

DIU de cardiologie interventionnelle structurelle valvulaire et non valvulaire
Année universitaire 2022-2023

Imagerie des fistules coronaires

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Imagerie des fistules coronaires

fistules coronaires

- prévalence angiographique -

1/1.000 coronarographies



groupe de travail multidisciplinaire sur les ANOmalties CORonaires congénitales



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Patrick Dupouy (Antony)
Xavier Halna du Fretay (Saran)
Fabien Hyafil (Paris)
Athanasios Koutsoukis (Melun)
Phalla Ou (Paris)

staffs ANOCOR

100 dossiers annuels

- Connexions anormales proximales **95**
- Connexions anormales distales **4**
- Autres anomalies/variantes anatomiques **1**



Imagerie des fistules coronaires

-  IRM cardiaque
-  Echocardiogramme
-  Coronarographie
-  Scanner coronaire et cardiaque
-  Modélisation 3-D

Imagerie des fistules coronaires

Type anatomique

- type A
- type B

Type anatomique

- petite
- intermédiaire
- large

Type anatomique

- microfistules
- macrofistules

Type anatomique

- fistule unique
- fistules multiples

Retentissement physiologique

- shunt gauche-droit
- shunt gauche-gauche
- vol coronaire

Retentissement fonctionnel

- symptômes
- pas de symptômes

Retentissement artériel

- allongement vasculaire
- déformation anévrysmale
- tortuosités
- calcifications

Imagerie des fistules coronaires

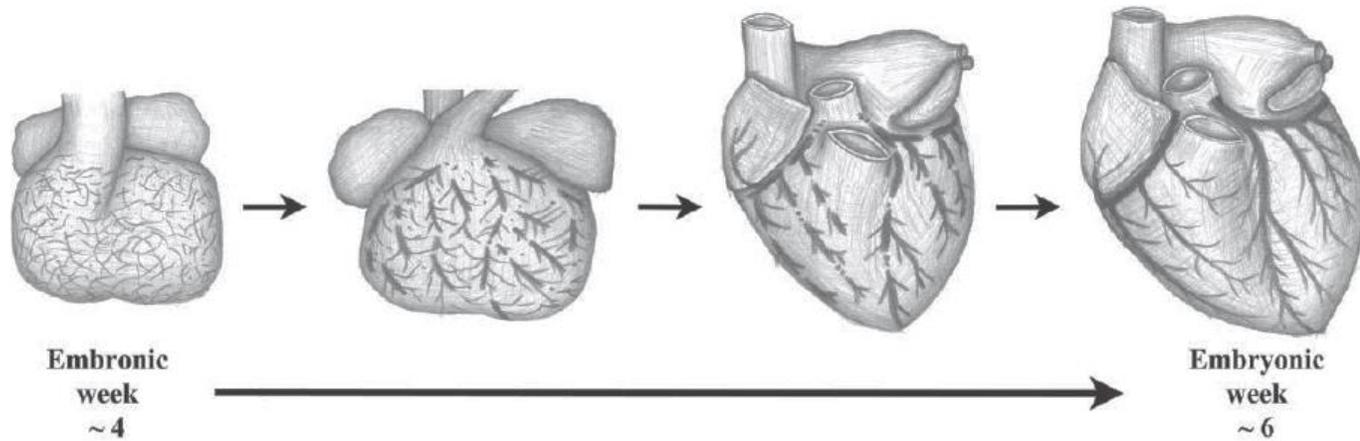
Type anatomique

- microfistules
- macrofistules



Microfistules multiples coronaire gauche - VG

Imagerie des fistules coronaires



Development of coronary vessels during embryogenesis.

Lluri G. *Clin Cardiol* 2014

Bogers AJ. *Anat Embryol* 1989

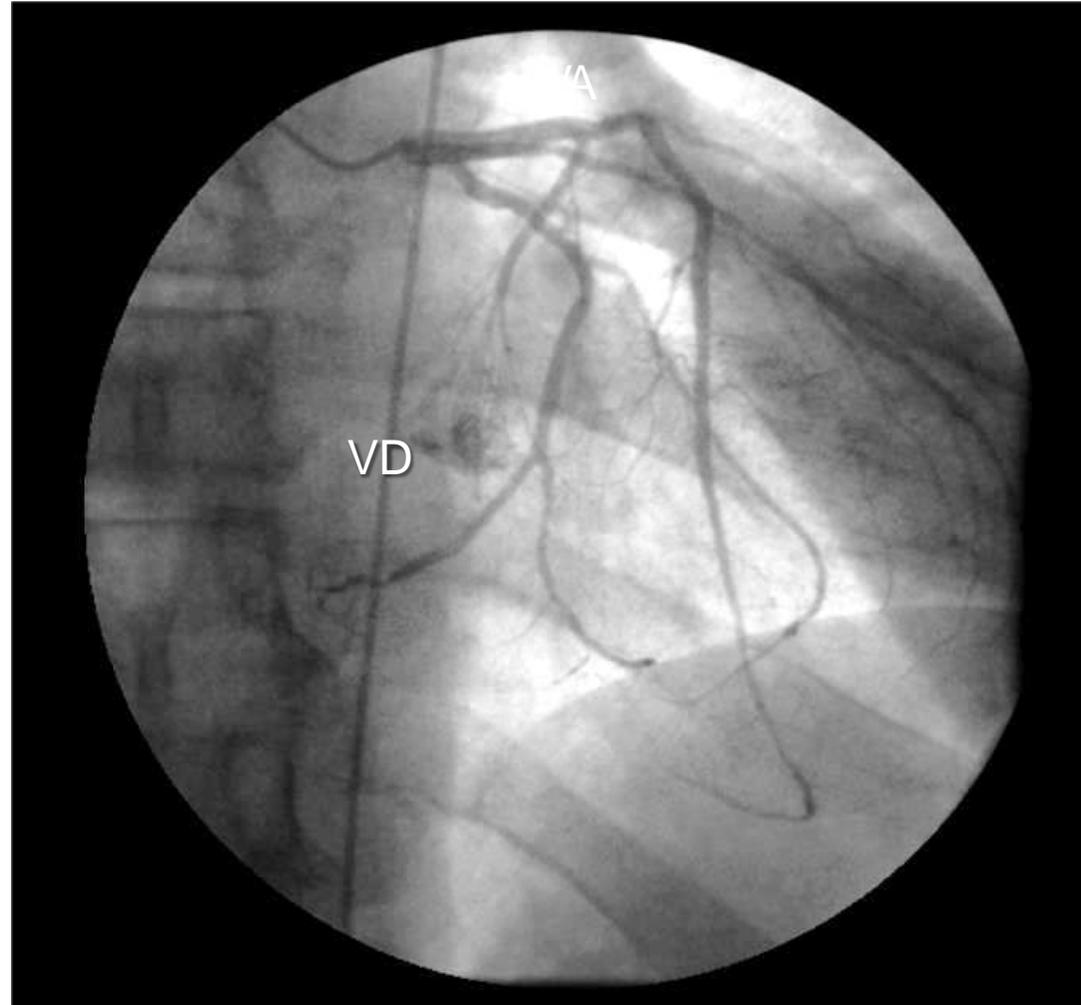


Microfistules multiples coronaire gauche - VG

Imagerie des fistules coronaires

Type anatomique

- microfistules
- macrofistules



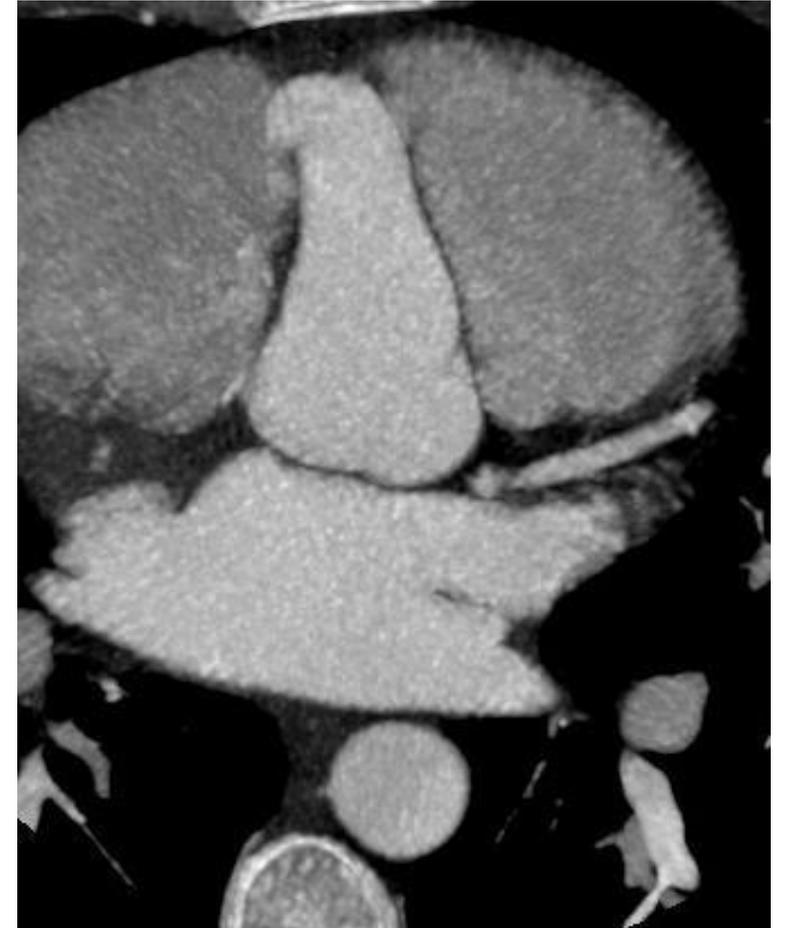
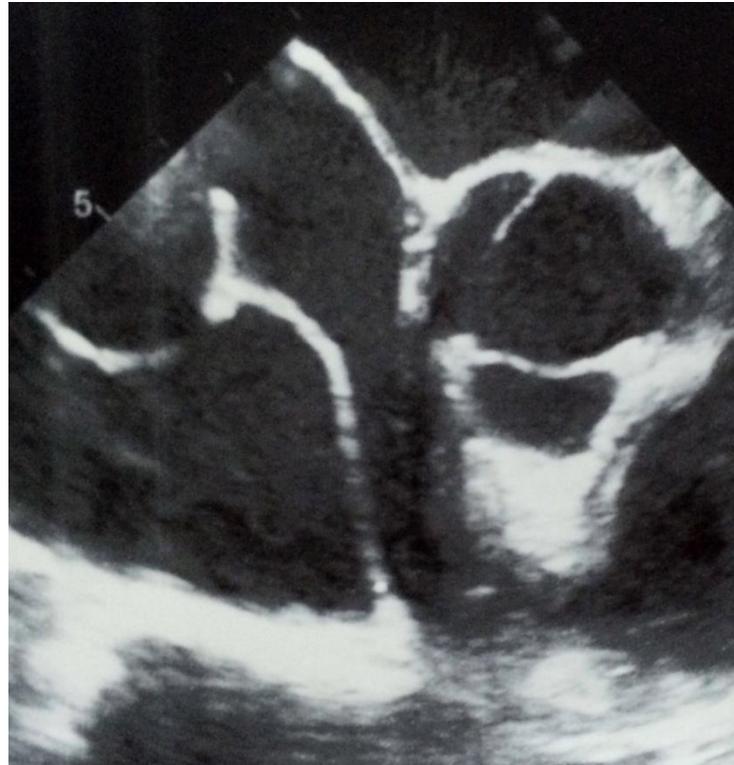
Microfistules multiples IVA - VD

Imagerie des fistules coronaires

- Femme de 25 ans
- Lipothymies d'effort
- Souffle cardiaque continu

Type anatomique

- microfistules
- macrofistules

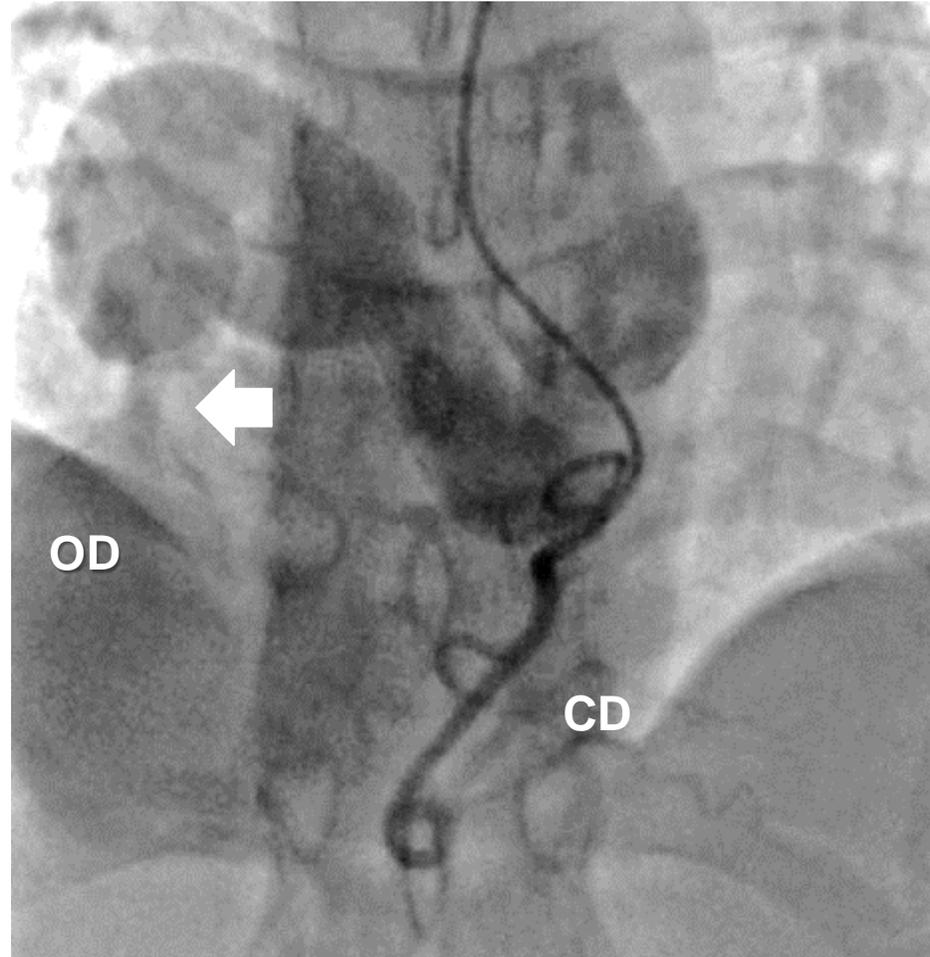


Courtesy of Dr Senassaoui (Oran, Algérie)

Imagerie des fistules coronaires

Type anatomique

- type A
- type B



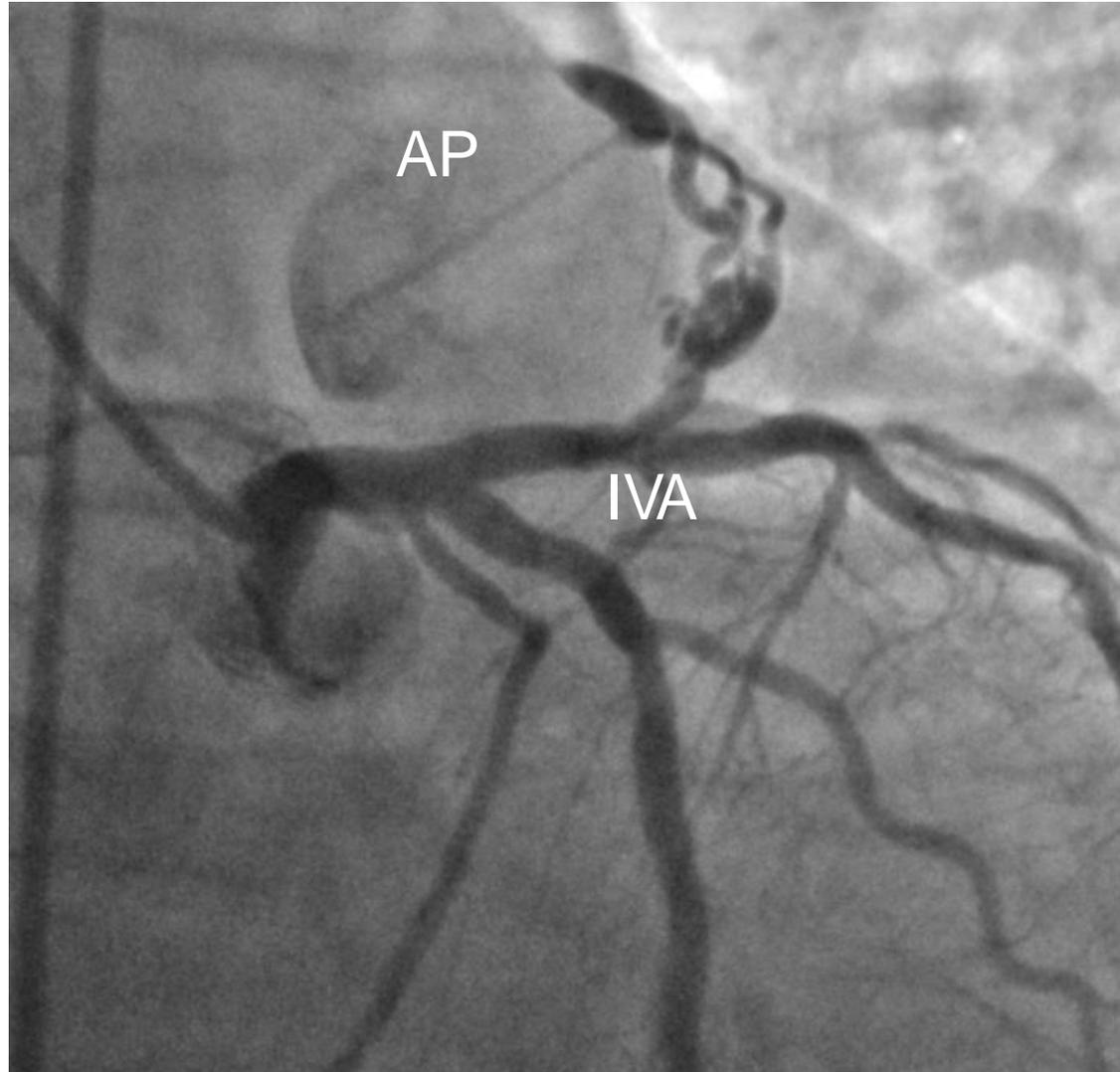
Fistule coronaire droite - OD

Courtesy of Dr Senassaoui (Oran, Algérie)

Imagerie des fistules coronaires

Type anatomique

- type A
- type B



Fistule unique IVA - AP (type A)

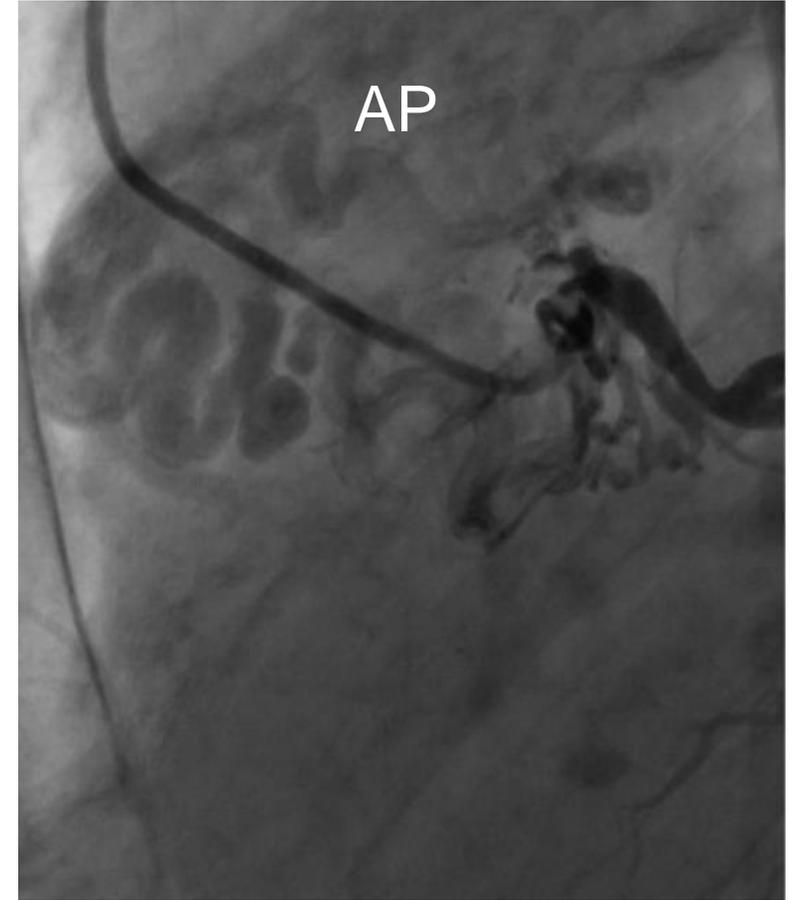
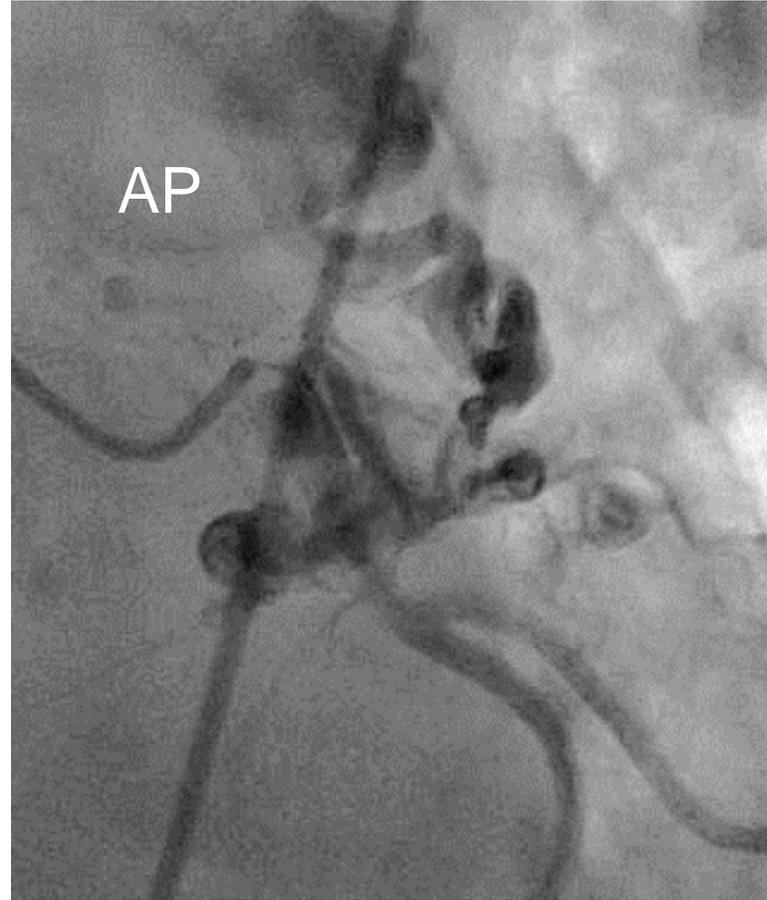
Imagerie des fistules coronaires

Type anatomique

- type A
- type B

Type anatomique

- fistule unique
- fistules multiples



Fistules multiples coronaires gauches - AP

Imagerie des fistules coronaires

Retentissement physiologique

- shunt gauche-droit
- shunt gauche-gauche
- vol coronaire ?



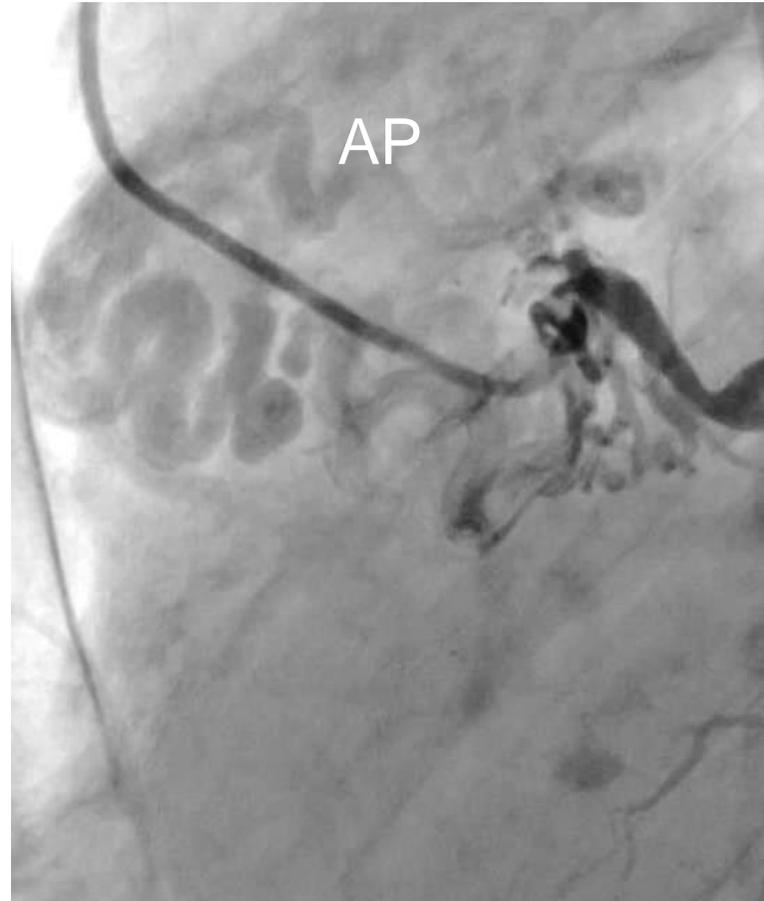
Imagerie des fistules coronaires

Type anatomique

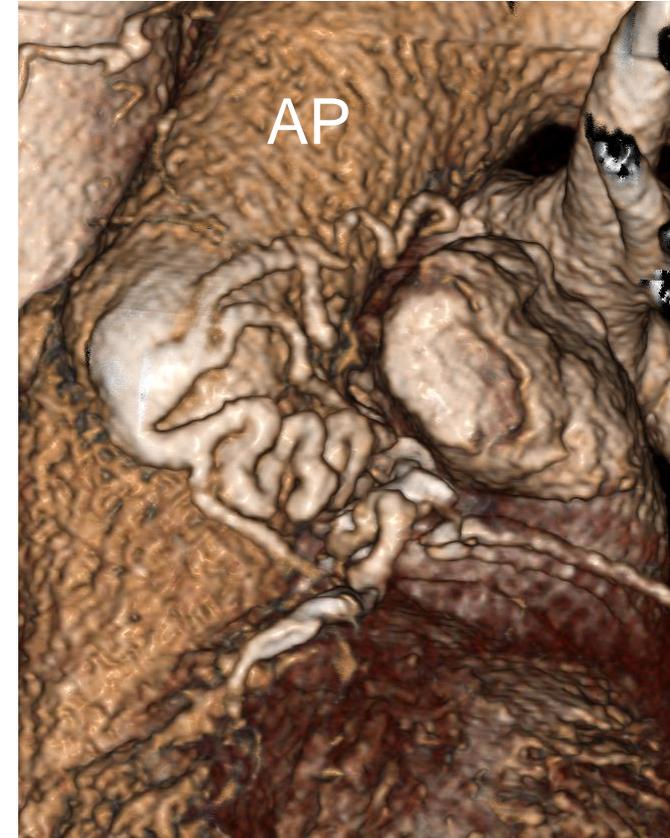
- fistule unique
- fistules multiples

Type anatomique

- petite
- intermédiaire
- large



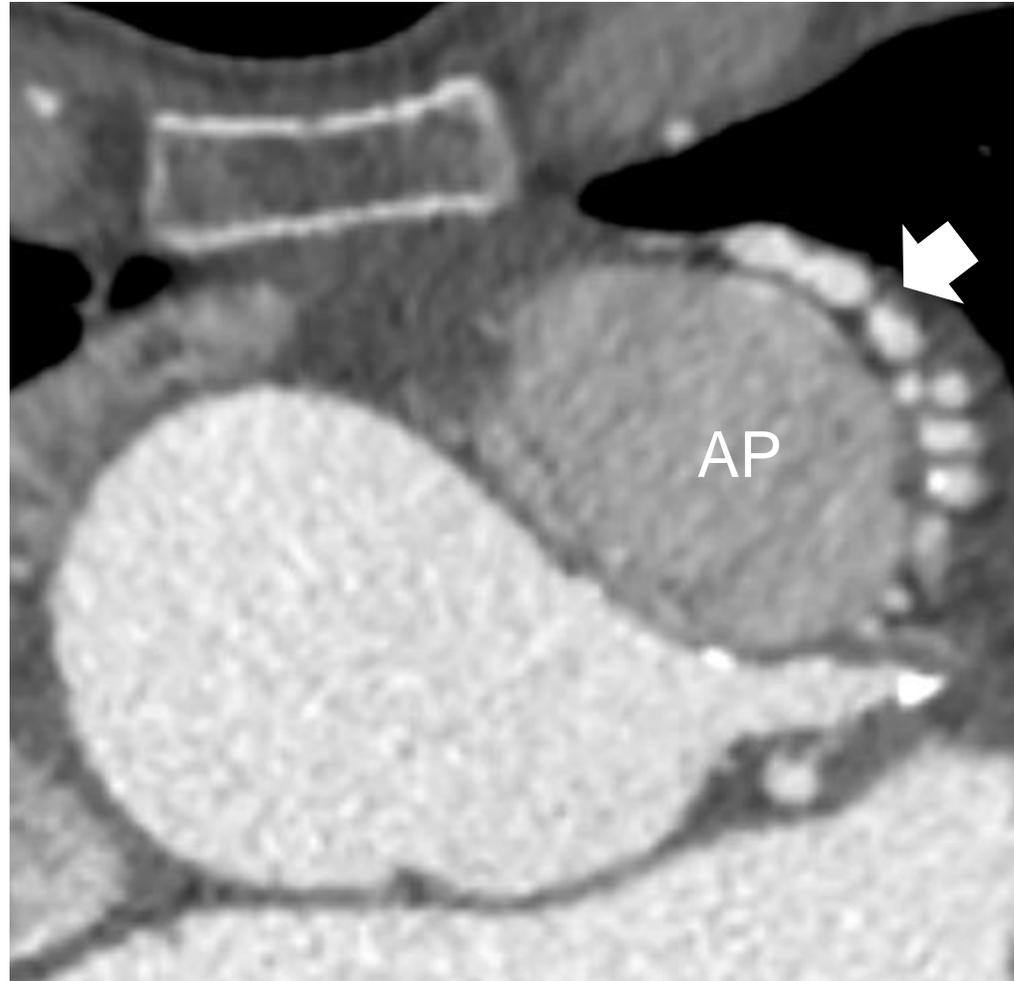
fistules multiples



Imagerie des fistules coronaires

Type anatomique

- fistule unique
- fistules multiples



fistules multiples

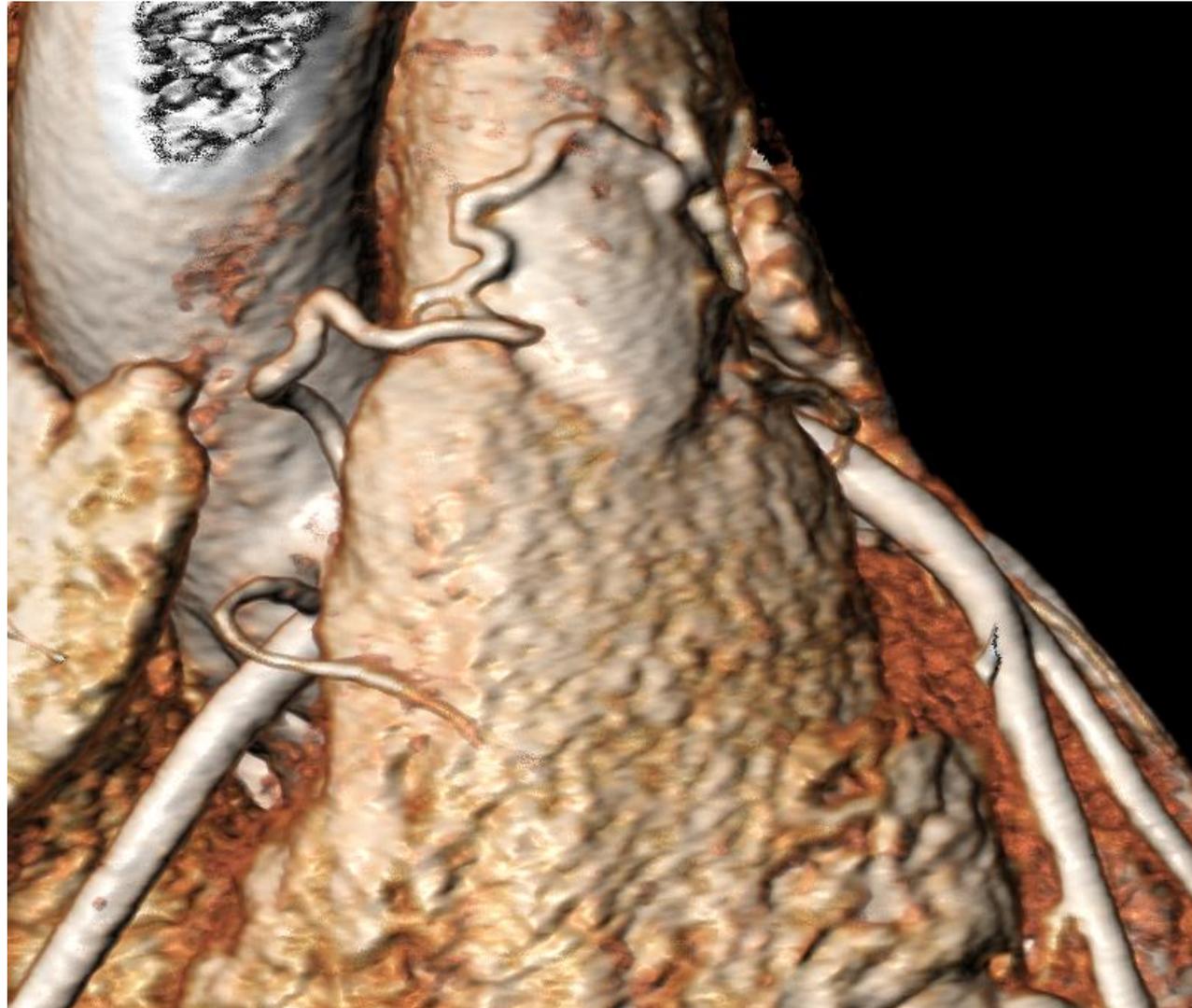
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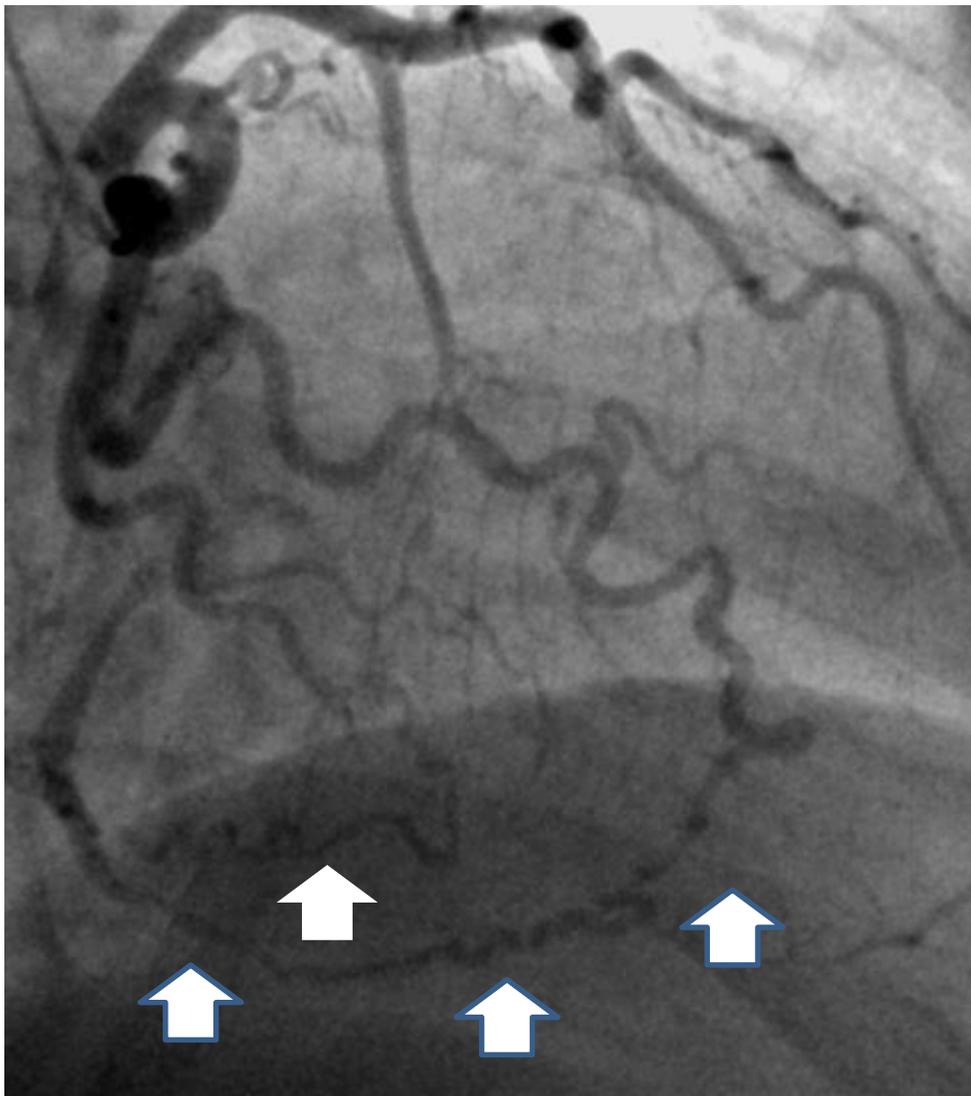


Fistule coronaire droite - AP

Imagerie des fistules coronaires

Type anatomique

- type A
- type B

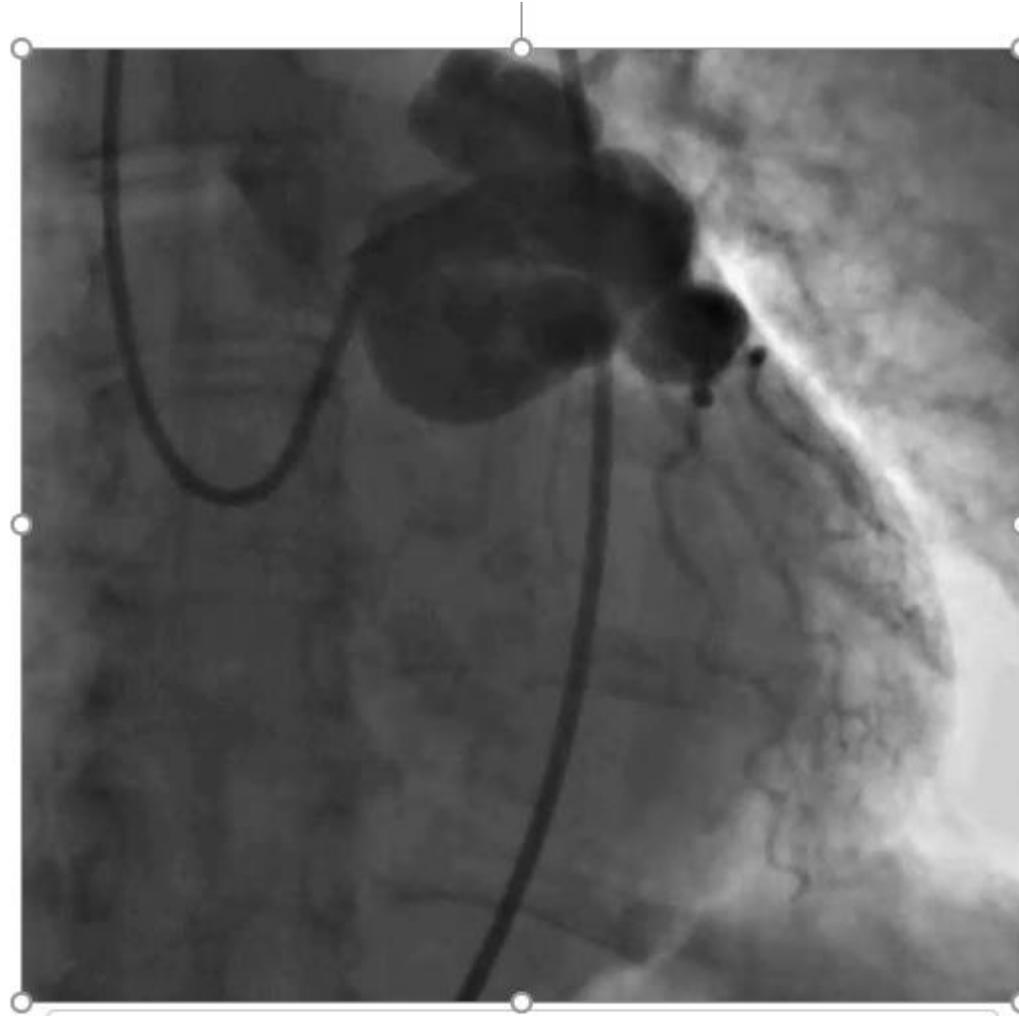


fistules marginales gauches - VG

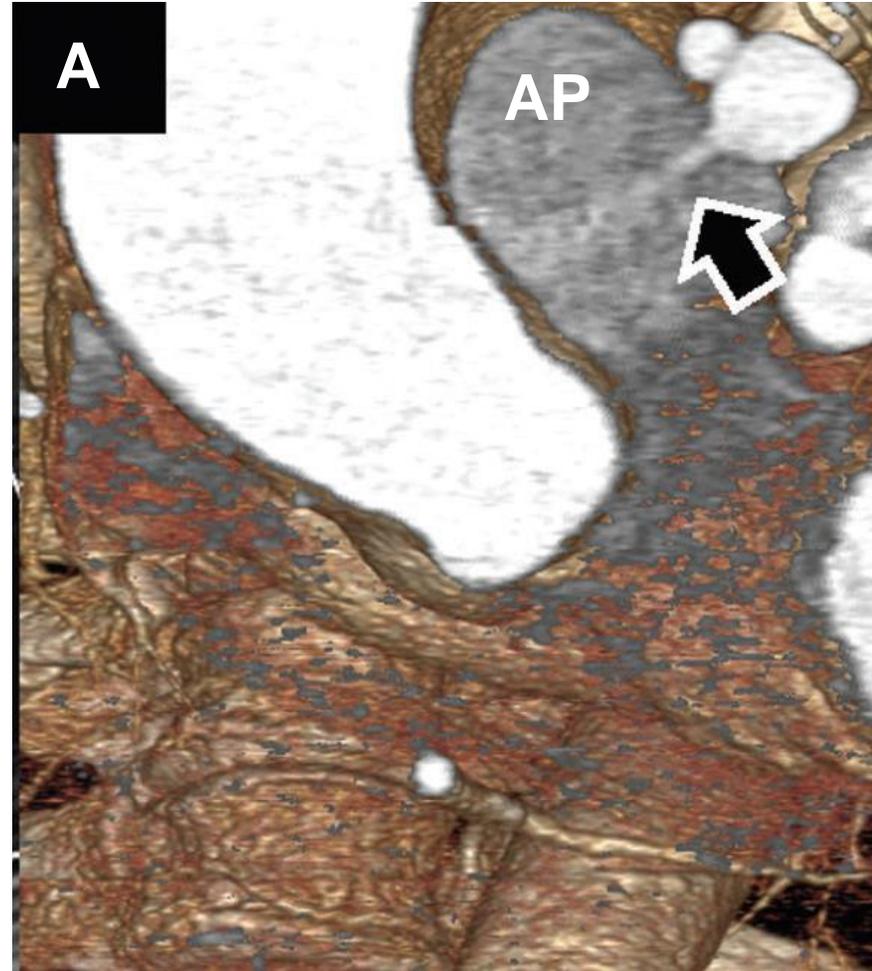
Imagerie des fistules coronaires

Type anatomique

- petite
- intermédiaire
- large



Imagerie des fistules coronaires



Fistule IVA - AP

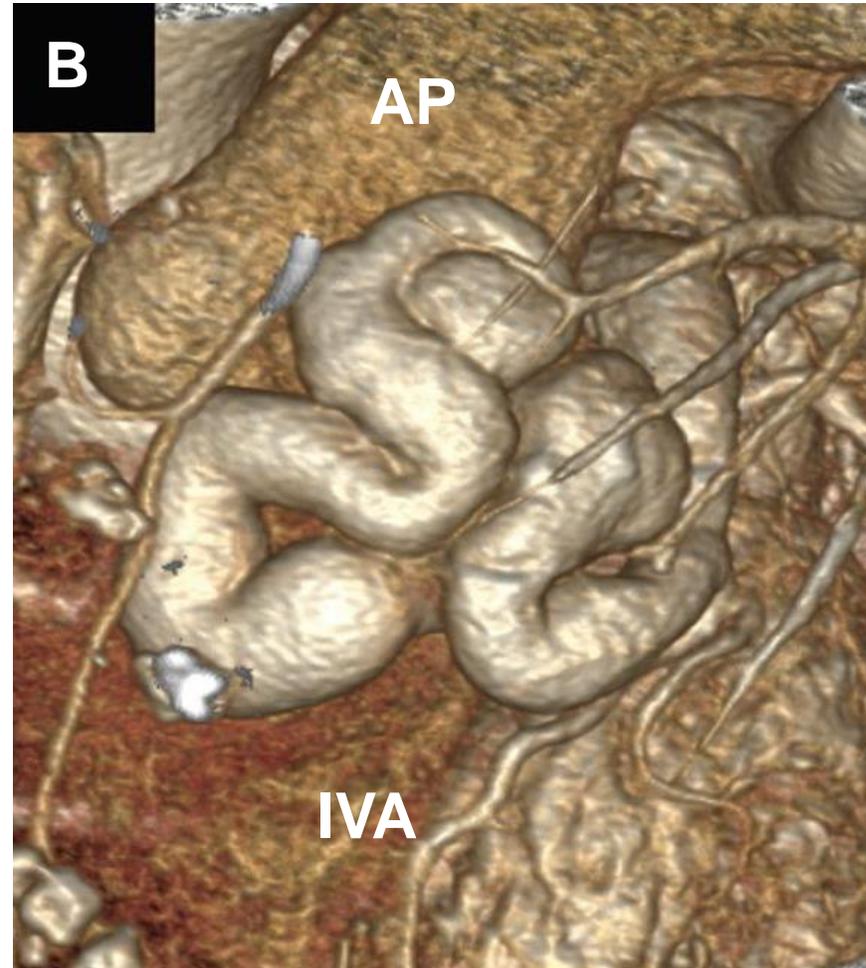
Imagerie des fistules coronaires

Type anatomique

- type A
- type B

Retentissement artériel

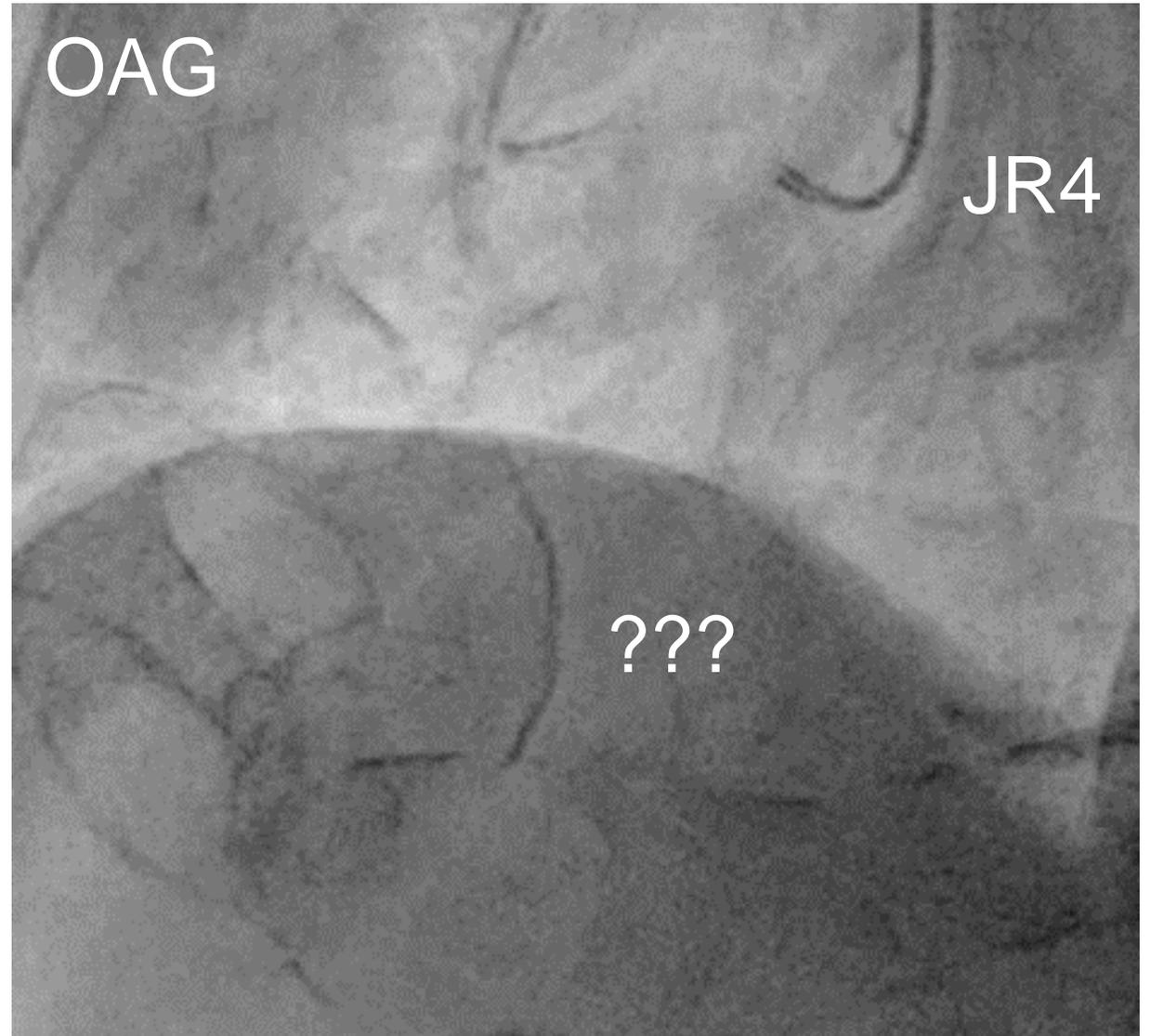
- allongement vasculaire
- déformation anévrysmale
- tortuosités
- calcifications



Fistule IVA - AP

Imagerie des fistules coronaires

- Femme de 87 ans
- Tableau insuffisance cardiaque droite
- Dilatation cavités droites



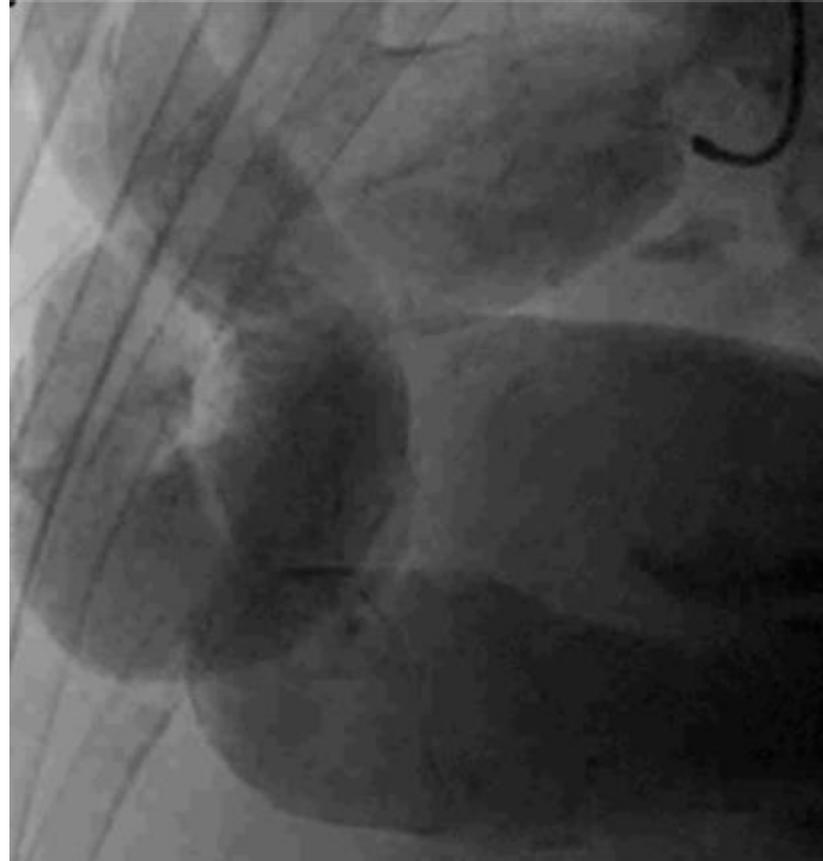
Imagerie des fistules coronaires

Type anatomique

- petite
- intermédiaire
- large

Retentissement physiologique

- shunt gauche-droit
- shunt gauche-gauche
- vol coronaire



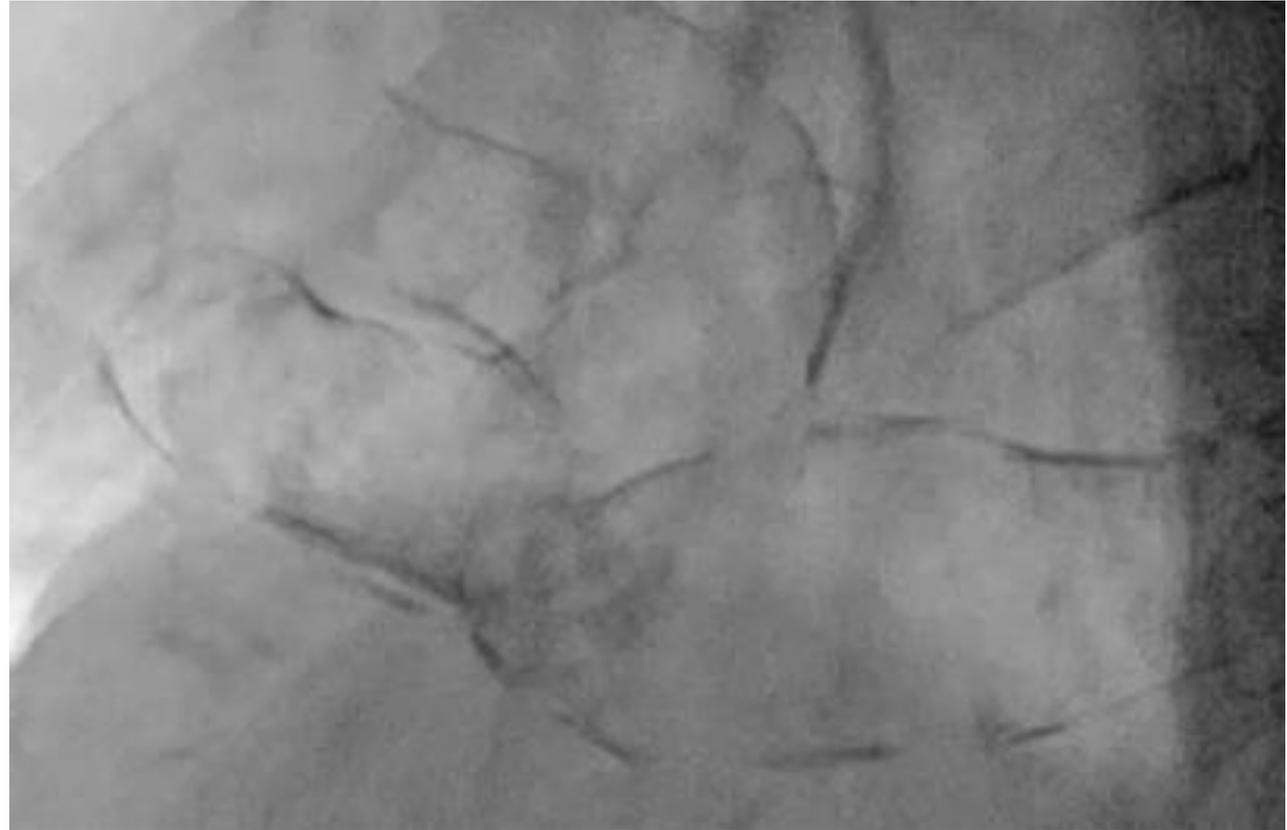
Fistule coronaire droite - OD

Courtesy of Pr Meneveau (CHU BESANCON)

Imagerie des fistules coronaires

Retentissement artériel

- allongement vasculaire
- déformation anévrysmale
- tortuosités
- calcifications



Fistule coronaire droite - OD

Courtesy of Pr Meneveau (CHU BESANCON)

Imagerie des fistules coronaires

Type anatomique

- type A
- type B

Retentissement fonctionnel

- symptômes
- pas de symptômes

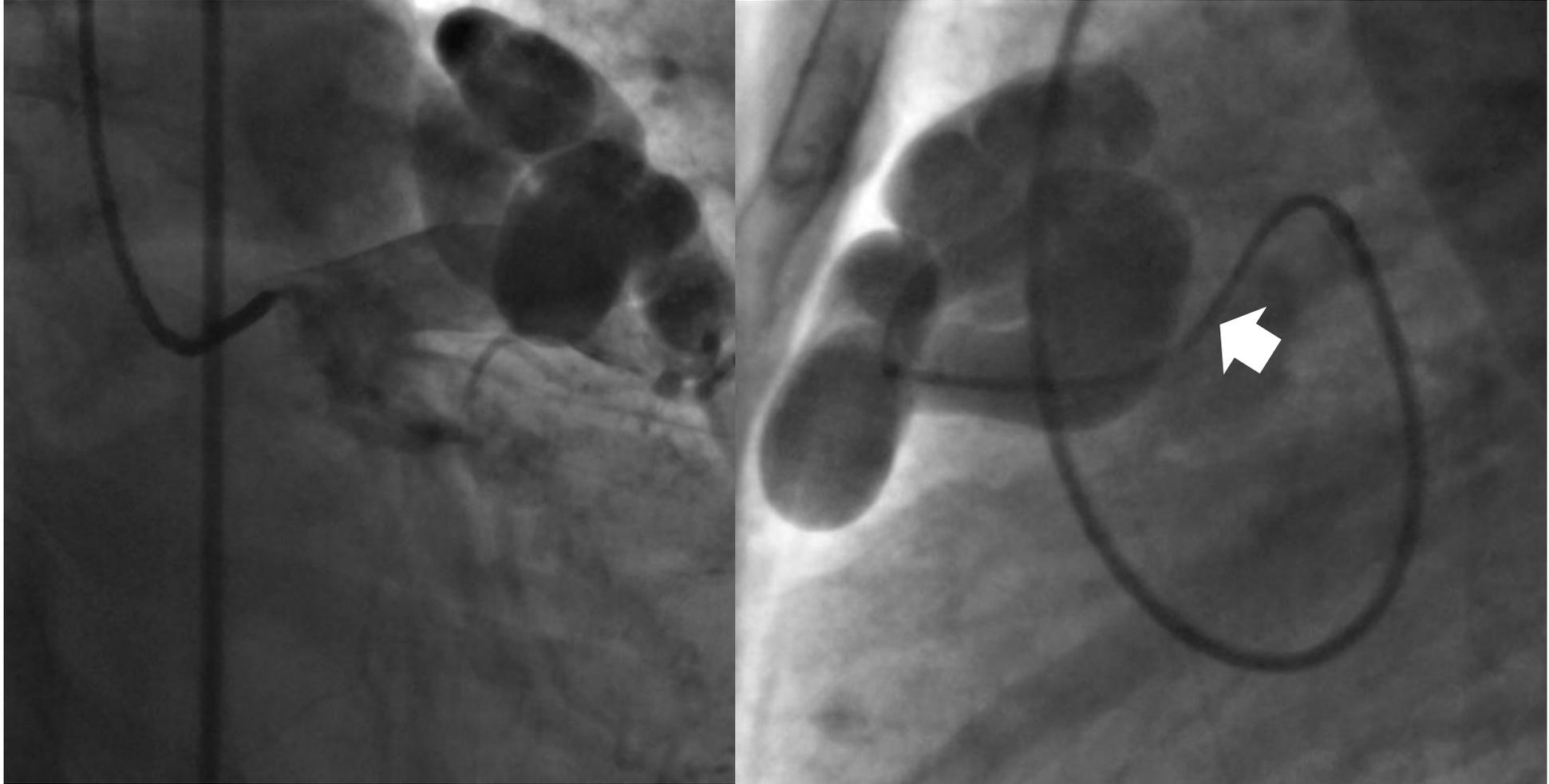


Fistule coronaire droite - OD

Courtesy of Pr Meneveau (CHU BESANCON)

Imagerie des fistules coronaires

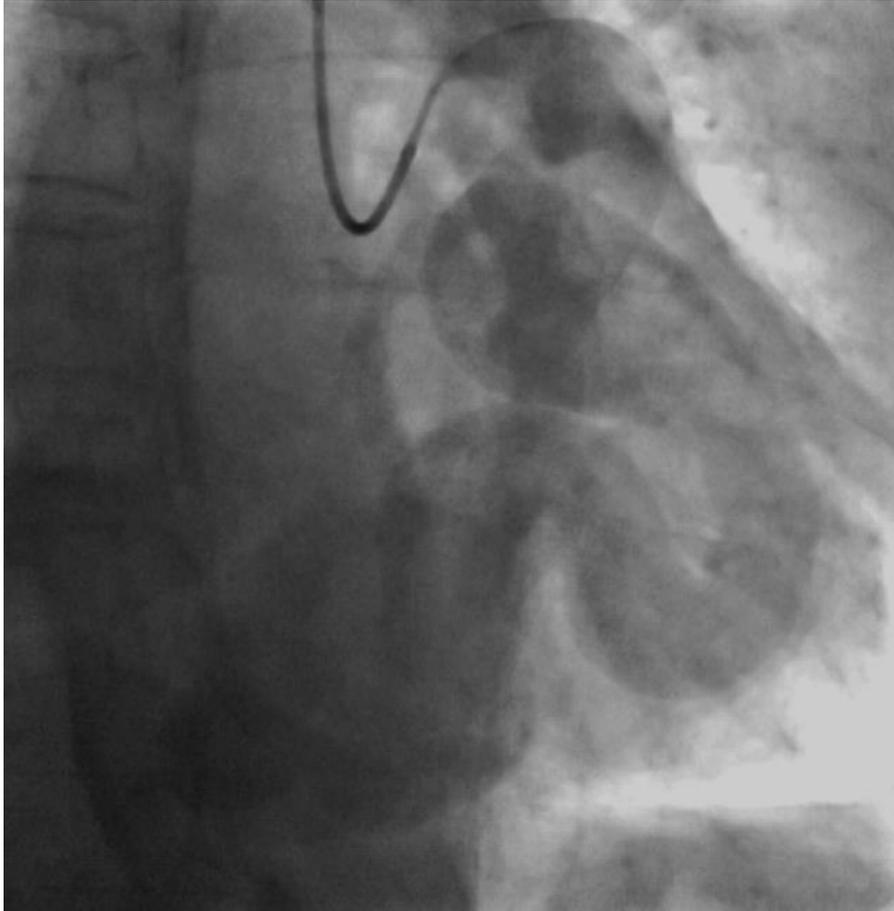
Extension de cathéter



Fistule IVA - AP

Imagerie des fistules coronaires

Limites de la coronarographie



Fistule Cx - sinus coronaire

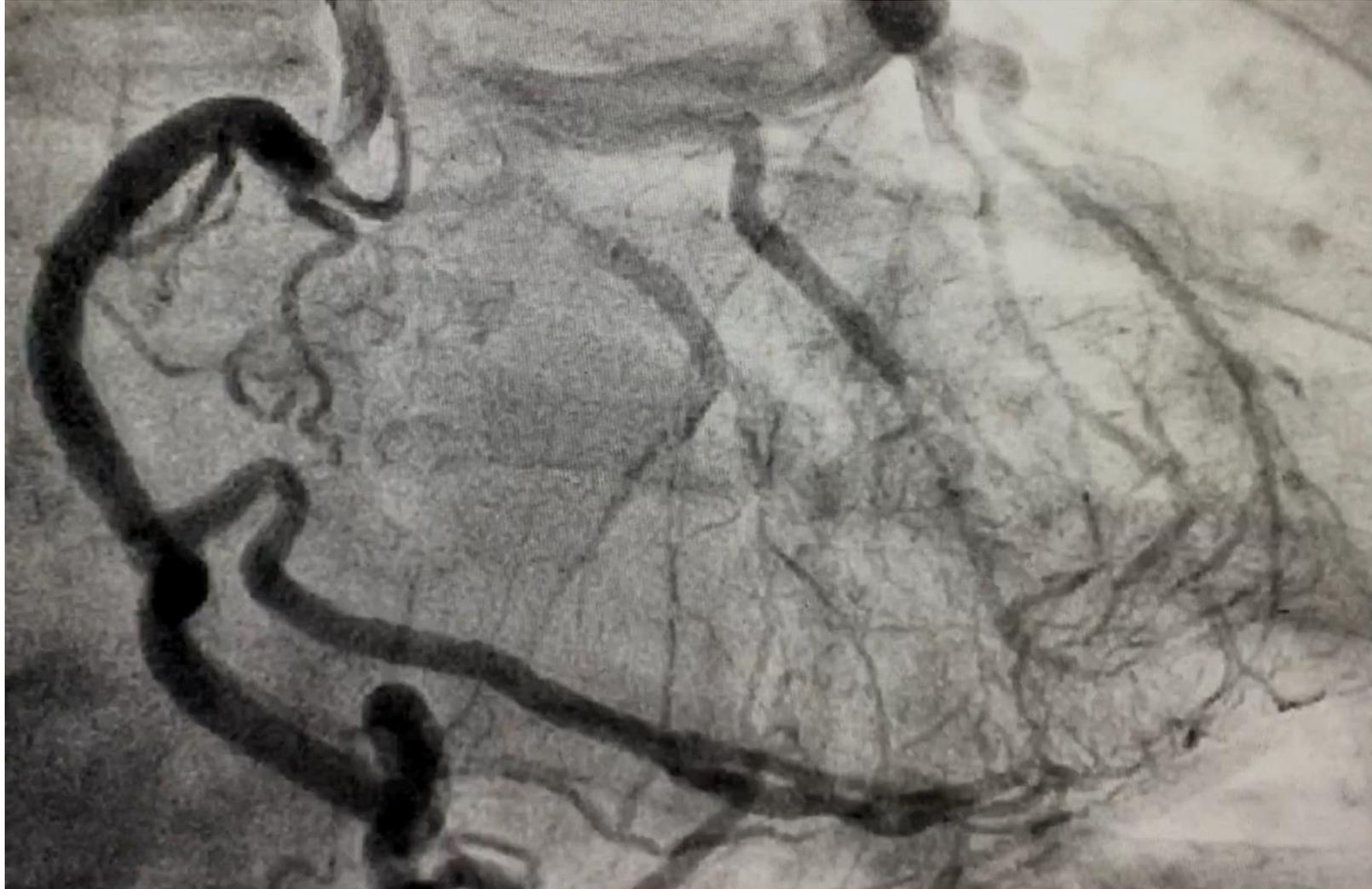
Imagerie des fistules coronaires

Coronarographie des fistules larges

- Injections classiques
- Augmentation débits/volumes
- Cathéters large lumière
- Extension de cathéter
- Aortographies
- Scanner

Imagerie des fistules coronaires

Diagnostic différentiel



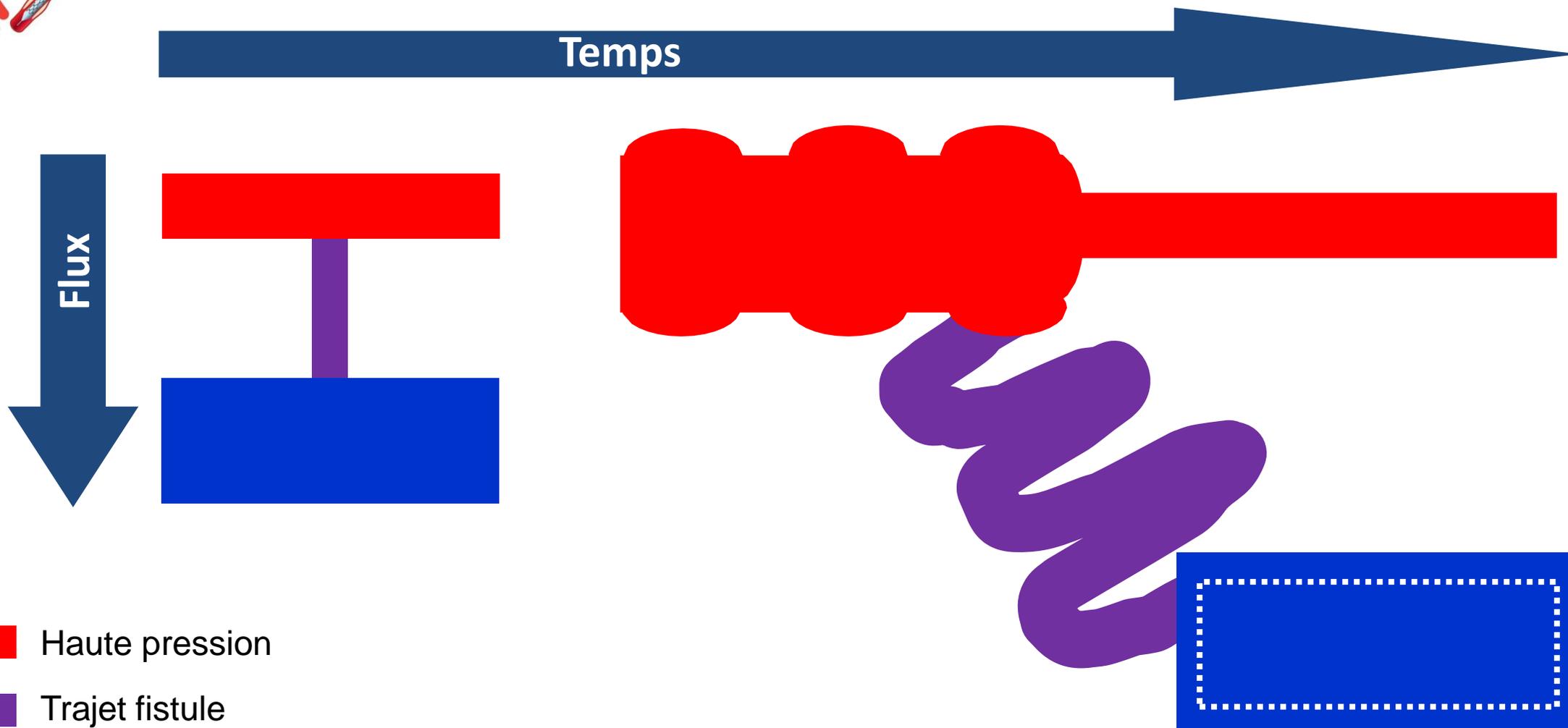
Imagerie des fistules coronaires

Diagnostic différentiel



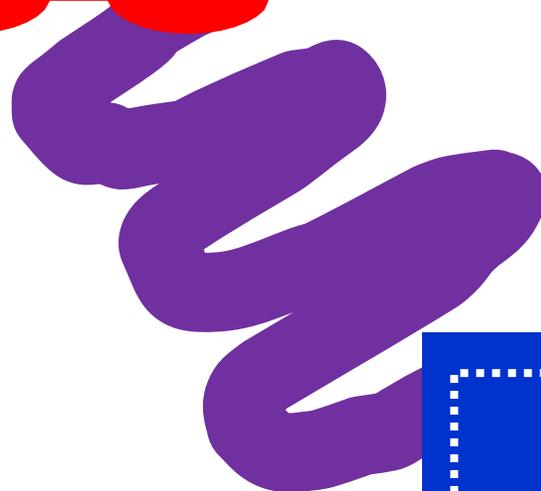
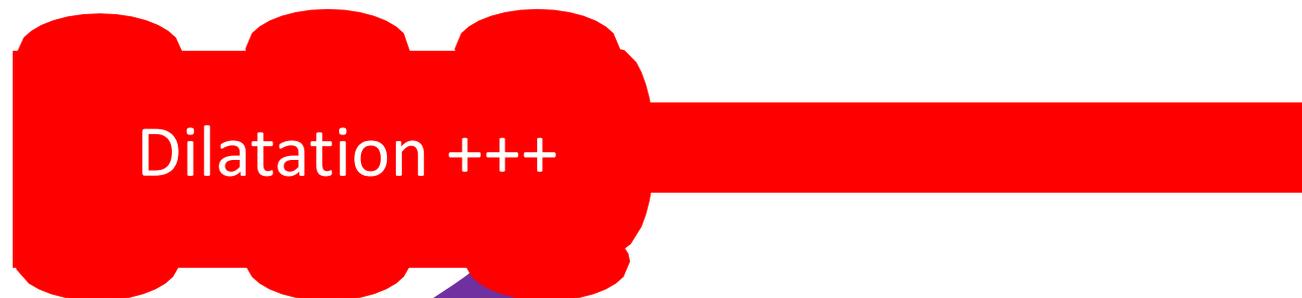
Connexion IVA dans artère pulmonaire

Fistules coronaires larges de type A



- Haute pression
- Trajet fistule
- Basse pression

Fistules coronaires larges de type A



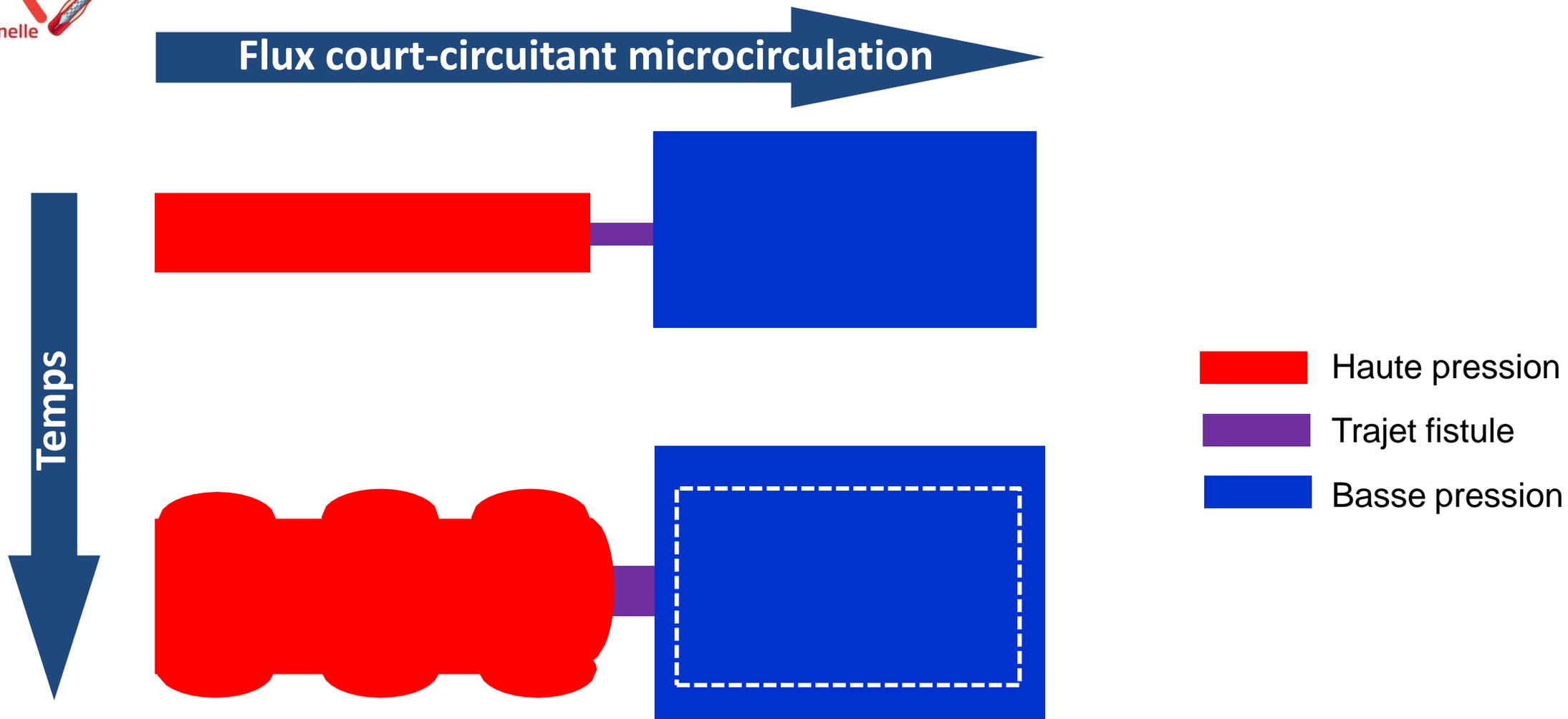
Vasculogénèse +++



Dilatation assez rare

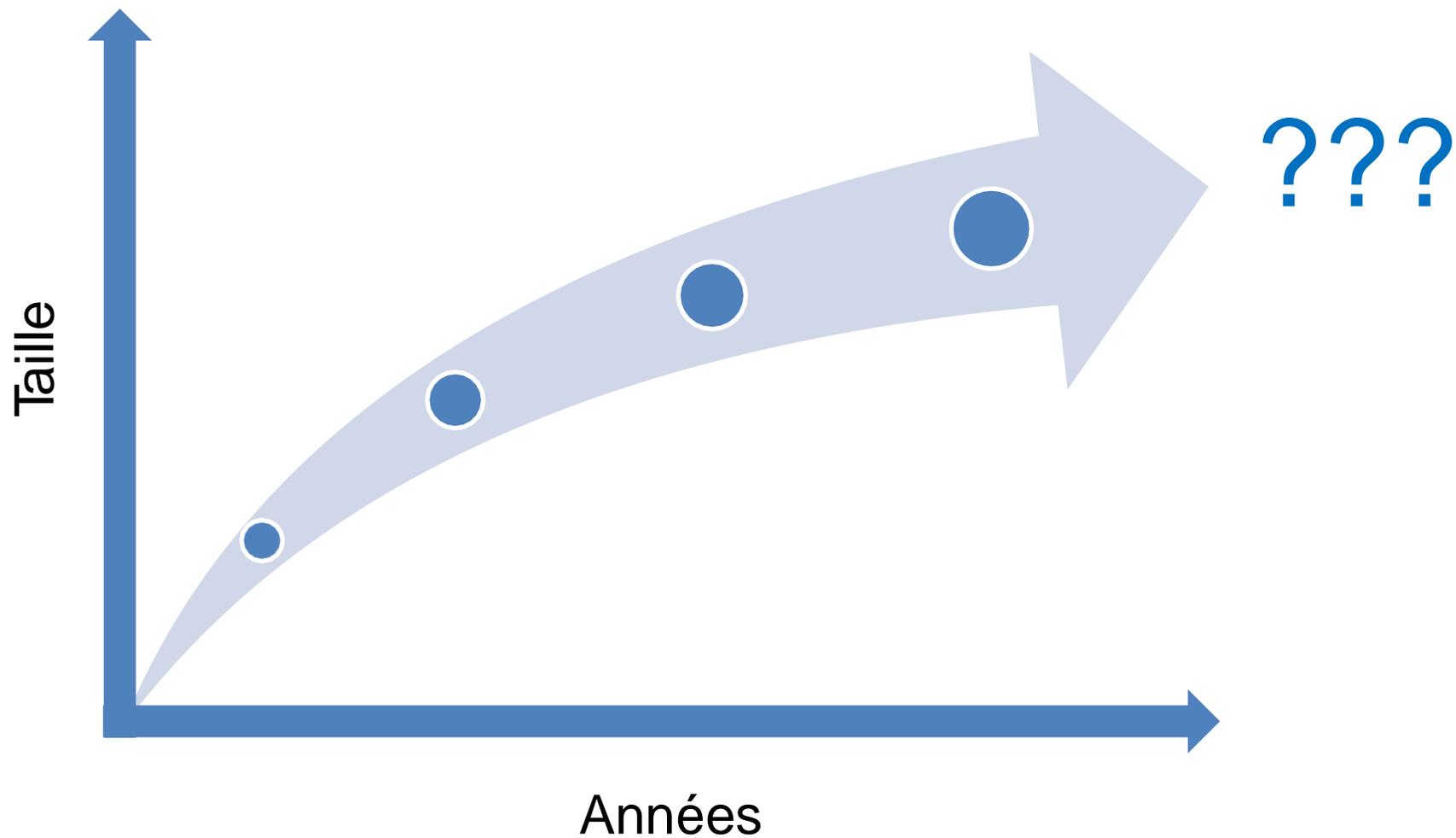
-  Haute pression
-  Trajet fistule
-  Basse pression

Fistules coronaires larges de type B



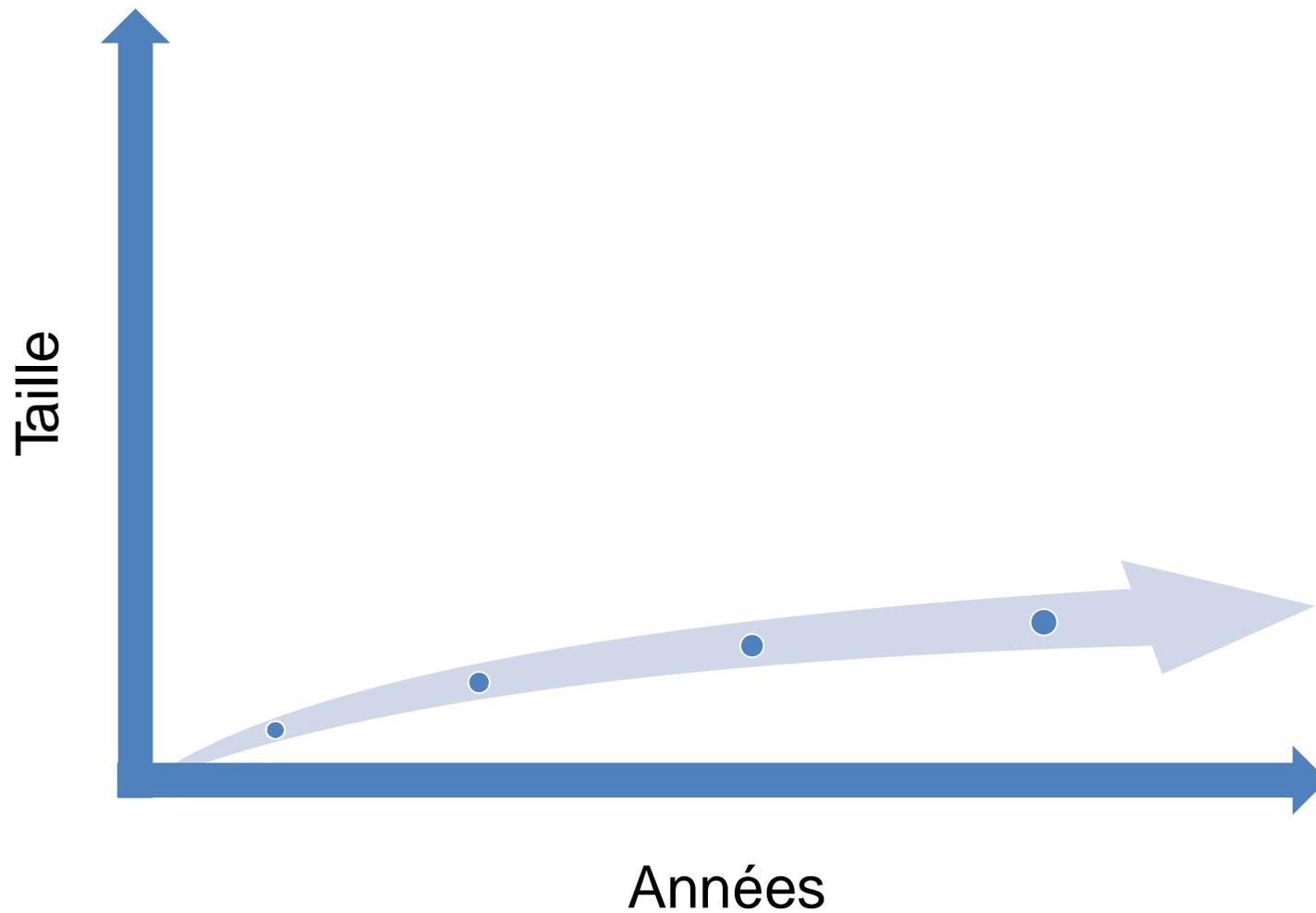
Taille des fistules coronaires

Evolution mal connue



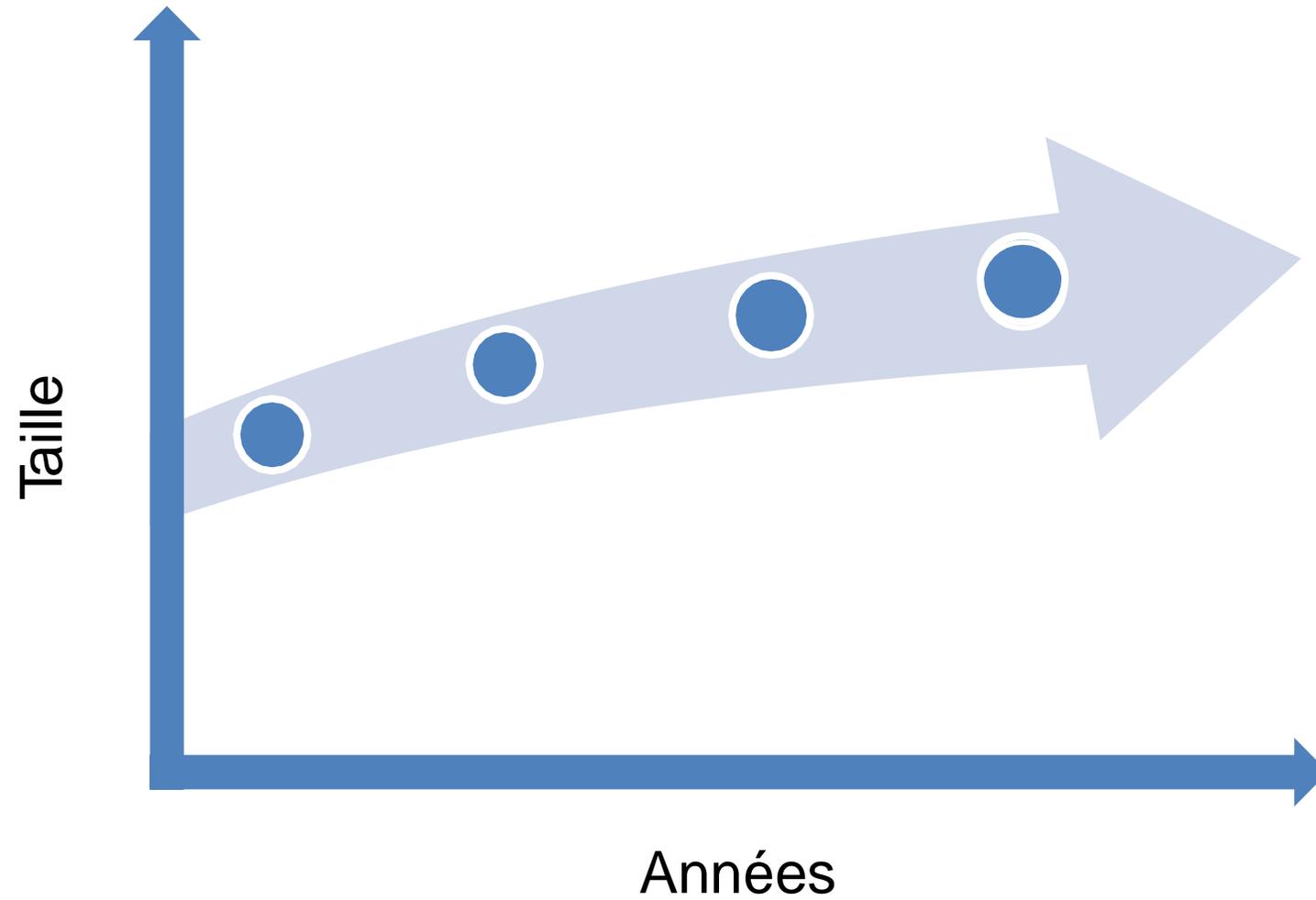
Taille des fistules coronaires

Evolution mal connue



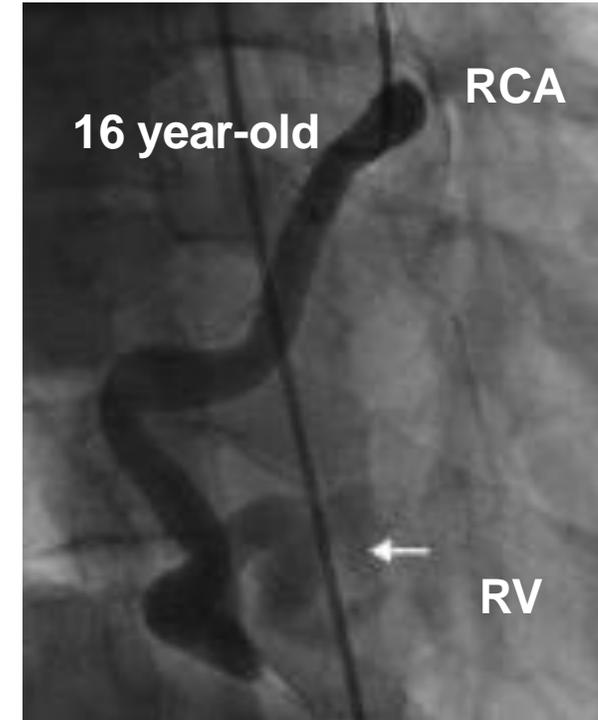
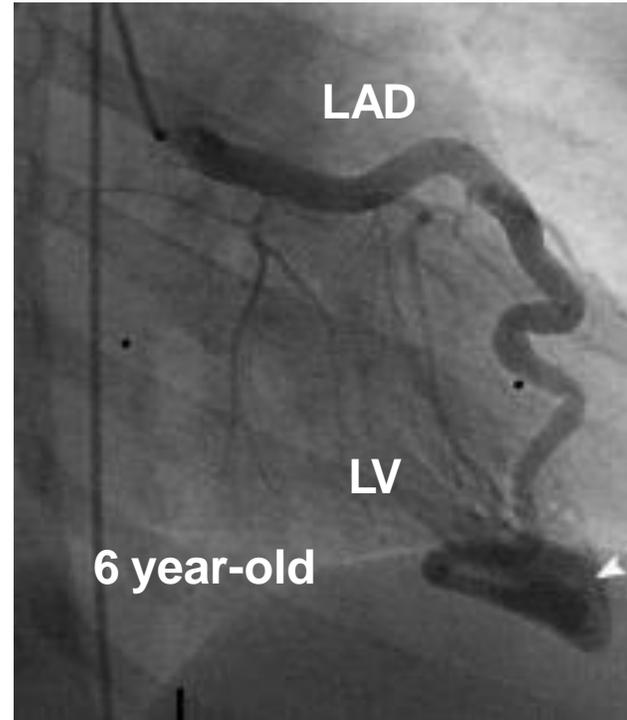
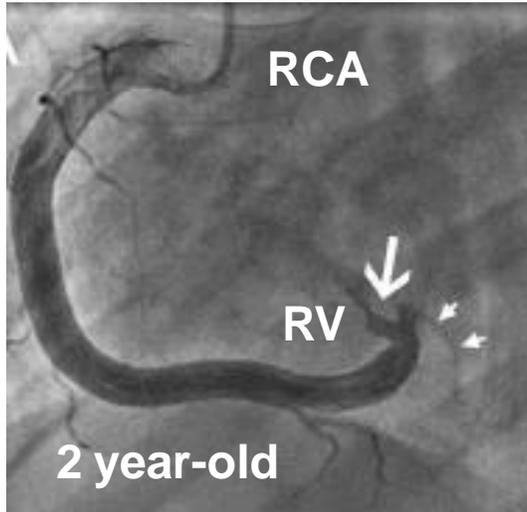
Taille des fistules coronaires

Evolution mal connue

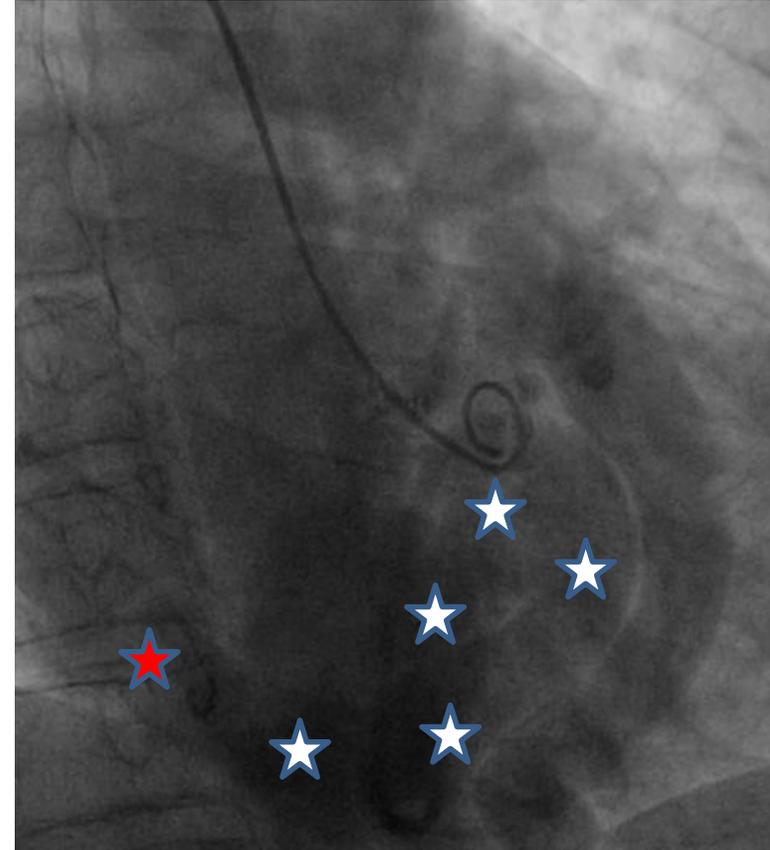
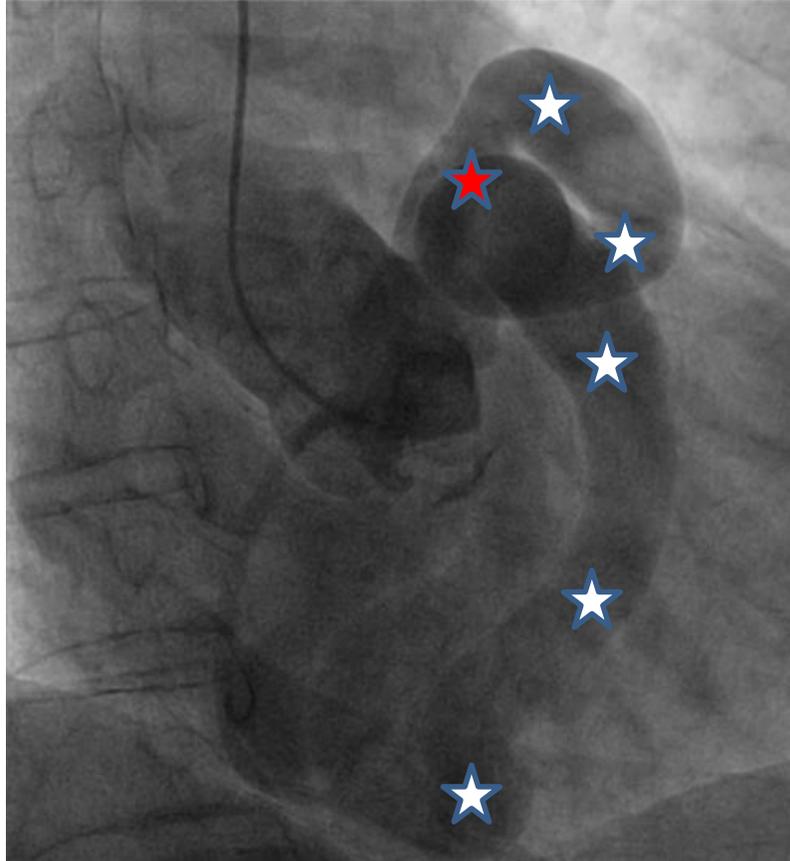


Imagerie des fistules coronaires

Larges fistules possibles avant l'âge adulte

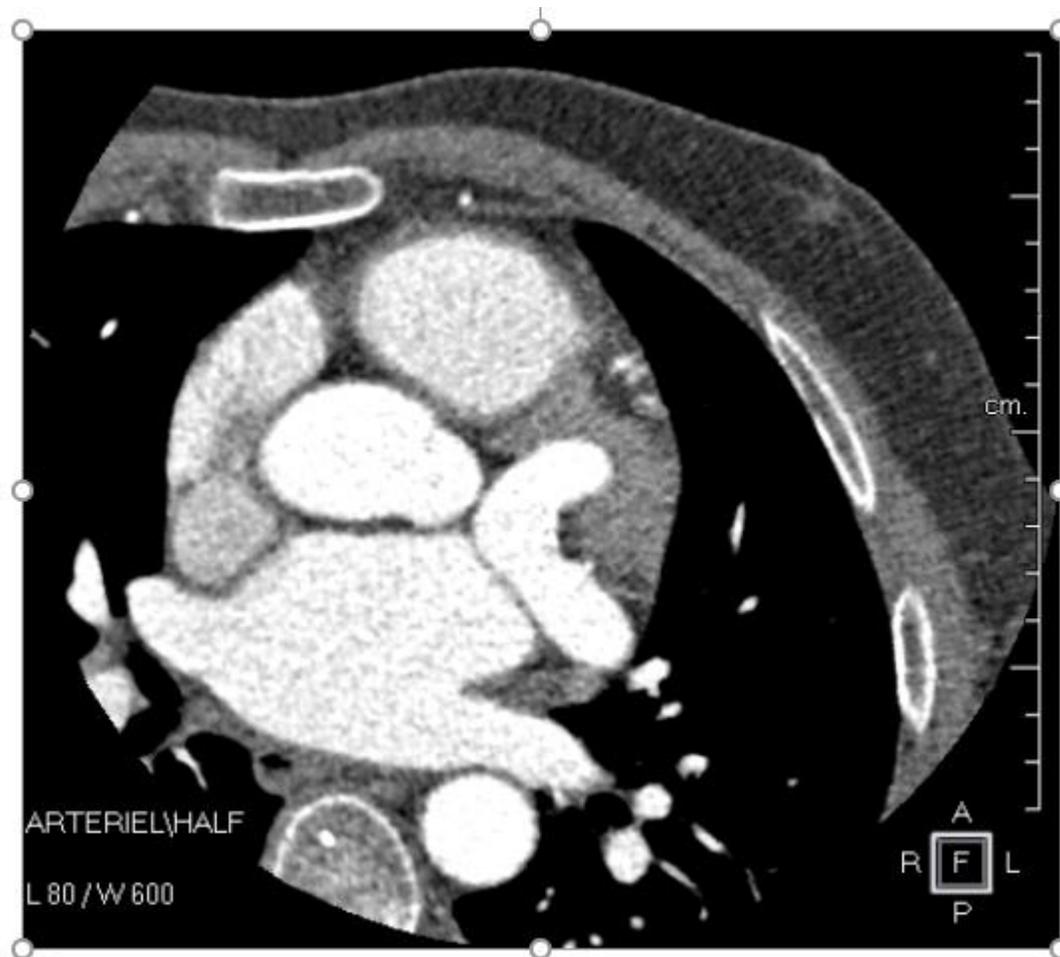


Imagerie des fistules coronaires



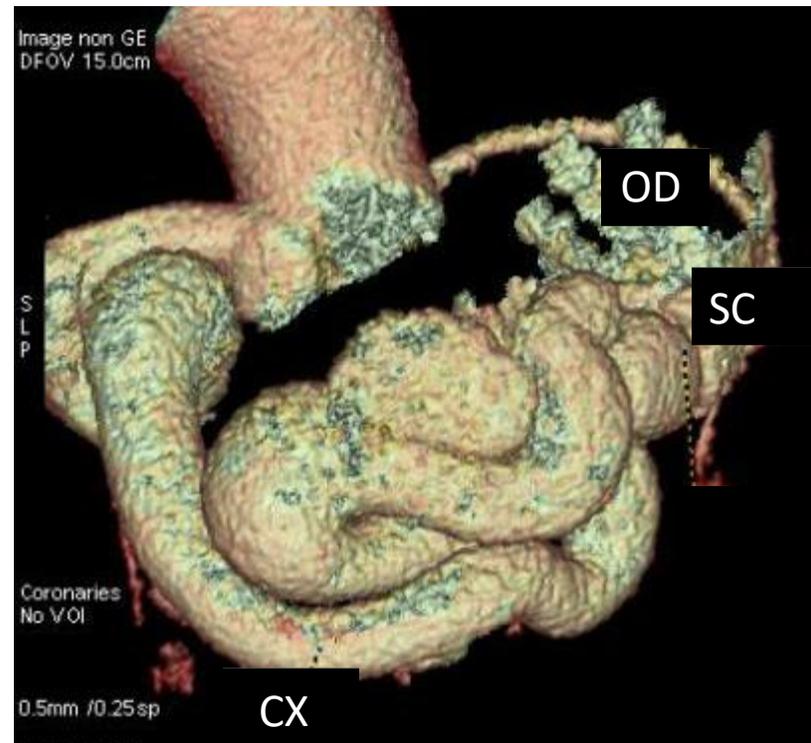
Courtesy of Pr Ohlmann (CHU STRASBOURG)

Imagerie des fistules coronaires



Courtesy of Pr Ohlmann (CHU STRASBOURG)

Imagerie des fistules coronaires



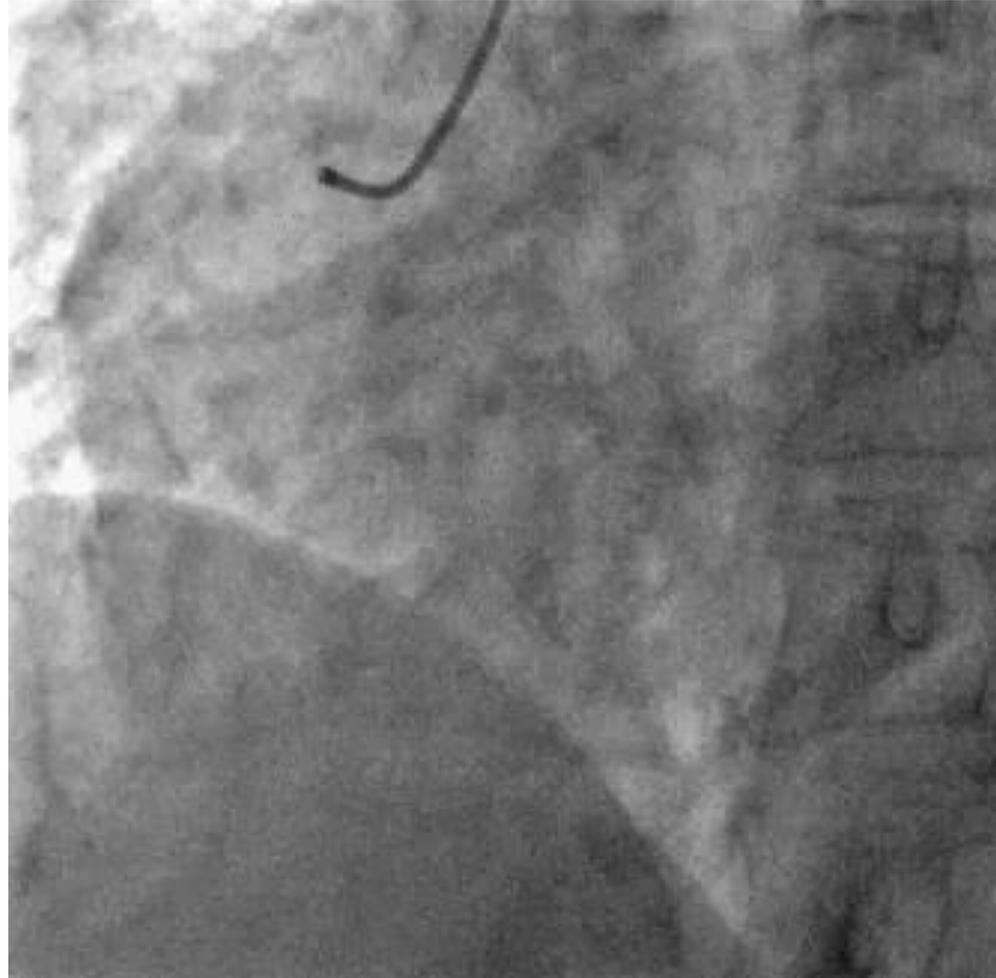
fistule circonflexe - sinus coronaire (type B)

Courtesy of Pr Ohlmann (CHU STRASBOURG)

Imagerie des fistules coronaires

Type anatomique

- type A
- type B

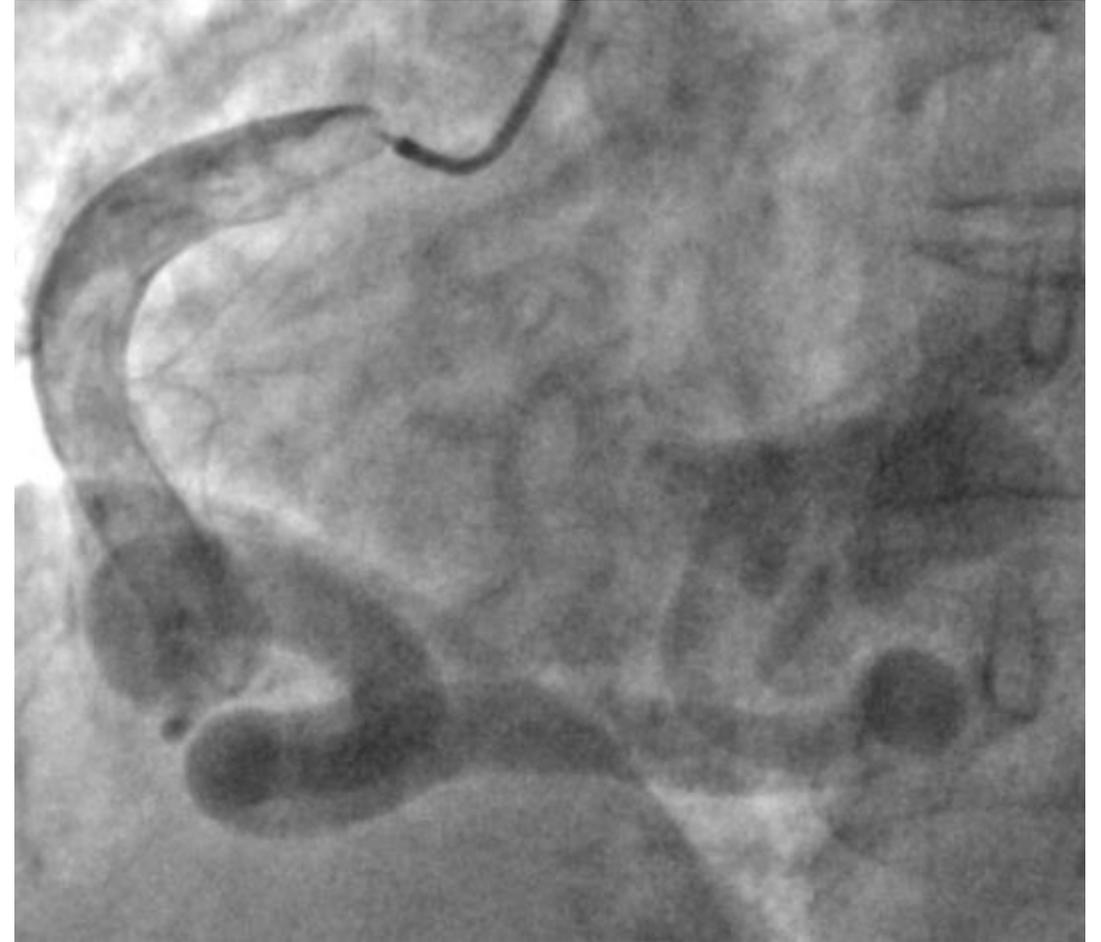


fistule coronaire droite - sinus coronaire ? OD ?

Imagerie des fistules coronaires

Type anatomique

- petite
- intermédiaire
- large



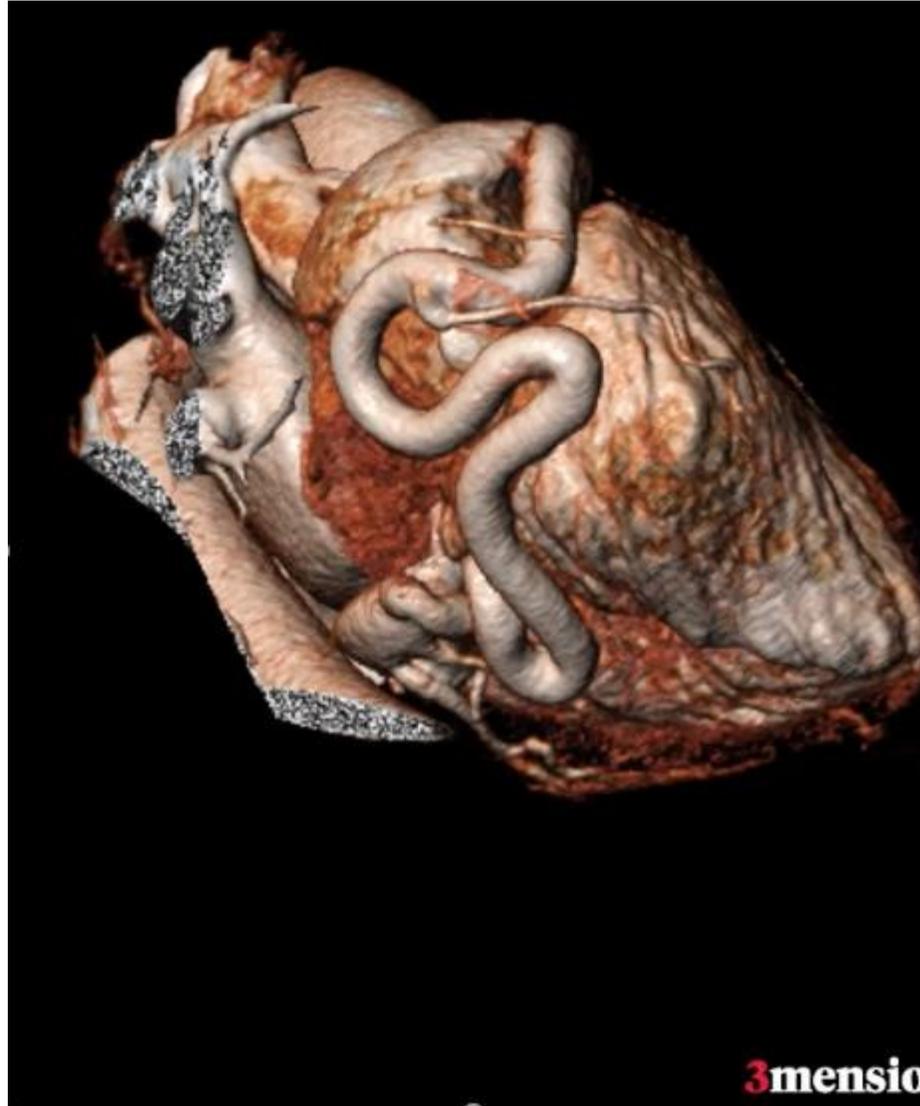
Imagerie des fistules coronaires

Type anatomique

- type A
- type B

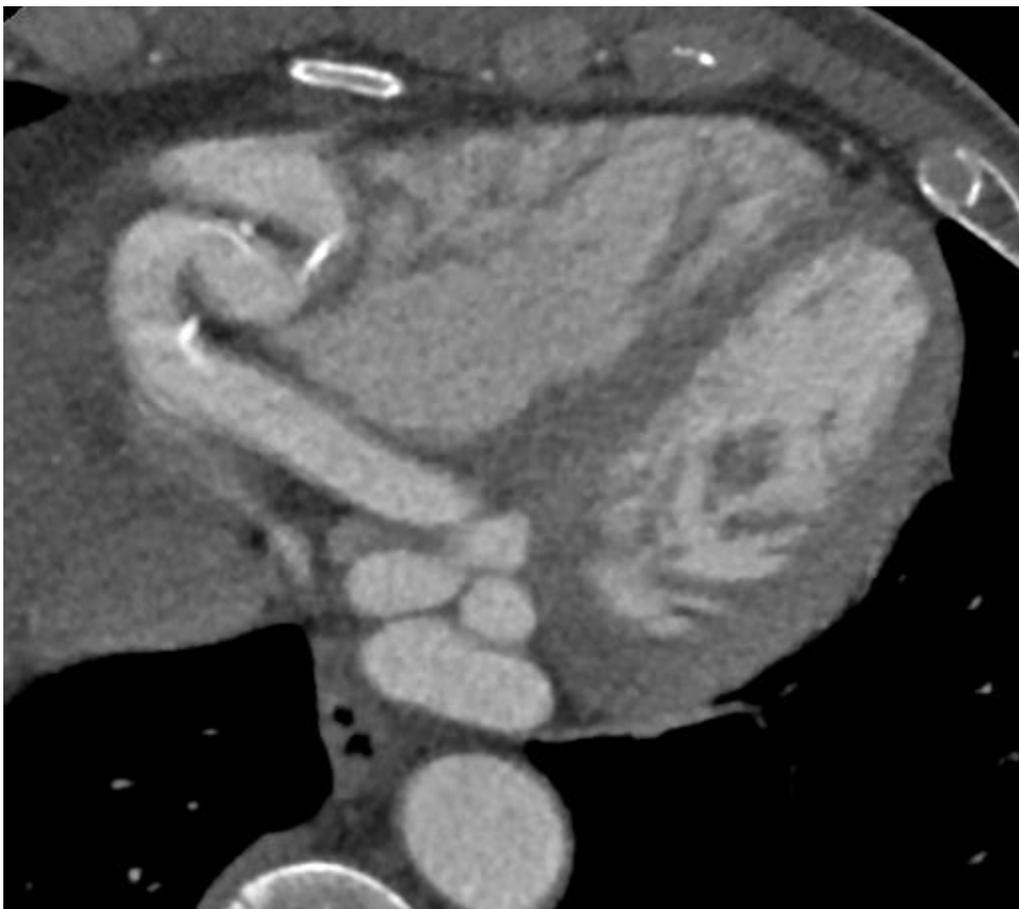
Type anatomique

- petite
- intermédiaire
- large



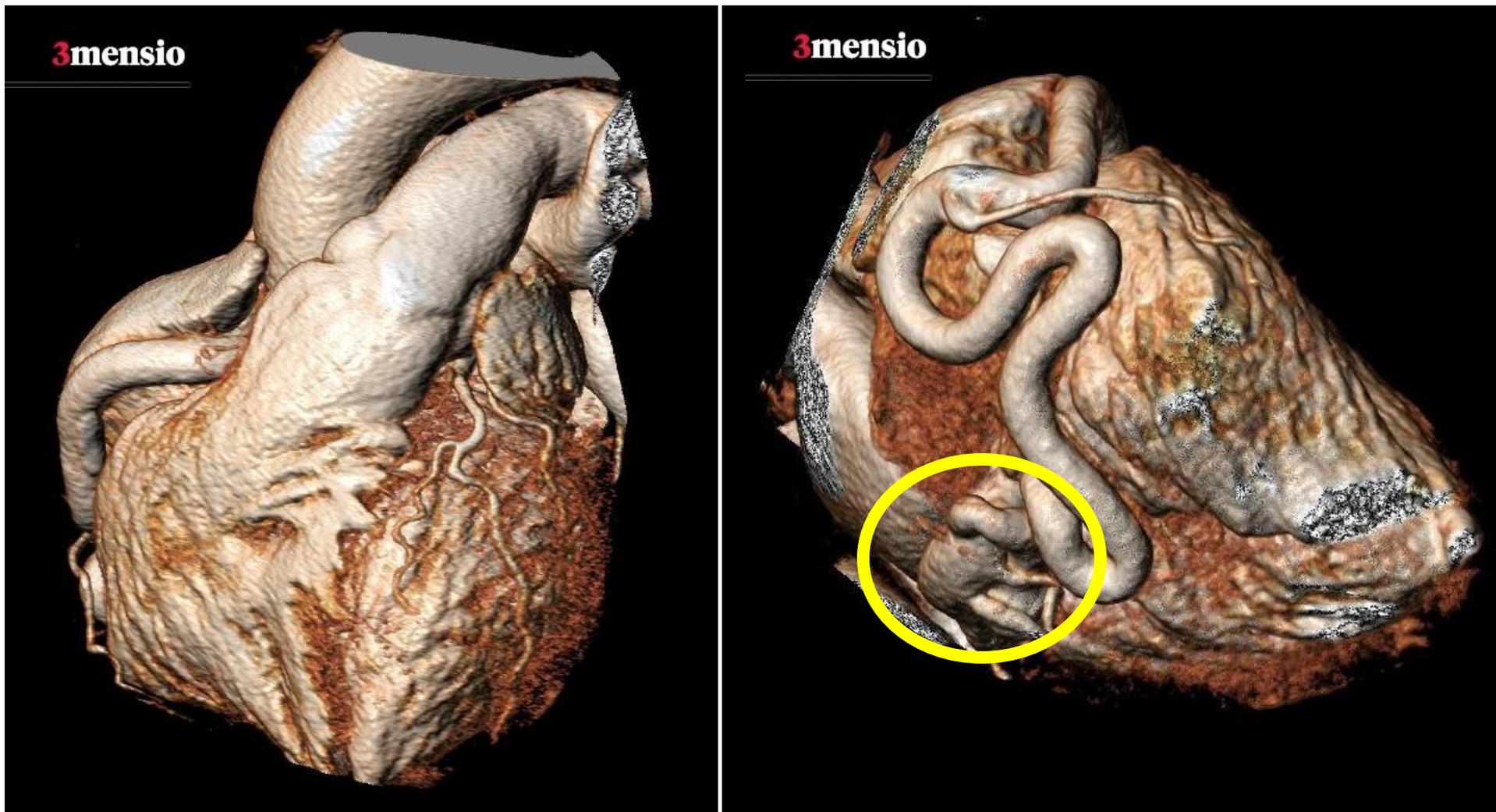
Imagerie des fistules coronaires

Visualisation de la connexion distale



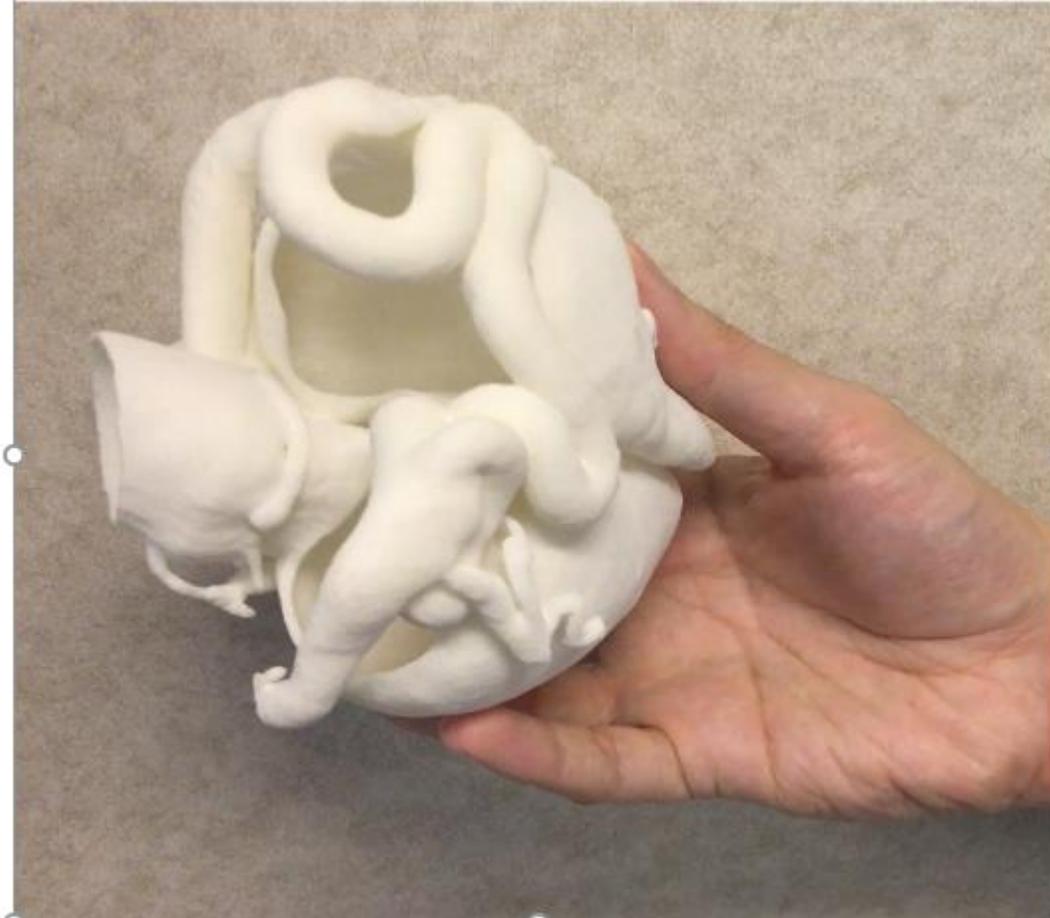
fistule coronaire droite - sinus coronaire

Imagerie des fistules coronaires



fistule coronaire droite - sinus coronaire (type B)

Imagerie des fistules coronaires



Fistule coronaire droite - sinus coronaire
Réalisée par Docteur Vlad Ciobotaru (Nîmes)

STATE-OF-THE-ART REVIEW

CORONARY

Coronary Artery Fistulas

Indications, Techniques, Outcomes, and Complications of Transcatheter Fistula Closure



Mohammed Al-Hijji, MD,^{a,b} Abdallah El Sabbagh, MD,^c Stephanie El Hajj, MD,^a Mohamad AlKhouli, MD,^a
Bassim El Sabawi, MD,^a Allison Cabalka, MD,^a William R. Miranda, MD,^a David R. Holmes, MD,^a
Charanjit S. Rihal, MD^a

FUTURE PERSPECTIVES

Advances in cardiac imaging can further improve transcatheter closure outcomes by improving pre-procedural planning and device selection. Printing of 3-dimensional models can facilitate pre-procedural planning by better defining complex fistula tracts and studying the interaction between devices and patient heart models.

Imagerie des fistules coronaires

Modélisation 3D



Fistule circonflexe - sinus coronaire

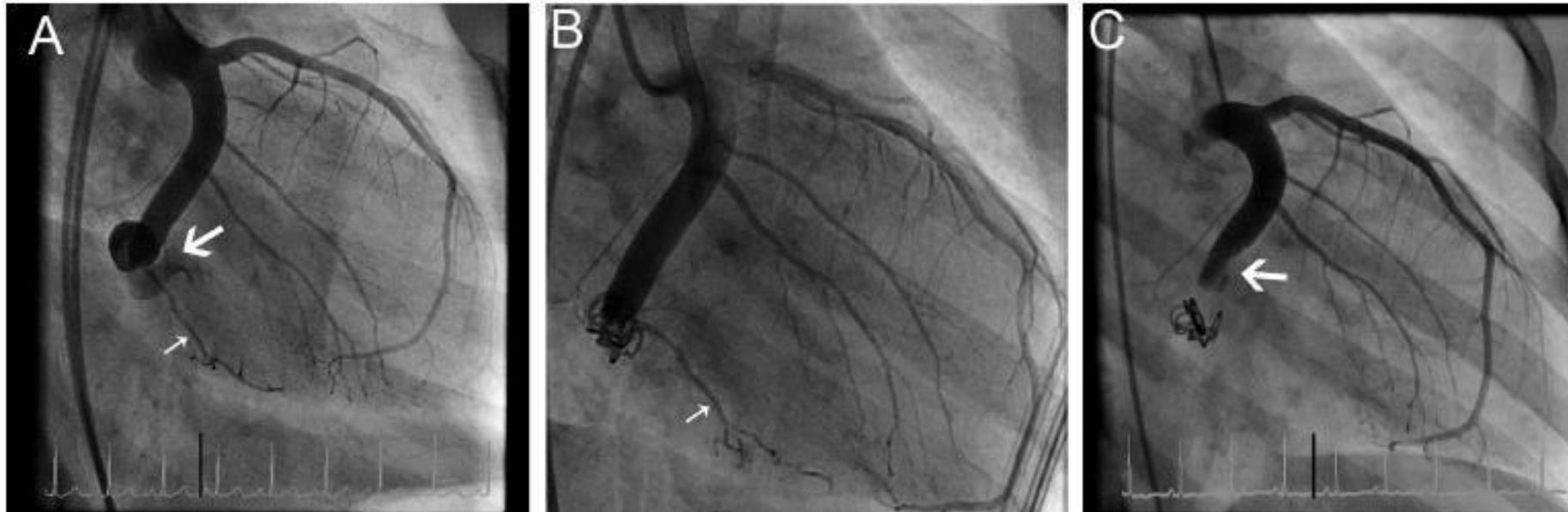
Réalisée par Docteur Vlad Ciobotaru (Nîmes)



Impression 3D

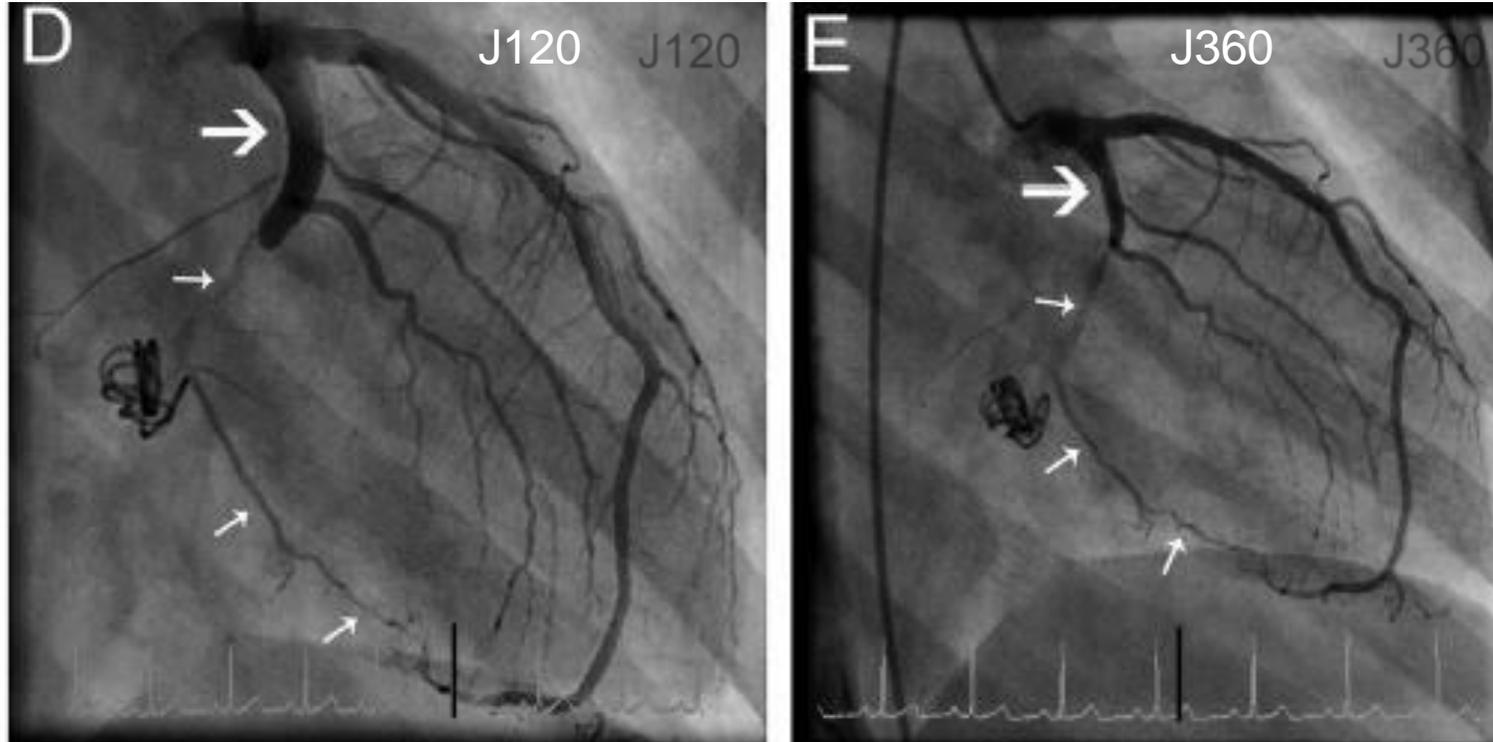
Imagerie des fistules coronaires

Remodelage vasculaire (jeune fille de 15 ans)
Fistule circonflexe - VD (type B)



Imagerie des fistules coronaires

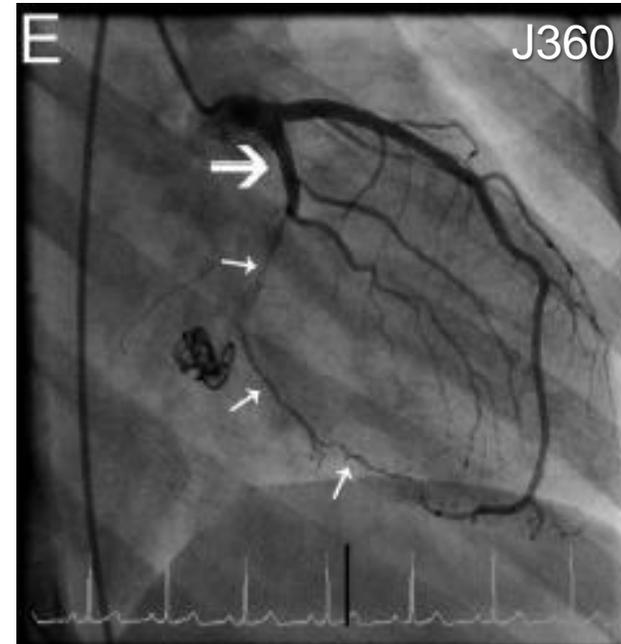
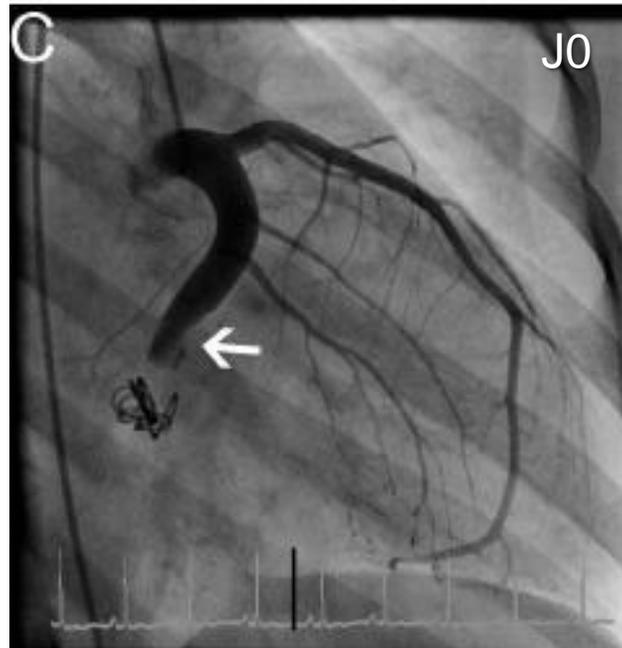
Remodelage vasculaire (jeune fille de 15 ans)
Fistule circonflexe - VD (type B)



Imagerie des fistules coronaires

Remodelage vasculaire (jeune fille de 15 ans)

Fistule circonflexe - VD (type B)



Imagerie des fistules coronaires

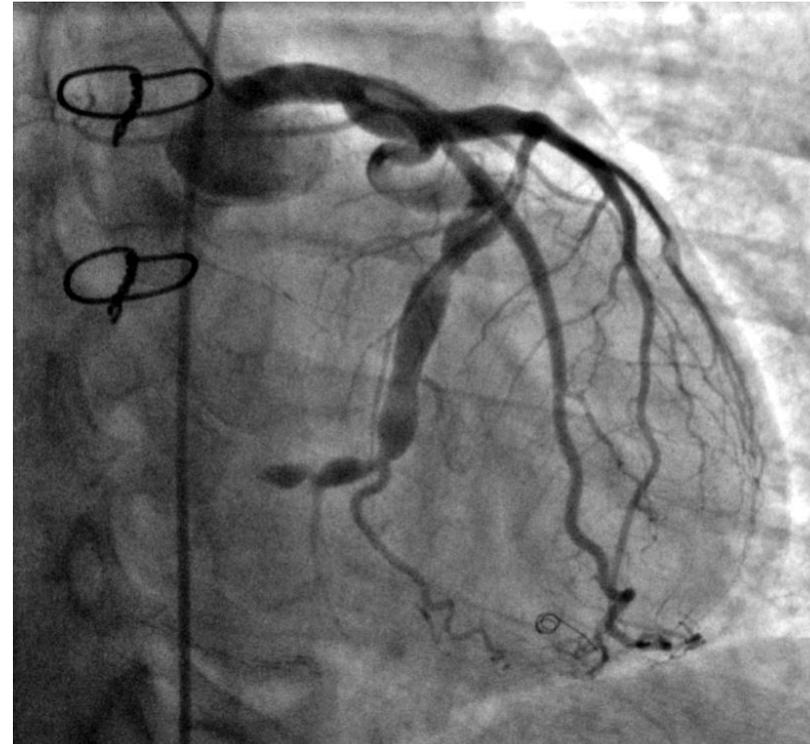
Remodelage vasculaire (femme de 55 ans)

Fistule circonflexe - sinus coronaire (type B)

Correction chirurgicale



2017

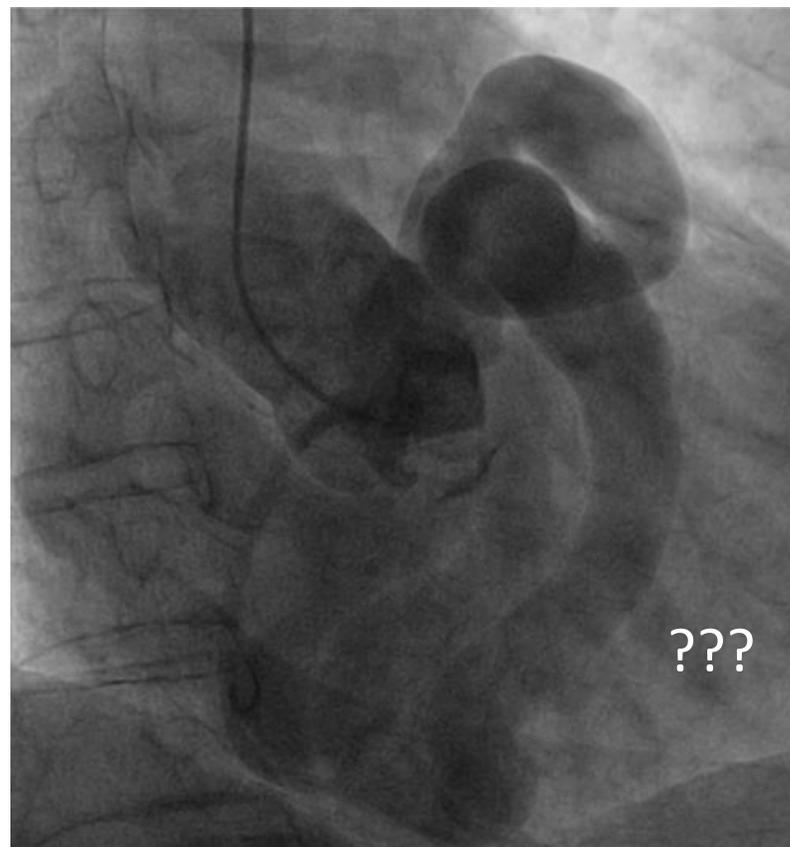
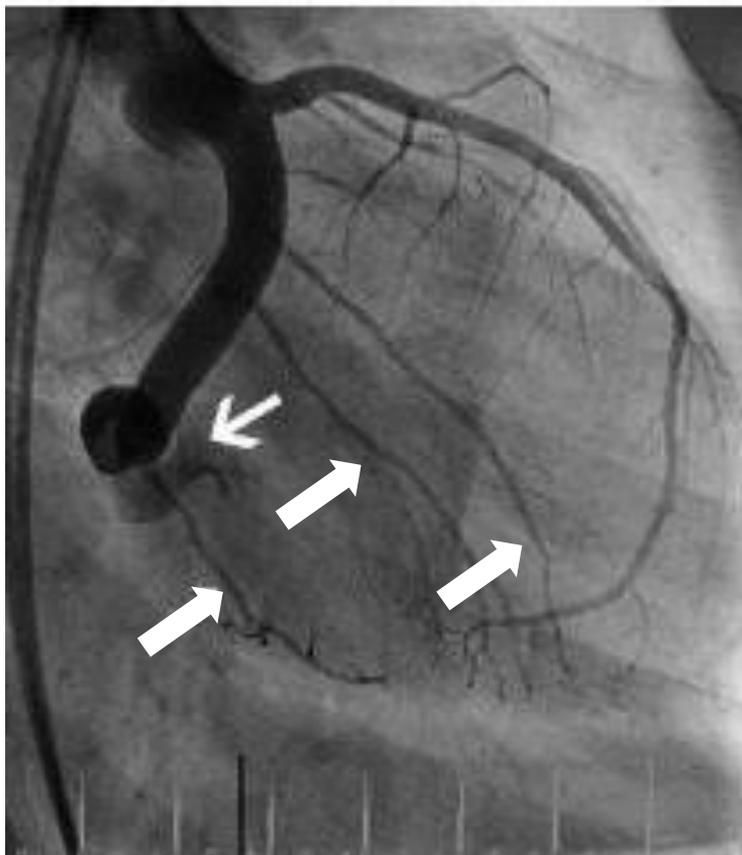


2020

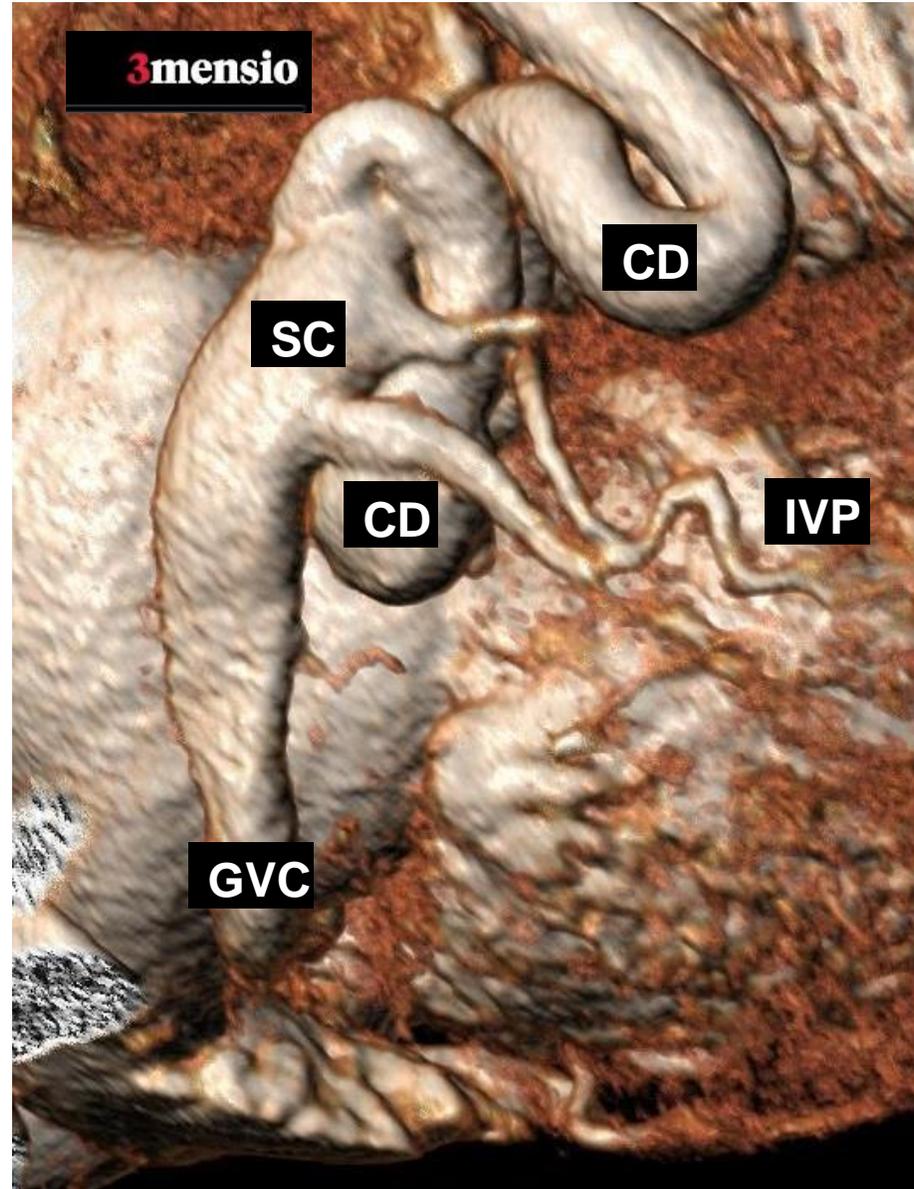
Imagerie des fistules coronaires

Identification des collatérales

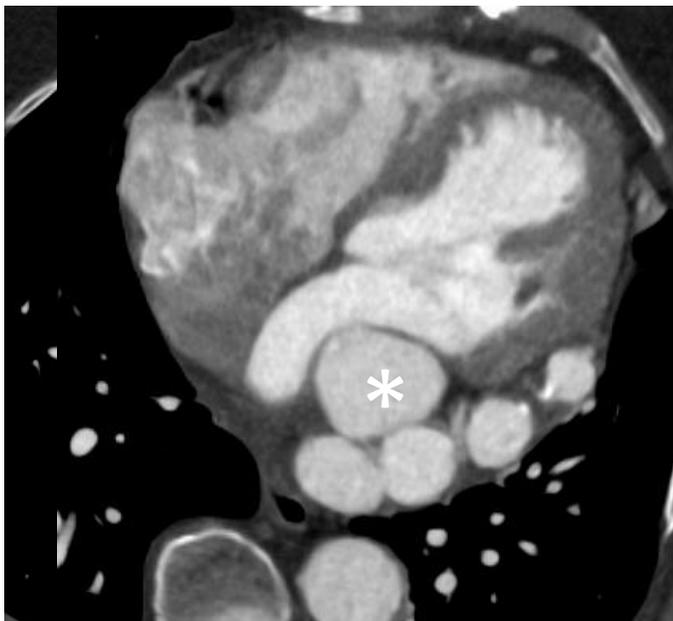
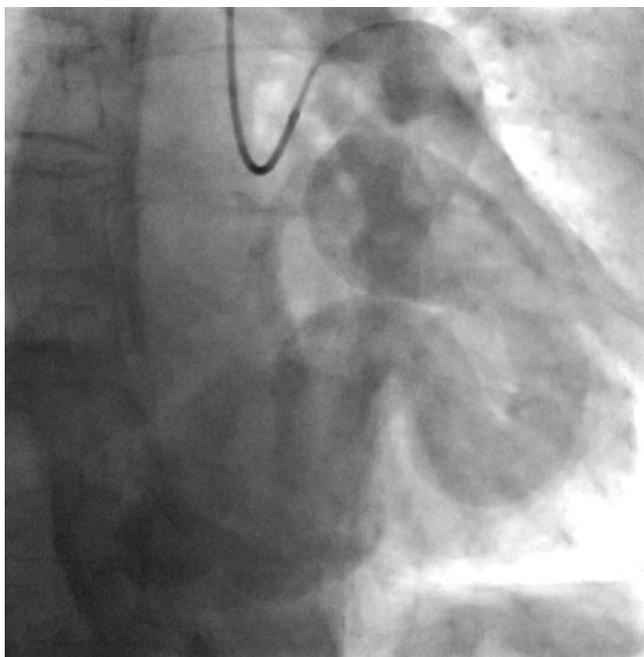
Fistules coronaires de type B



Imagerie des fistules coronaires



Imagerie des fistules coronaires



fistule circonflexe - sinus coronaire associée à anévrisme

Imagerie des fistules coronaires

Type

- petite
- intermédiaire
- large

Clinical Dilemmas in Interventional Cardiology

Coronary Artery Fistulae

Gautam Reddy, MD; James E. Davies, MD; David R. Holmes, MD; Hartzell V. Schaff, MD;
Satinder P. Singh, MD; Oluseun O. Alli, MD

Angiographic sizing (applicable to simple macrofistulas only)

Large: $>2\times$ distal reference vessel diameter

Medium: $1-2\times$ distal reference vessel diameter

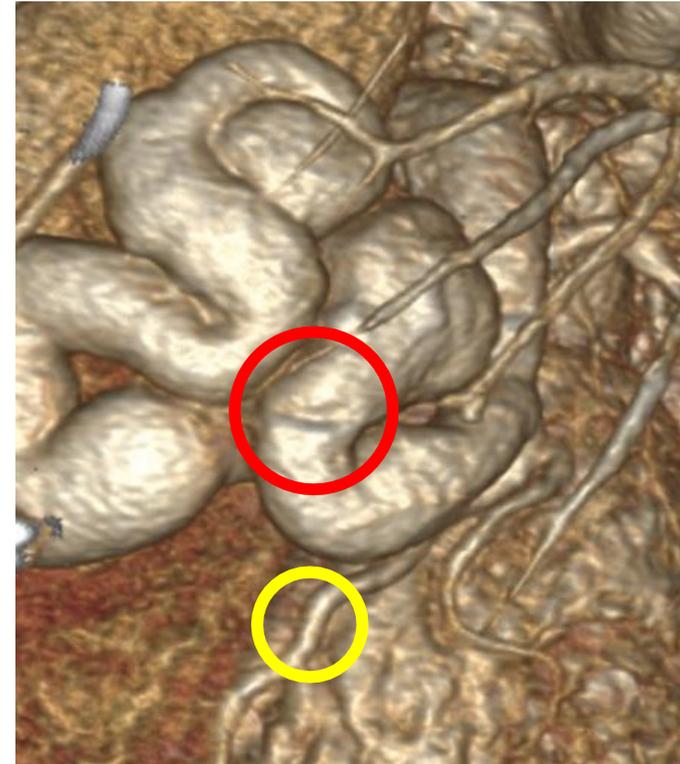
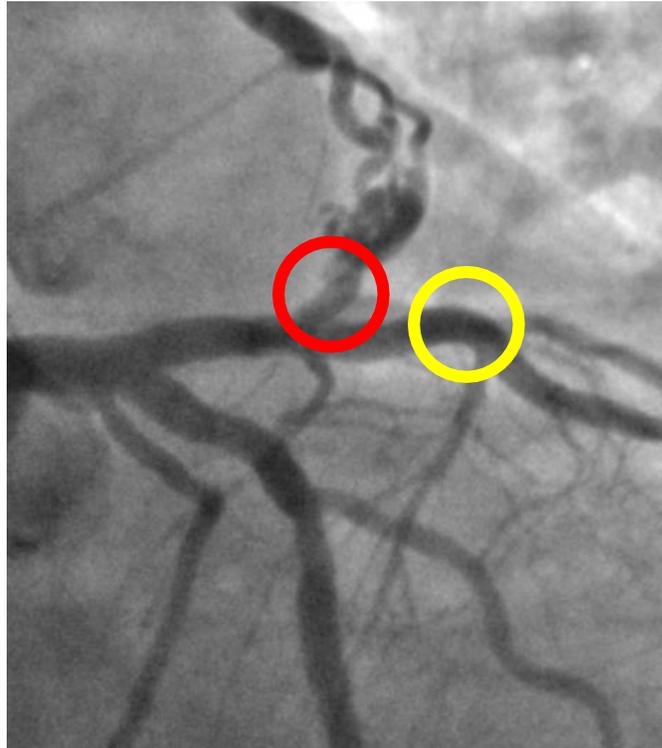
Small: $<1\times$ distal reference vessel diameter

Imagerie des fistules coronaires

Evaluation angiographique

(applicable pour les macrofistules uniques de type A)

- Fistule large : >2 x diamètre vaisseau donneur en aval connexion
- Fistule moyenne : $1-2$ x diamètre vaisseau donneur en aval connexion
- Fistule petite : < 1 x diamètre vaisseau donneur en aval connexion



Evaluation fistule coronaire de type B

CAFs can be classified as:

- Small: if the fistula diameter <1 times the largest diameter of the coronary vessel not feeding the coronary fistula
- Medium: if the fistula diameter 1 to 2 times the largest diameter of the coronary vessel not feeding the coronary fistula
- Large: if the fistula diameter >2 times the largest diameter of the coronary vessel not feeding the coronary fistula

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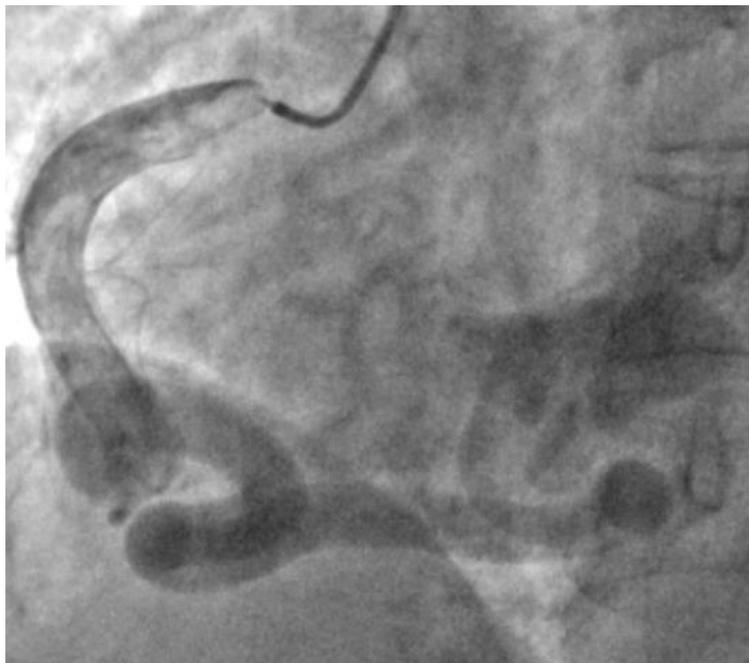
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Charanjit S. Rihal, MD^a

Imagerie des fistules coronaires

Evaluation fistule coronaire de type B



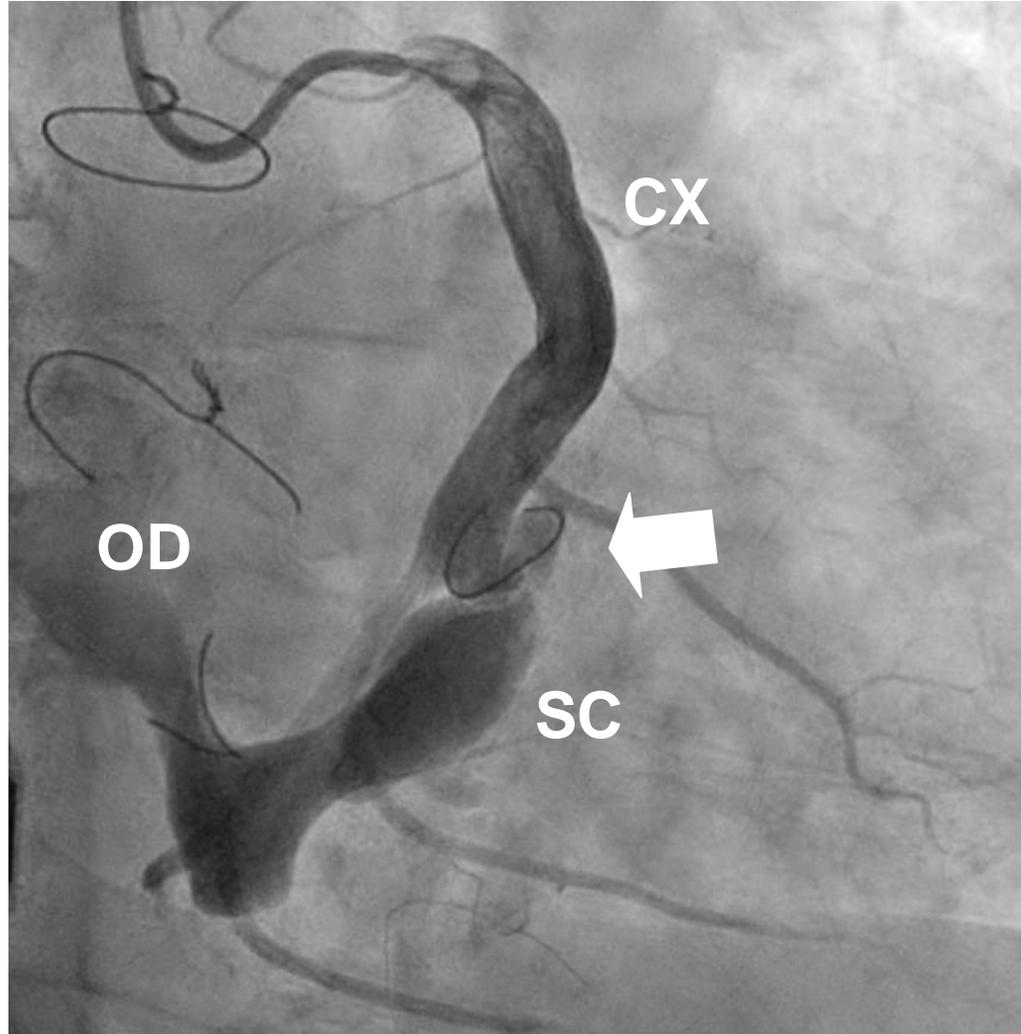
Diamètre IVA vs diamètre coronaire droite



Diamètre Cx vs diamètre IVA

Imagerie des fistules coronaires

Fistule post-chirurgie cardiaque (Cx – SC)



Imagerie des fistules coronaires

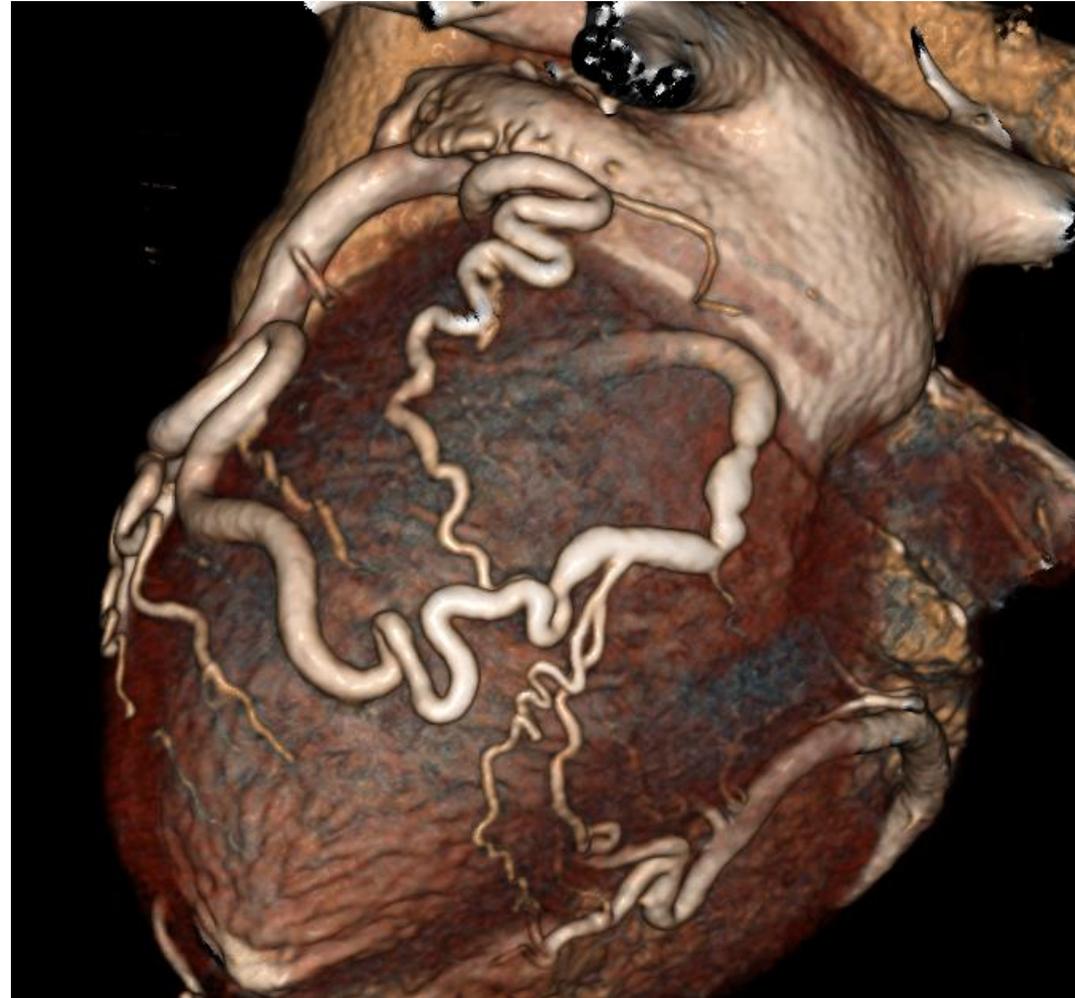
CAS CLINIQUE

Imagerie des fistules coronaires

- Homme de 39 ans
Pratique sportive (vélo)
Précordialgies depuis 2022
Modifications ECG fluctuantes (sous décalage ST antérieur)
Echocardiogramme : HVG modérée
Scanner coronaire anormal

Imagerie des fistules coronaires

Type anatomique complexe



fistule diagonale - VG (type B)

Imagerie des fistules coronaires

Type anatomique

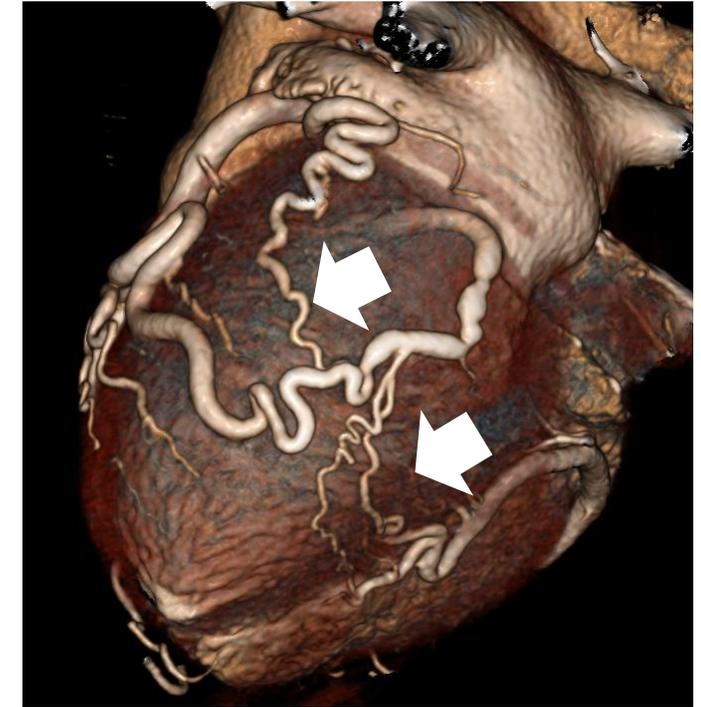
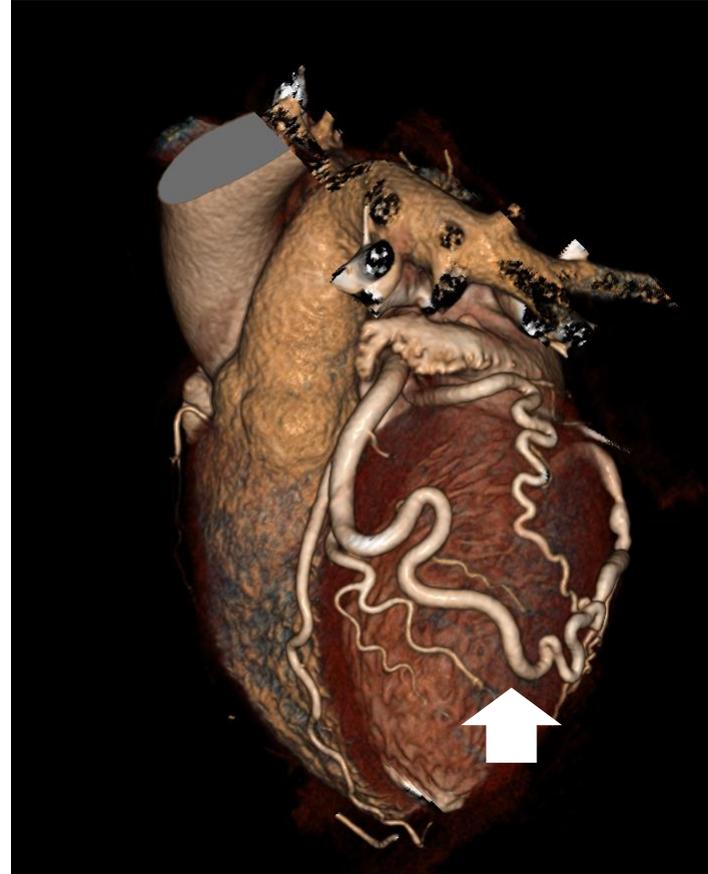
- fistule unique
- fistules multiples

Type anatomique

- type A
- type B

Type anatomique

- petite
- intermédiaire
- large



fistules multiples

Imagerie des fistules coronaires

Type anatomique

- fistule unique
- fistules multiples

Type anatomique

- type A
- type B

Type anatomique

- petite
- intermédiaire
- large



fistules multiples

2020 ESC Guidelines for the management of adult congenital heart disease

**The Task Force for the management of adult congenital heart
disease of the European Society of Cardiology (ESC)**

**Endorsed by: Association for European Paediatric and Congenital Cardiology
(AEPC), International Society for Adult Congenital Heart Disease (ISACHD)**

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Lars Sondergaard (Denmark), Katja Zeppenfeld (Netherlands)**

4.17 Coronary anomalies

4.17.1.3 Coronary artery fistulae

A coronary artery fistula, whether congenital or acquired, is an abnormal connection between a coronary artery and cardiac chamber or vessel. Small fistulae have a good prognosis without treatment. Medium or large fistulae are associated with long-term complications (angina, myocardial infarction, arrhythmias, heart failure, and endocarditis). The presence of symptoms, complications, and a significant shunt are the main indications for percutaneous or surgical closure.

Circulation

AHA/ACC GUIDELINE

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

NO INFORMATION

STATE-OF-THE-ART REVIEW

CORONARY

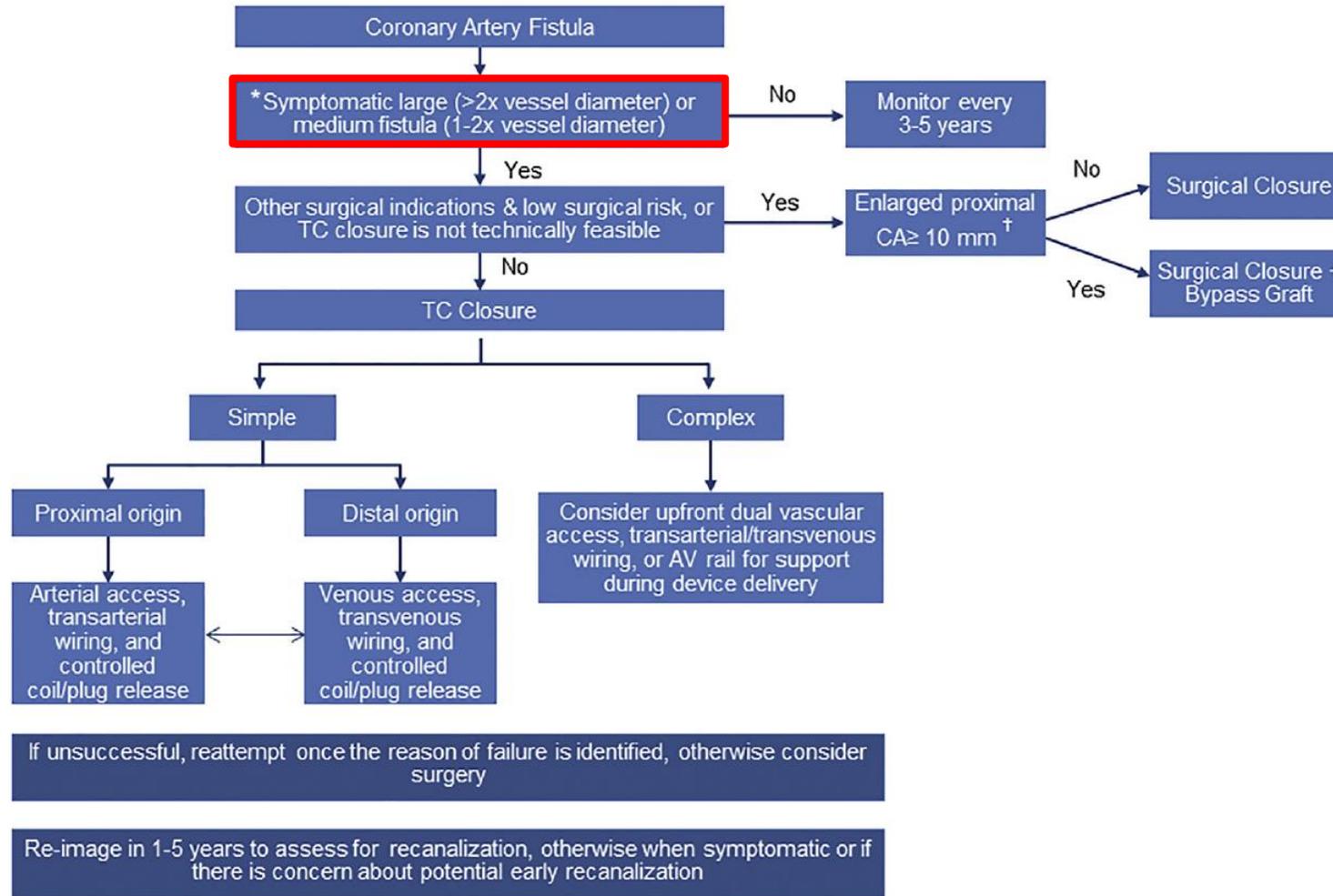
Coronary Artery Fistulas

Indications, Techniques, Outcomes, and Complications of Transcatheter Fistula Closure



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Charanjit S. Rihal, MD^a

FIGURE 1 Algorithm of Coronary Artery Fistula Evaluation and Management



*Symptomatic fistulas are coronary artery (CA) fistulas that potentially lead to myocardial ischemia, vessel aneurysm and rupture, endocarditis, unexplained cardiac chamber enlargement/dysfunction, or arrhythmia. †An enlarged proximal CA with diameter ≥ 10 mm has a tendency to thrombose after fistula closure, resulting in myocardial infarction. A simple fistula has a single-vessel origin, simply defined pathways, and a clearly defined termination. A complex fistula is a large fistula with multiple origins and plexiform formation. AV = arteriovenous; TC = transcatheter.

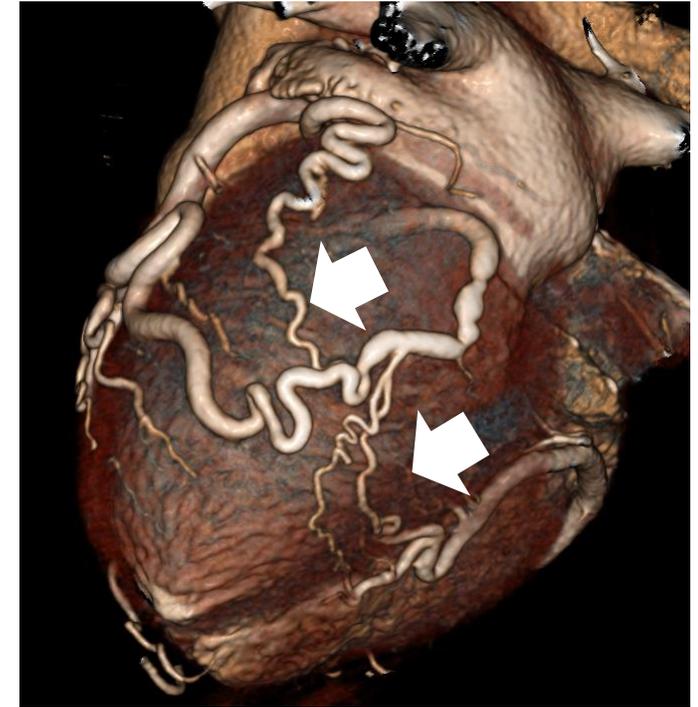
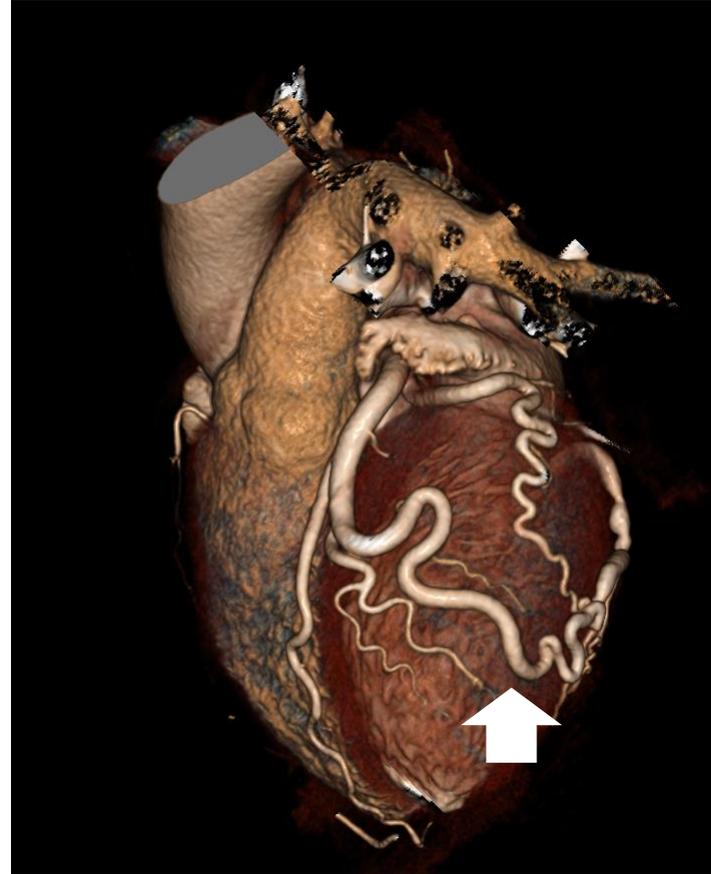
Imagerie des fistules coronaires

Retentissement physiologique

- shunt gauche-droit
- shunt gauche-gauche
- vol coronaire ?

Retentissement fonctionnel

- symptômes
- pas de symptômes



fistules multiples

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