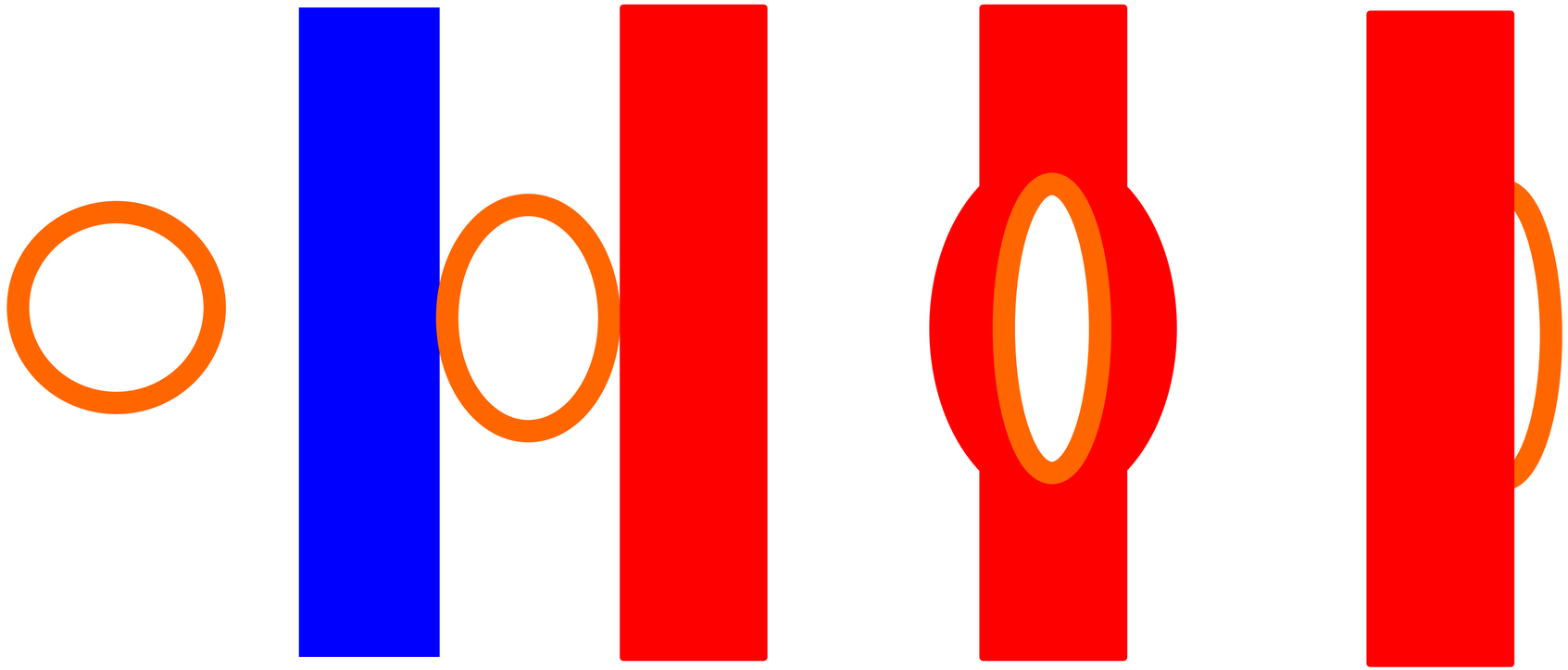
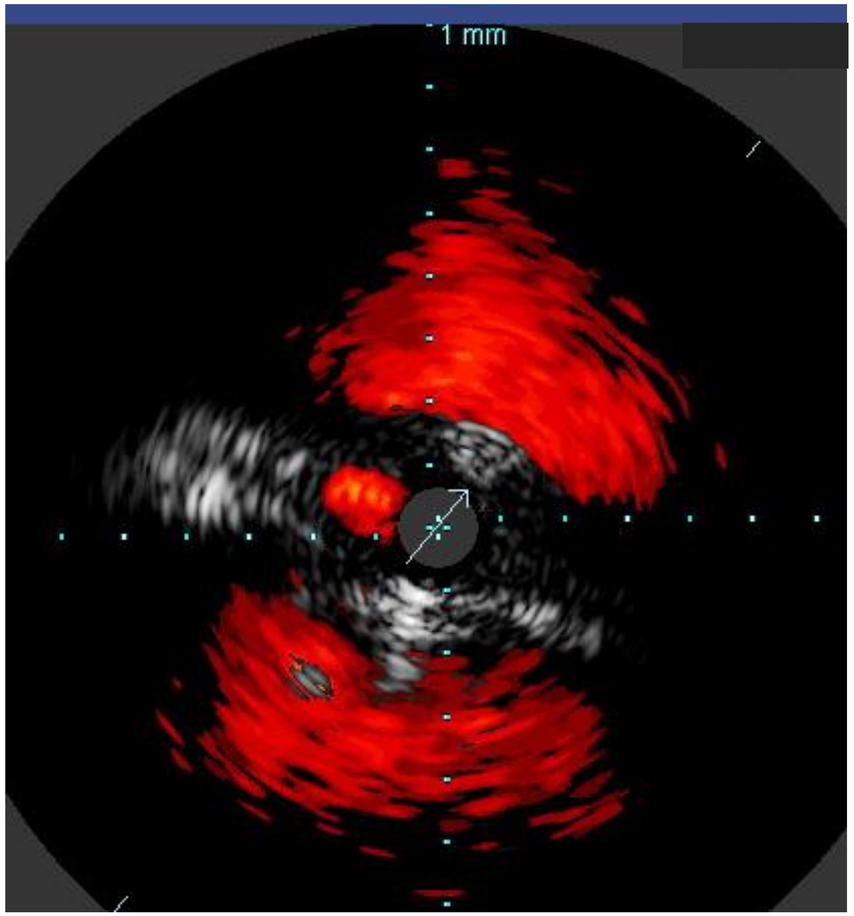
Connexions coronaires anormales et angioplastie

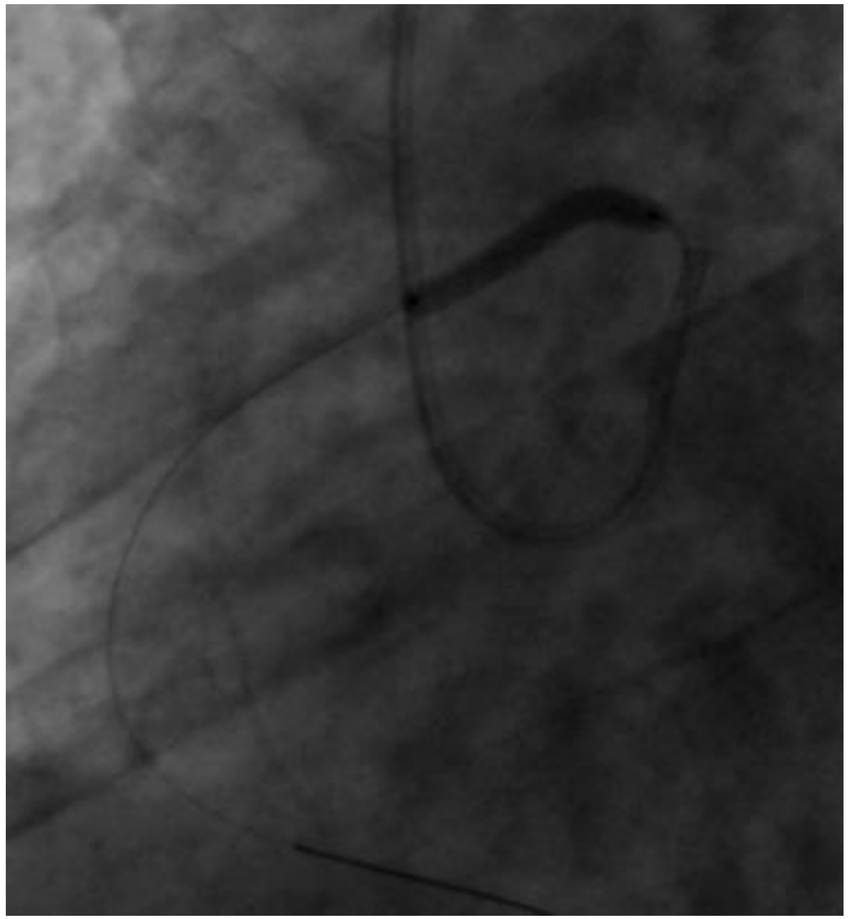


Connexions coronaires anormales et angioplastie

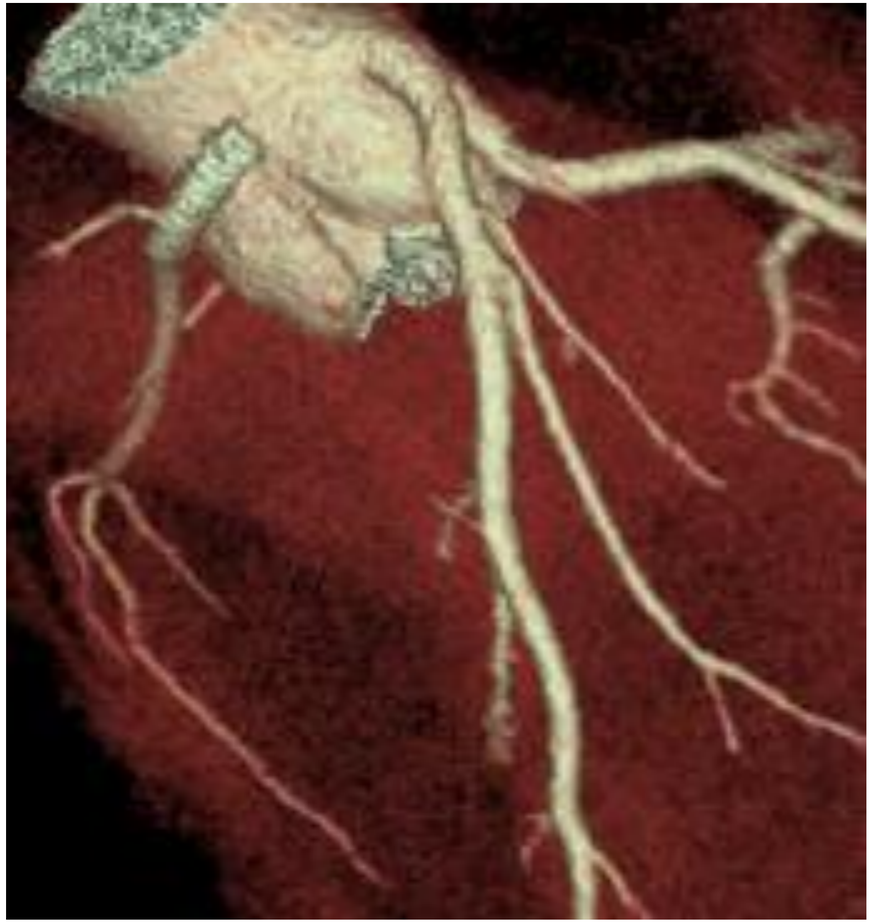


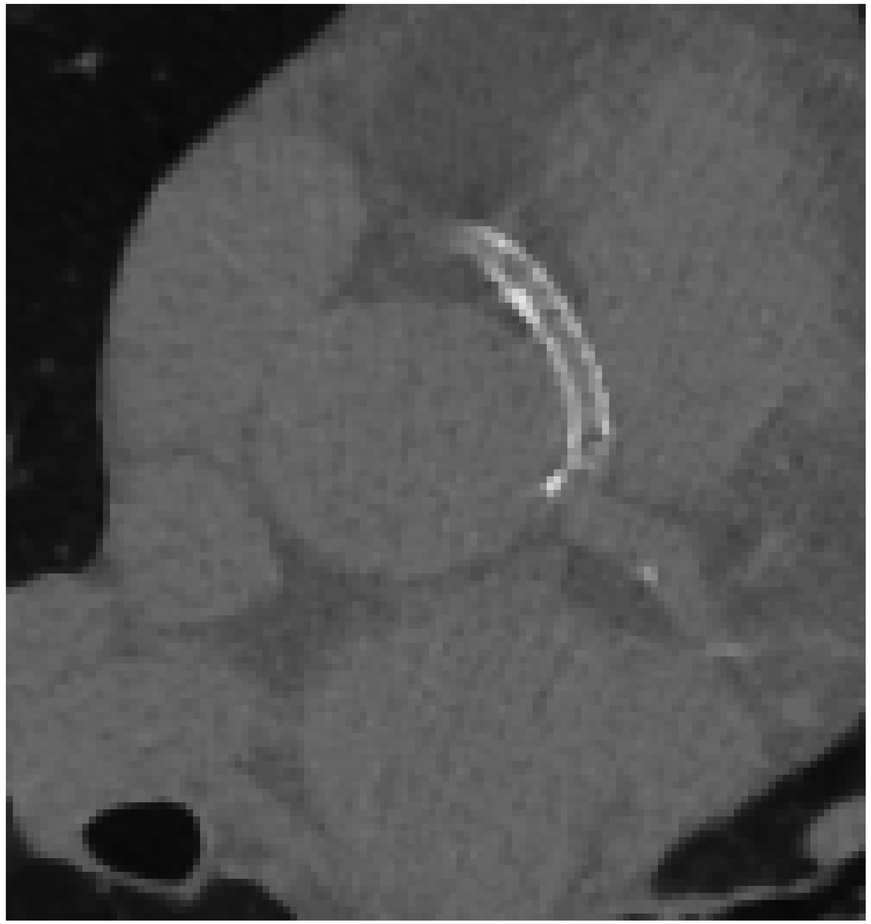
Connexions coronaires anormales et angioplastie





Scanner - 6 mois





Connexion coronaires anormales : l'angioplastie coronaire a-t-elle une place ?

Est-ce utile ?

ANOCOR stenting registry

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

ANOCOR stenting registry

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ANOCOR stenting registry

Baseline and angiographic characteristics

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

ANOCOR stenting registry

Procedural characteristics

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

ANOCOR stenting registry
Outcomes

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)

Conclusions

- Correction chirurgicale d'une connexion coronaire anormale : doit faire ses preuves dans certains cas.
- Stenting d'une connexion coronaire droite anormale : possible sans risques majeurs.
- Technique interventionnelle intégrable dans l'algorithme décisionnel : besoin d'une cohorte et d'un suivi conséquents.
- Connexion coronaire droite anormale avec symptomatologie d'allure ischémique chez un patient >30 ans : pensez à l'angioplastie.

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