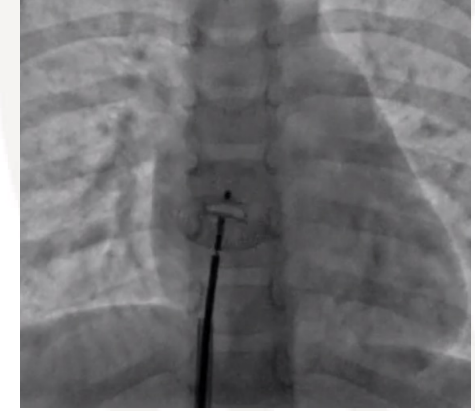
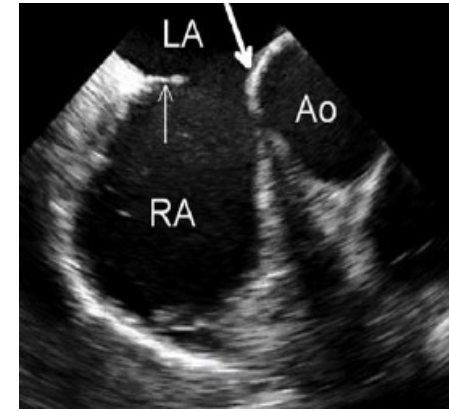
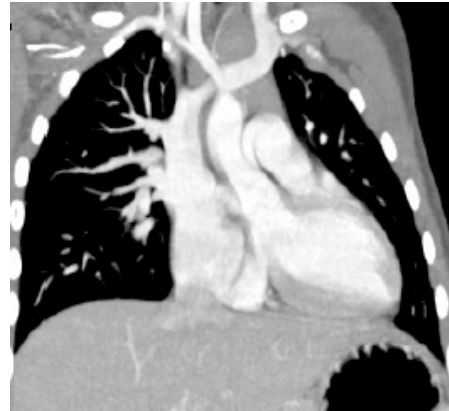
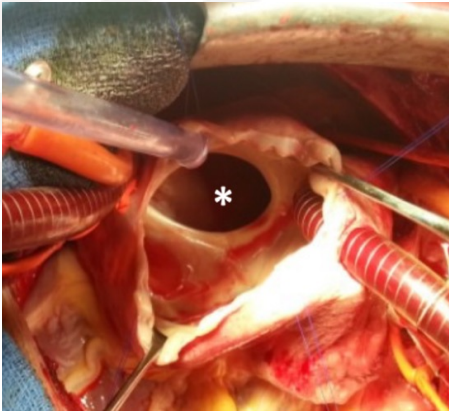


CIA - CAV partiel - RVPA partiel



Zakaria Jalal – MD, PhD / Dr. Scarduelli

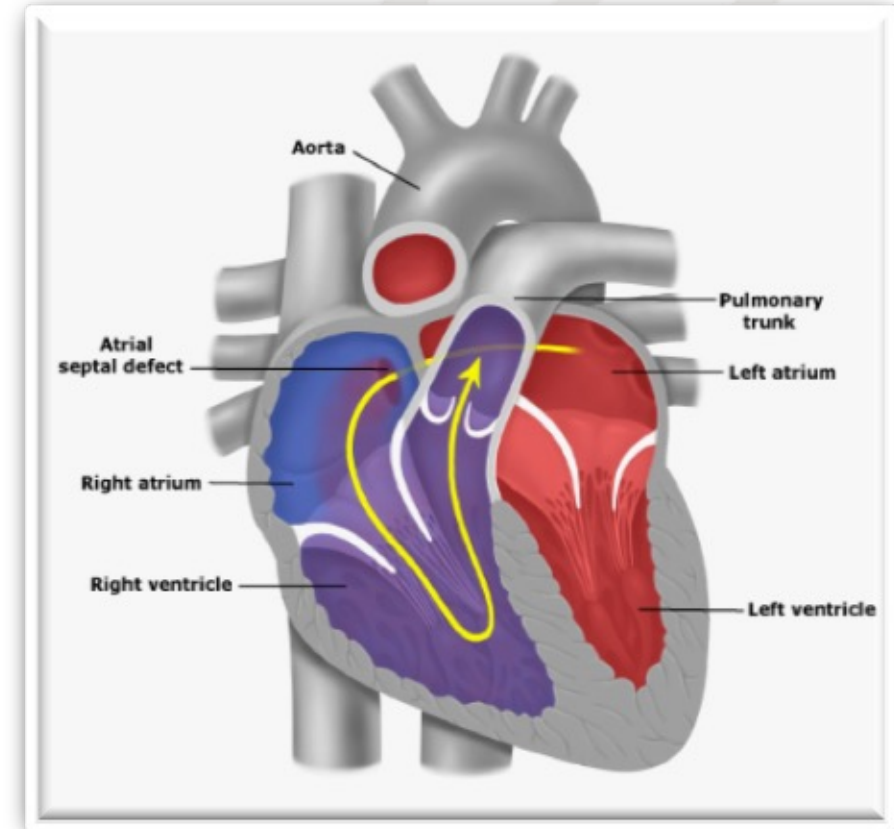
Service des cardiopathies congénitales de l'enfant et de l'adulte

Hôpital cardiologique Haut Lévêque - Bordeaux



PHYSIOPATHOLOGIE

- Shunt dépendant des **compliances ventriculaires**
- Classiquement $VD > VG \Rightarrow$ Shunt G-D pré-tricuspide
- **Surcharge volumique** cavités droites
- **Hyper débit** pulmonaire
- Arythmies atriales
- Syndrome d'Eisenmenger
- Shunt D-G d'emblée si SVP, anomalie tricuspide, HTAP



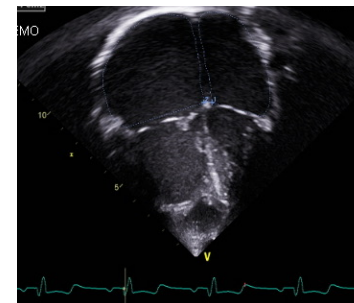
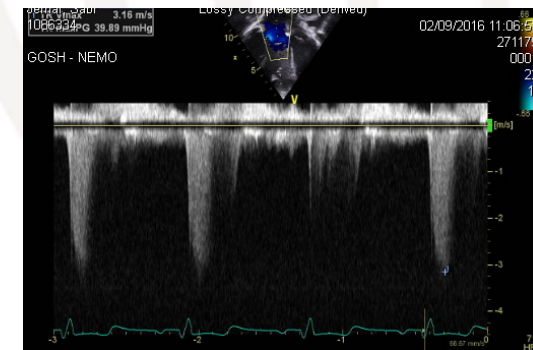
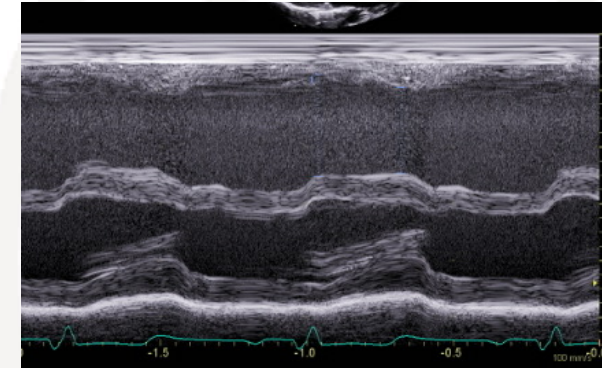
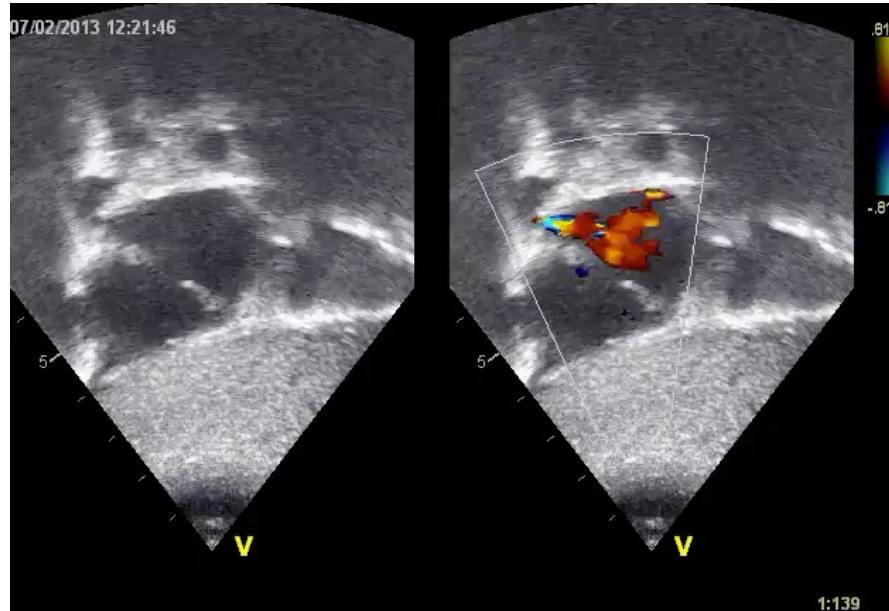


- Souvent **asymptomatique** (découverte fortuite adulte)
- **Hyperdébit pulmonaire** => Dyspnée, retard croissance, infections respiratoires
- **Arythmies** => Palpitations révélant une FA/Flutter/TA
- **Embolie paradoxale**
- **Insuffisance cardiaque droite**
- **Cyanose**



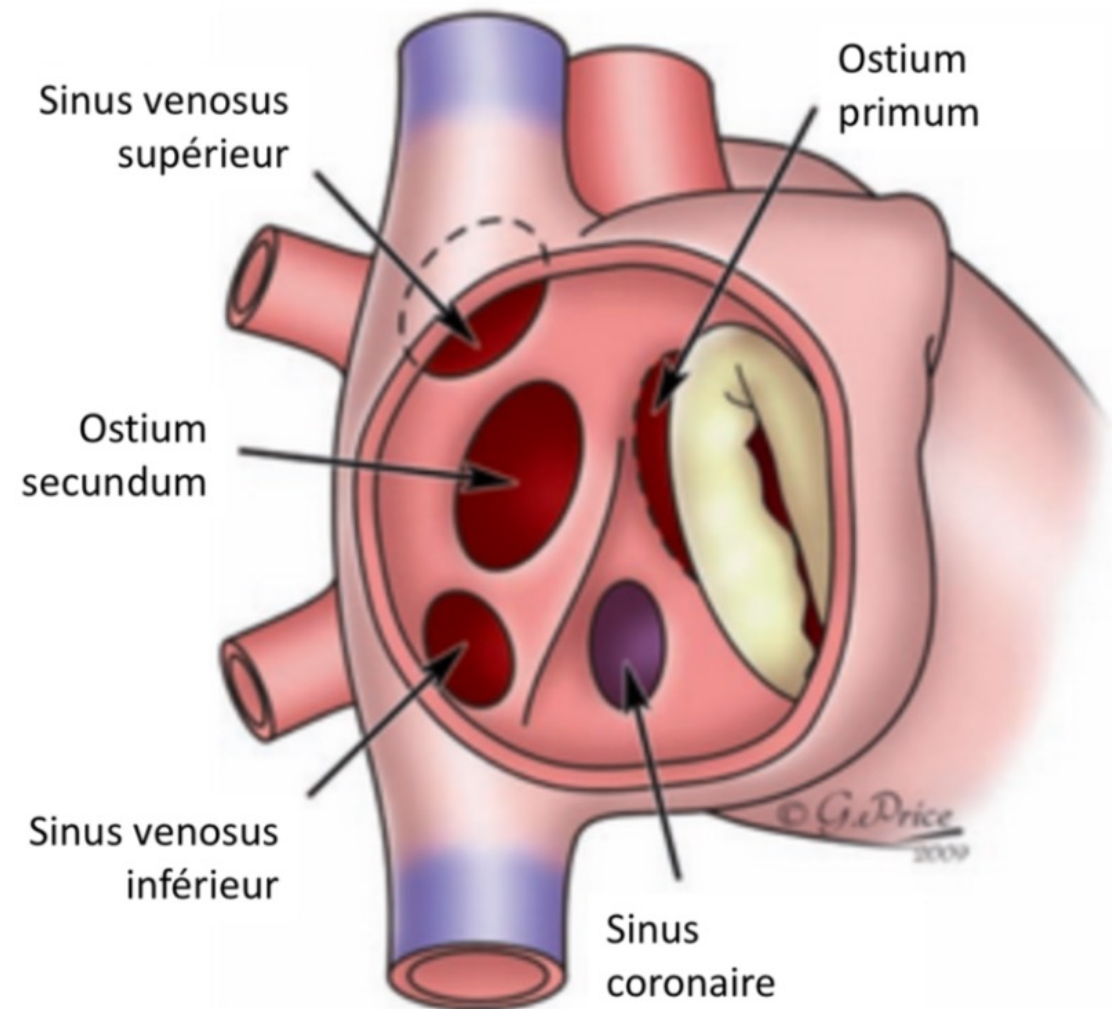
ECHOCARDIOGRAPHIE

- Diagnostic anatomique
- Retentissement:
 - Dilatation cavités droites
 - PAP
 - Q_p/Q_s
- Lésions associées (Valves AV, voie sous aortique, etc.)
- Possibilité de fermeture percutanée



INTRODUCTION

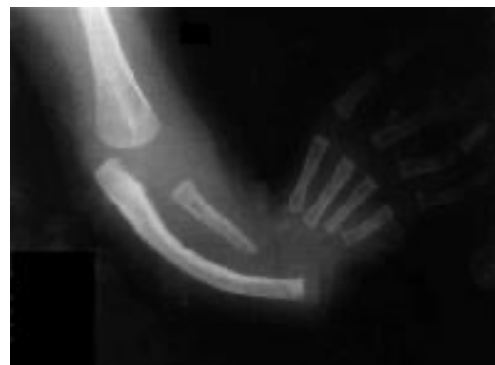
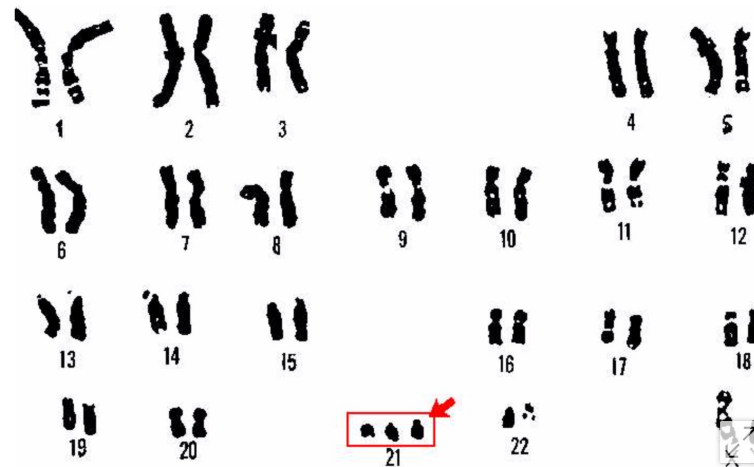
- 1/1500 naissances (10% des MCC)
- Associée à environ 50% des autres CC
- Diagnostic fréquent à l'âge adulte
- Types anatomiques:
 - CIA ostium primum (15%) => CAV
 - CIA ostium secundum (80%)
 - CIA sinus venosus (5%) => RVPAp
 - CIA sinus coronaire (rare)





GENETIQUE

- CIA ostium primum : T21
- CIA ostium secundum:
 - Holt Oram (TBX5, malformation MS)
 - NKX2.5 (CIA + BAV)
 - Elis Van Creveld (EVC1/EVC2, polydactylie, côtes courtes)

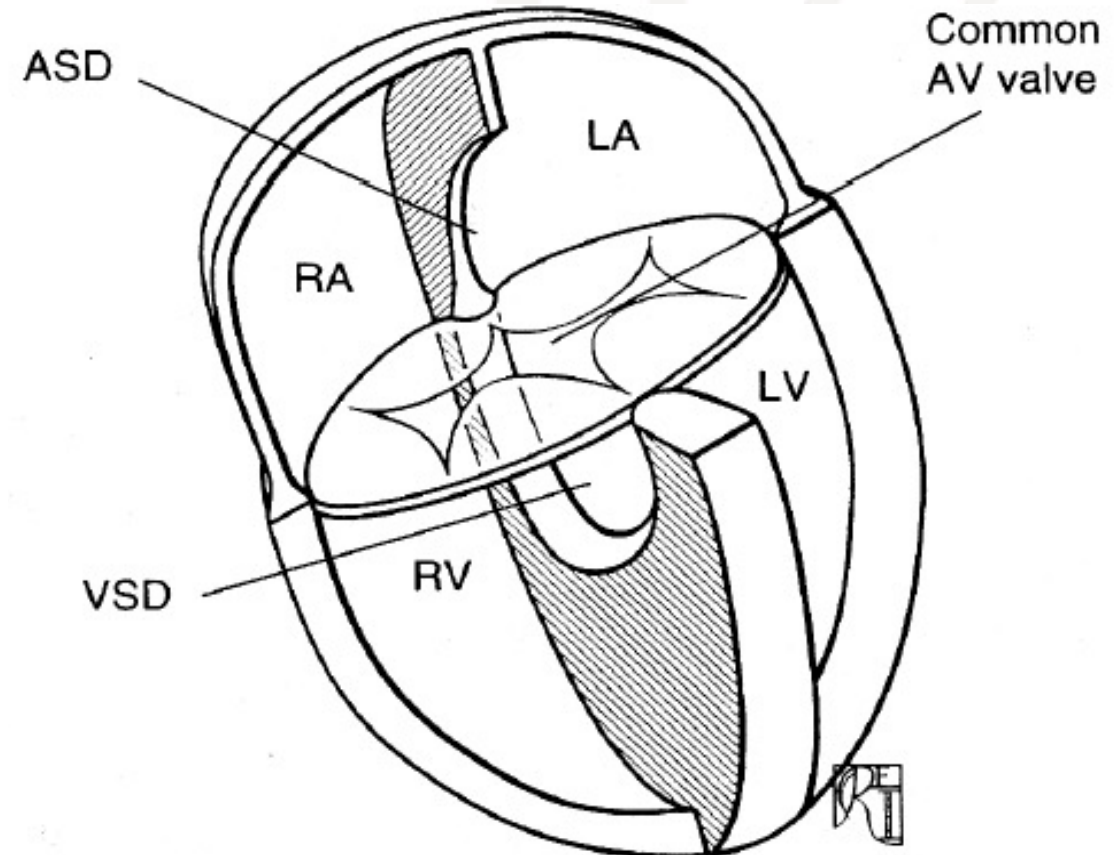




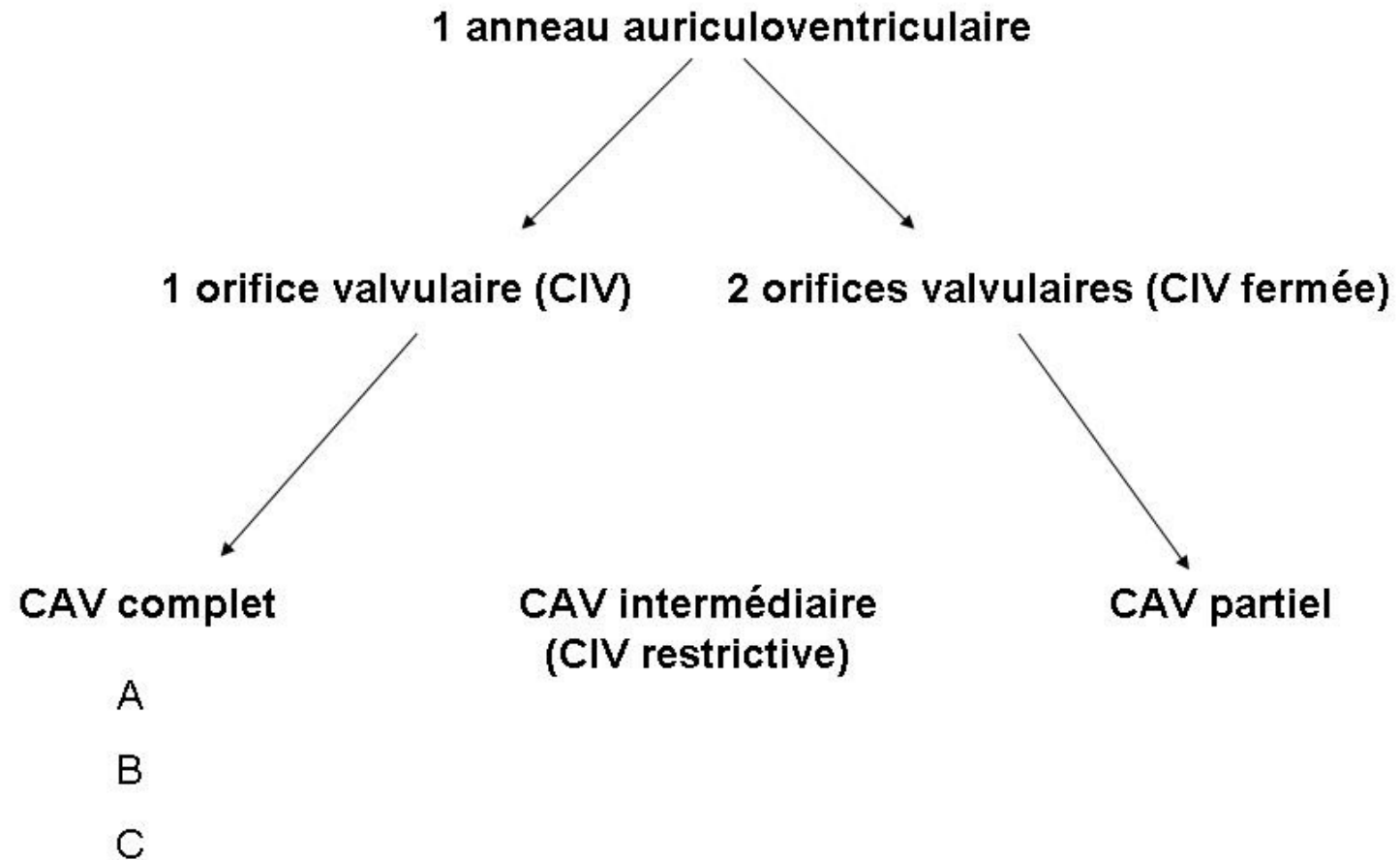
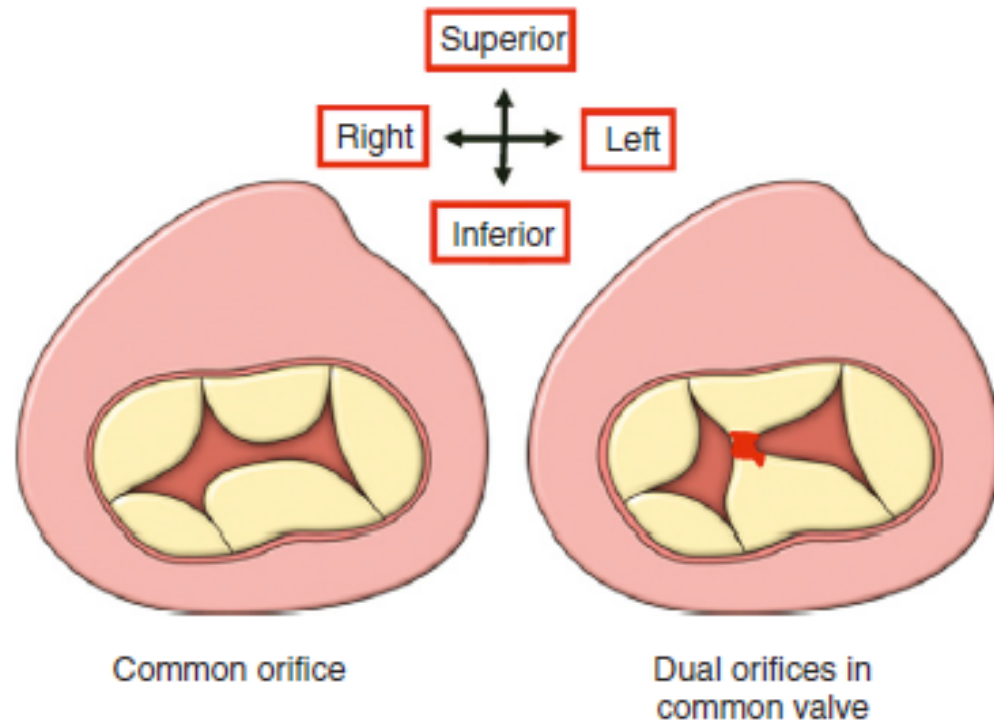
CANAL ATRIO-VENTRICULAIRE PARTIEL

ANOMALIE DES BOURGEONS ENDOCARDIQUES ET DE LA SEPTATION

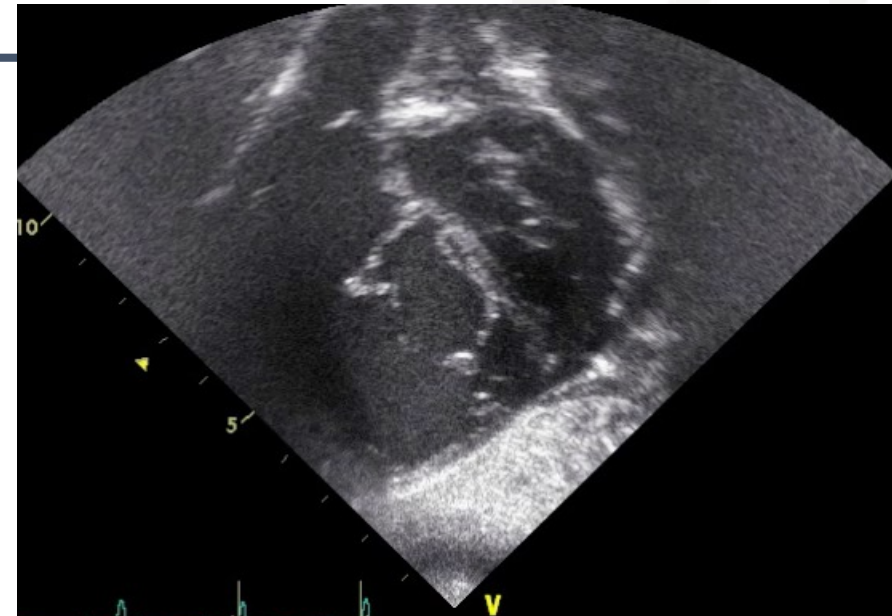
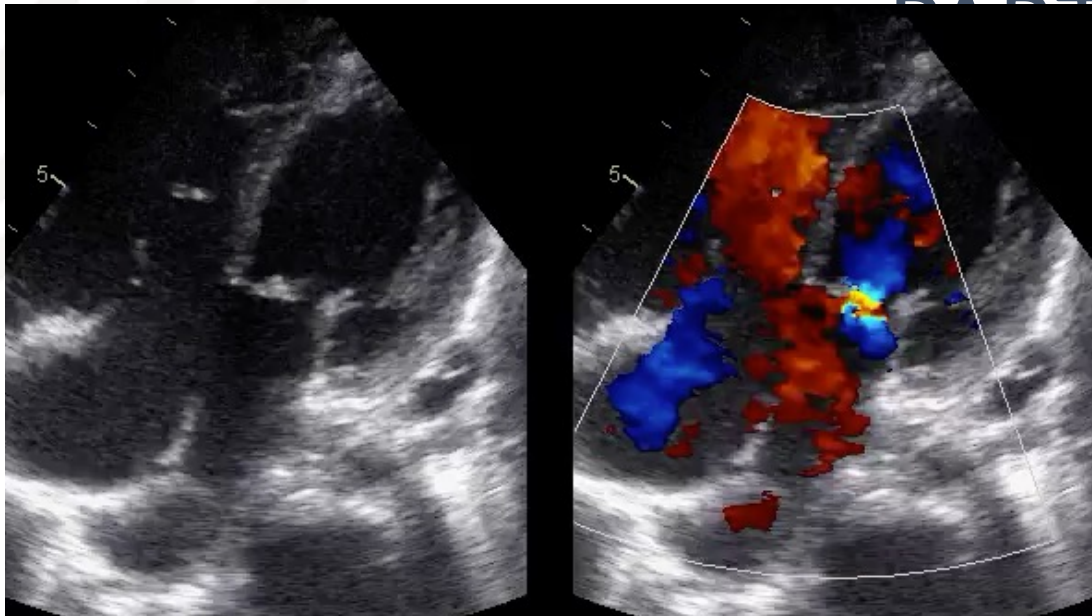
- Non fermeture de l'ostium primum
⇒ CIA
- Persistance d'une jonction auriculoventriculaire commune
⇒ un seul anneau valvulaire
- Développement anormal du septum d'admission
⇒ CIV



CANAL ATRIO-VENTRICULAIRE PARTIEL



CANAL ATRIO-VENTRICULAIRE

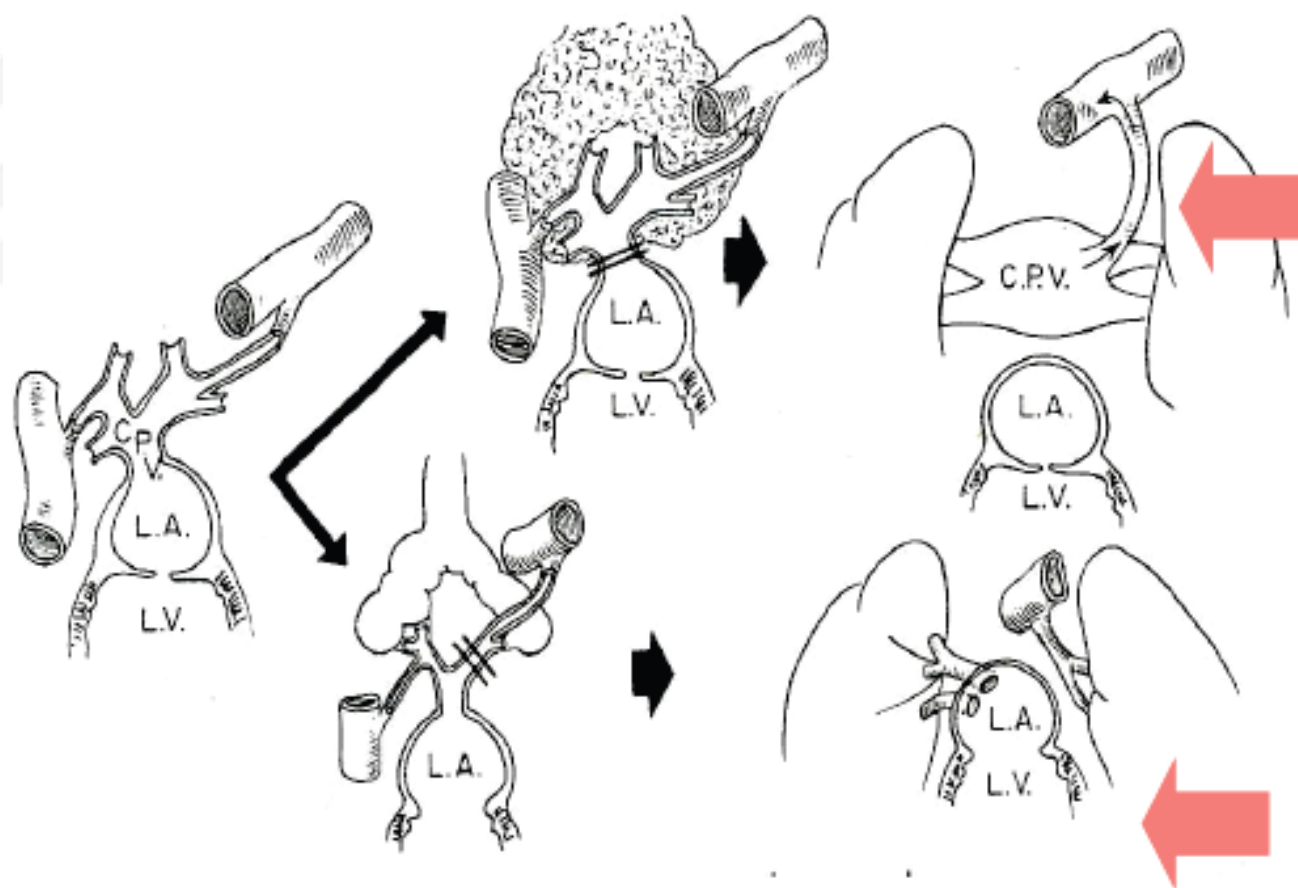


Un seul anneau valvulaire

CIA Ostium Primum

Fente VAV gauche



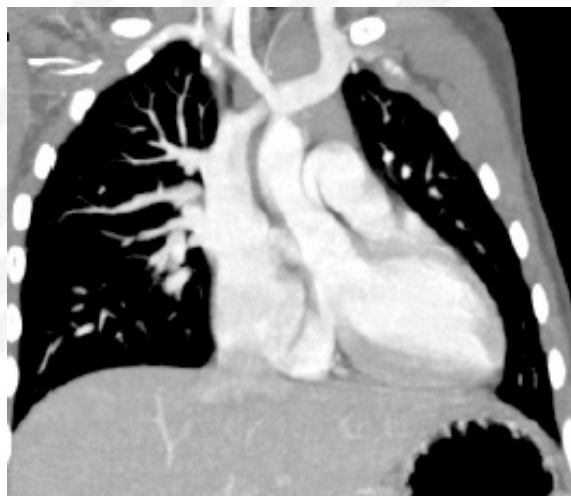


Atrésie de la veine
pulmonaire commune :
RVPA total avec
persistance d'une
connexion (v. verticale)

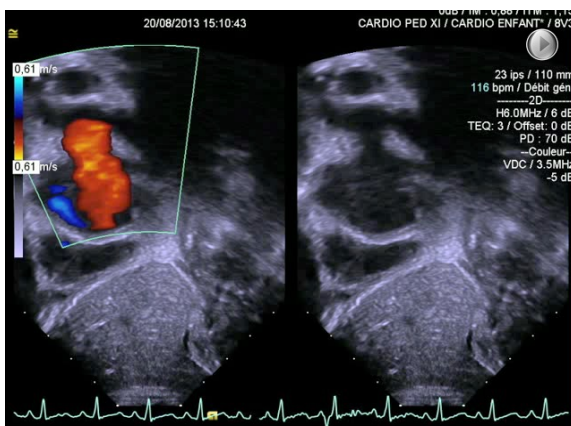
Atrésie d'une branche
de la VP commune :
RVPA partiel

VP DROITES

VCS

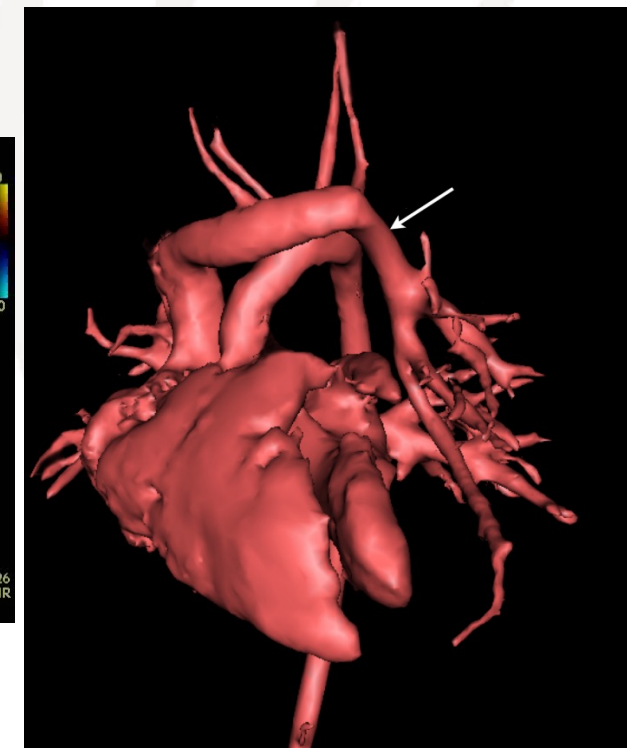
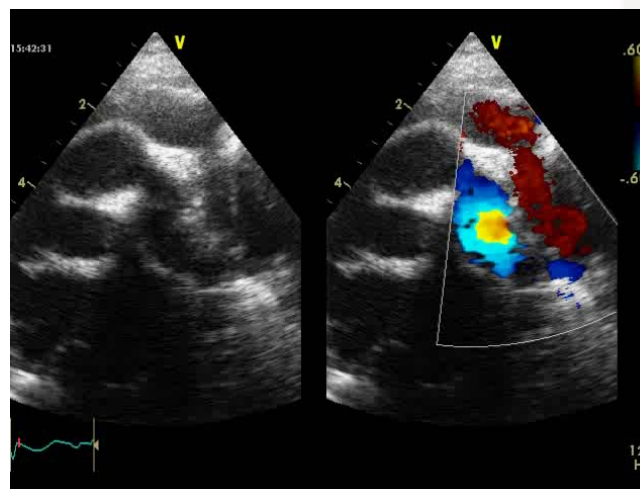


VCI



VP GAUCHES

TVI

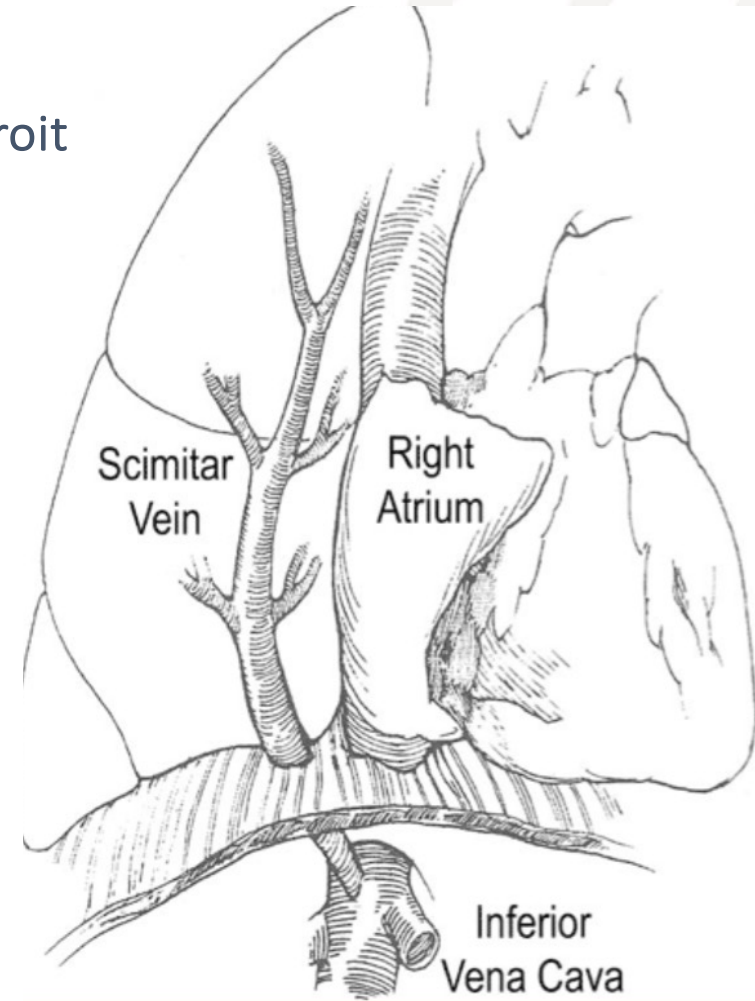
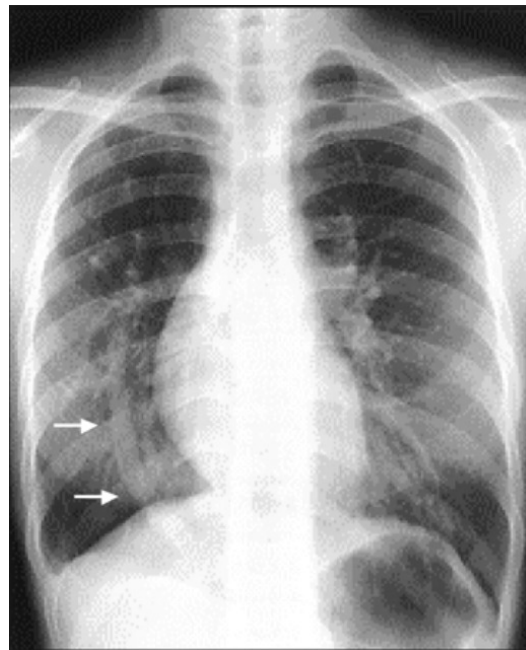




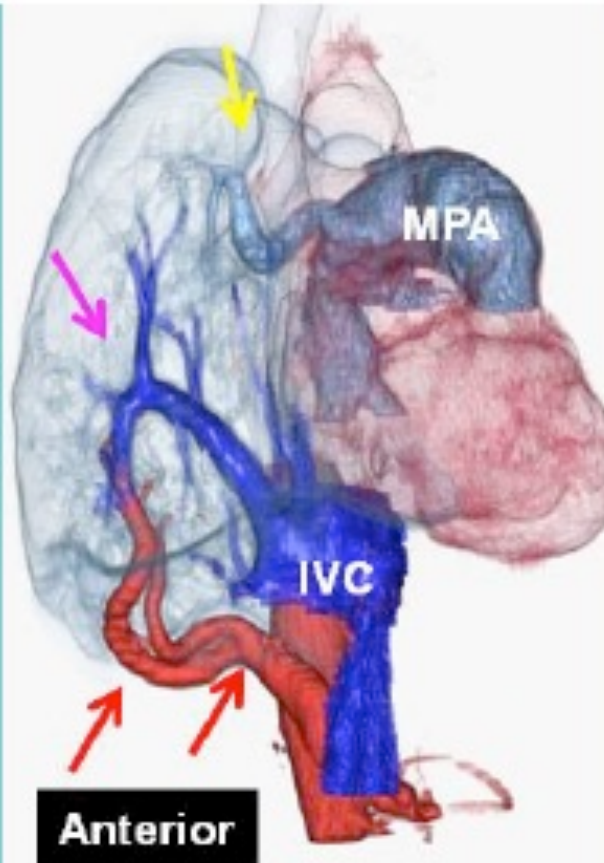
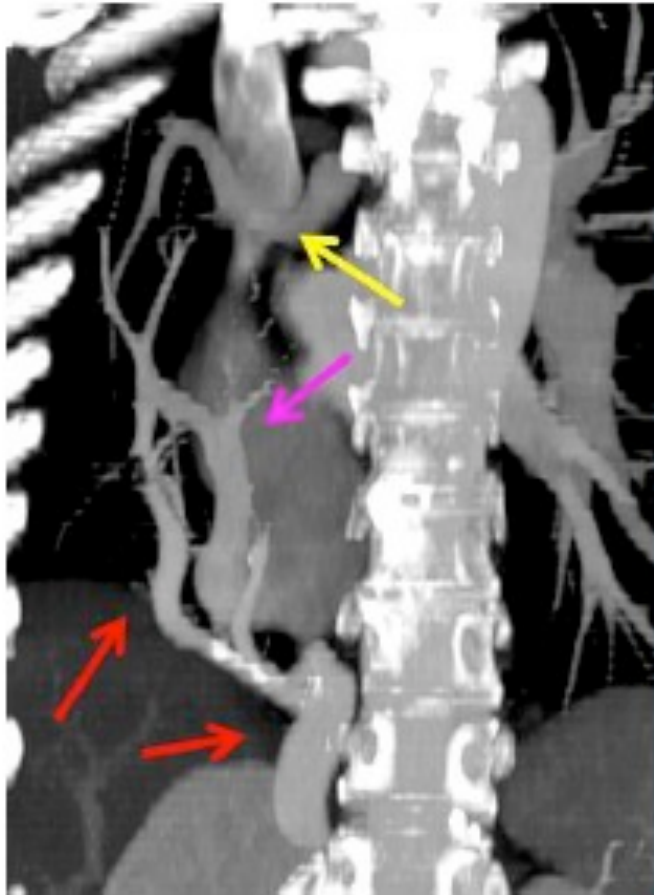
SYNDROME DE CIMETERRE

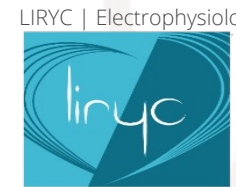


- RVPAP poumon D => VCI
- Hypoplasie pulmonaire droite
- Artère sequestrante poumon droit
- HTAP

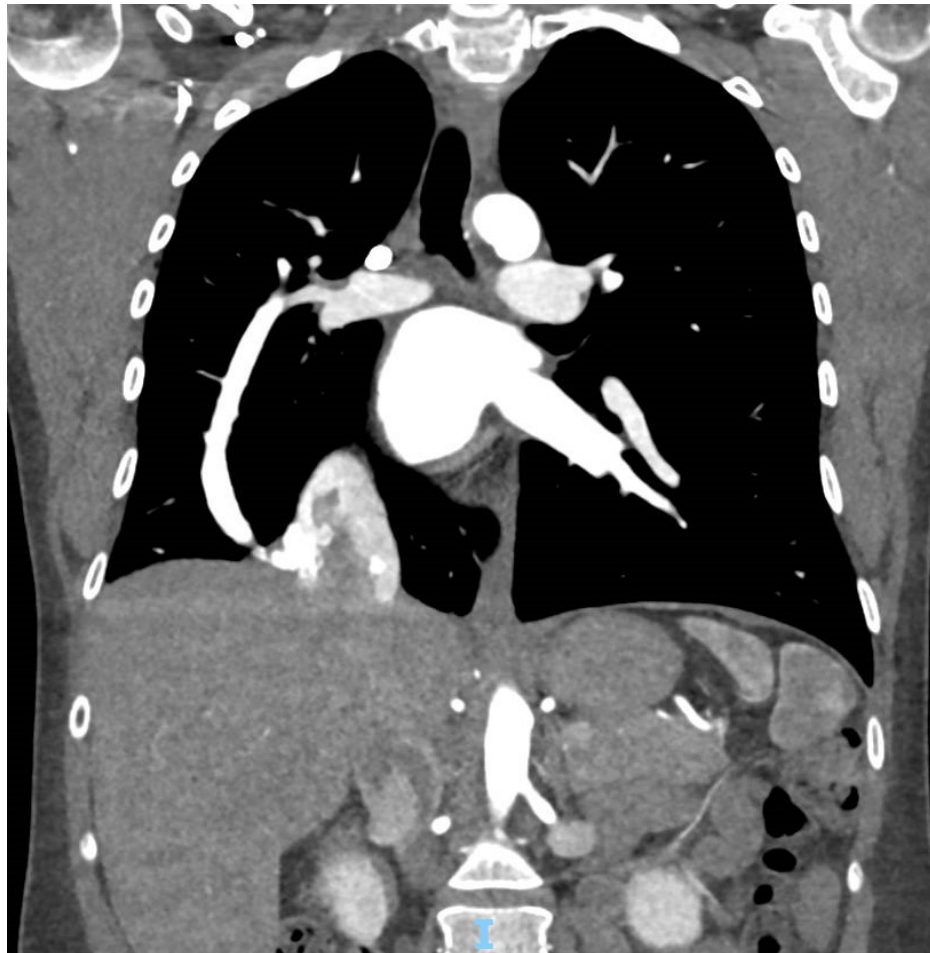


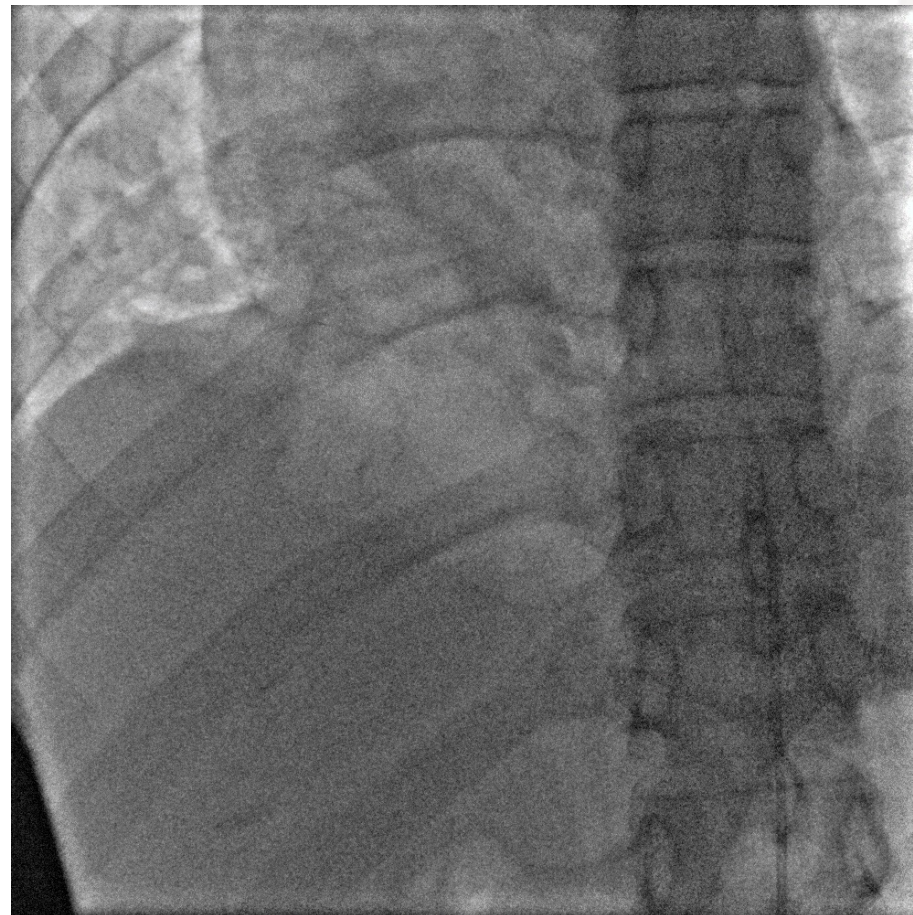
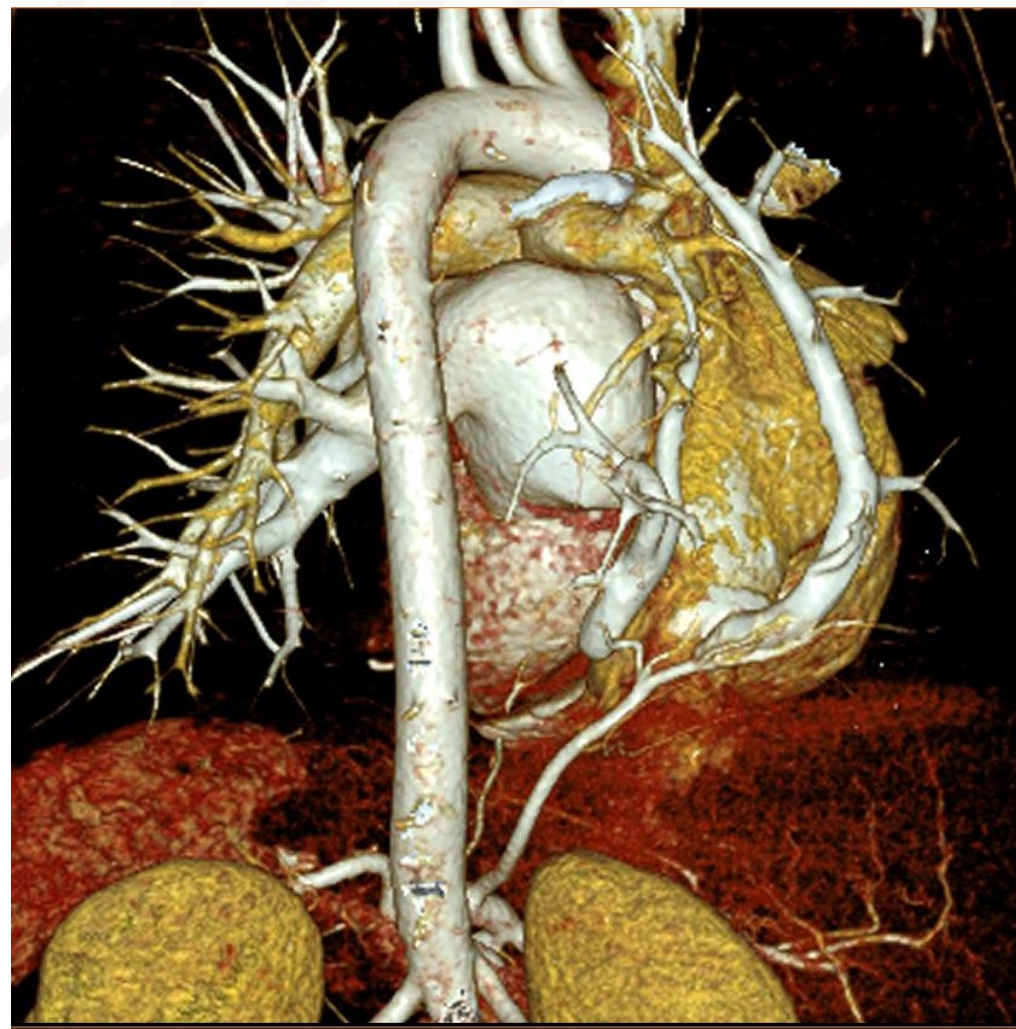
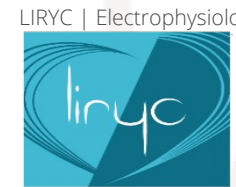
SYNDROME DE CIMETERRE





- **Patiente de 34 ans**
- **Infection pulmonaire**
- **Découverte abcès du séquestre pulmonaire**







AUTRES EXAMENS COMPLEMENTAIRES



TDM/IRM

Anomalies du retour veineux pulmonaire

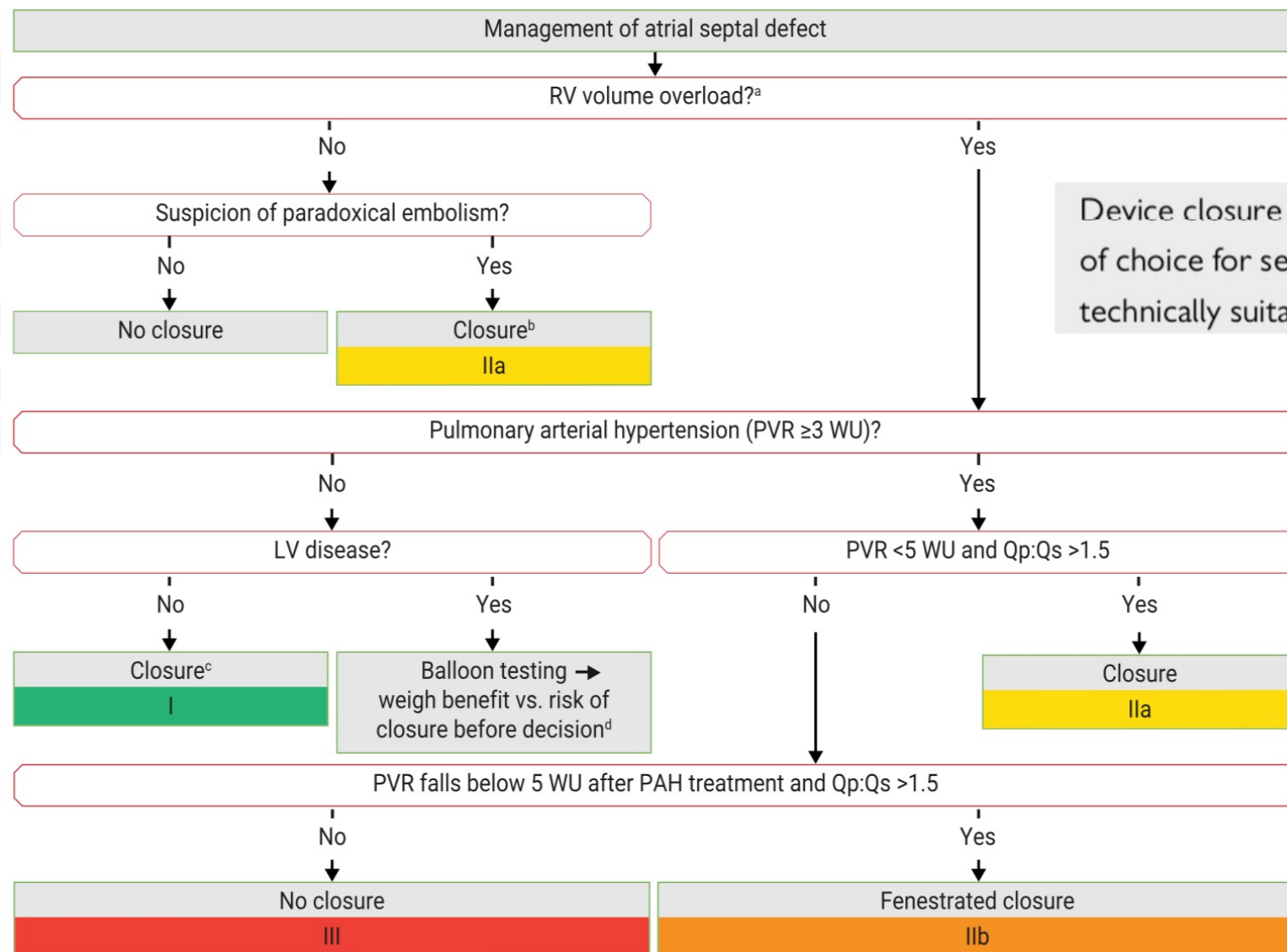


KT

Si HTAP en ETT

Mesure Pressions; Qp/Qs

Résistances pulmonaires+++



Device closure is recommended as the method of choice for secundum ASD closure when technically suitable.

I

C



CANAL ATRIO-VENTRICULAIRE

PARTIEL

Partial AVSD (primum ASD)

Surgical closure is recommended in patients with significant RV volume overload and should only be performed by a congenital cardiac surgeon.

I
C

For further details see recommendations for intervention in ASD (section 4.1).

AV valve regurgitation

Valve surgery, preferably AV valve repair, is recommended in symptomatic patients with moderate to severe AV valve regurgitation and should be performed by a congenital cardiac surgeon.

I
C

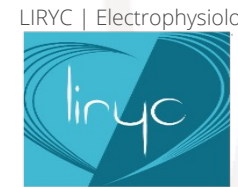
In asymptomatic patients with severe left-sided AV valve regurgitation, valve surgery is recommended when LVESD ≥ 45 mm^d and/or LVEF $\leq 60\%$ provided other causes of LV dysfunction are excluded.

I
C

RVPAP

4.1.5 Specific aspects of isolated anomalous pulmonary venous connections

Indications for surgery follow the principals of recommendation for ASD closure, but technical suitability for repair and operative risk must be weighed against the potential benefit of intervention. It is unusual for a single anomalous pulmonary venous connection of only one pulmonary lobe to result in a sufficient volume load to justify surgical repair.



FERMETURE PERCUTANÉE – LES PIONNIERS

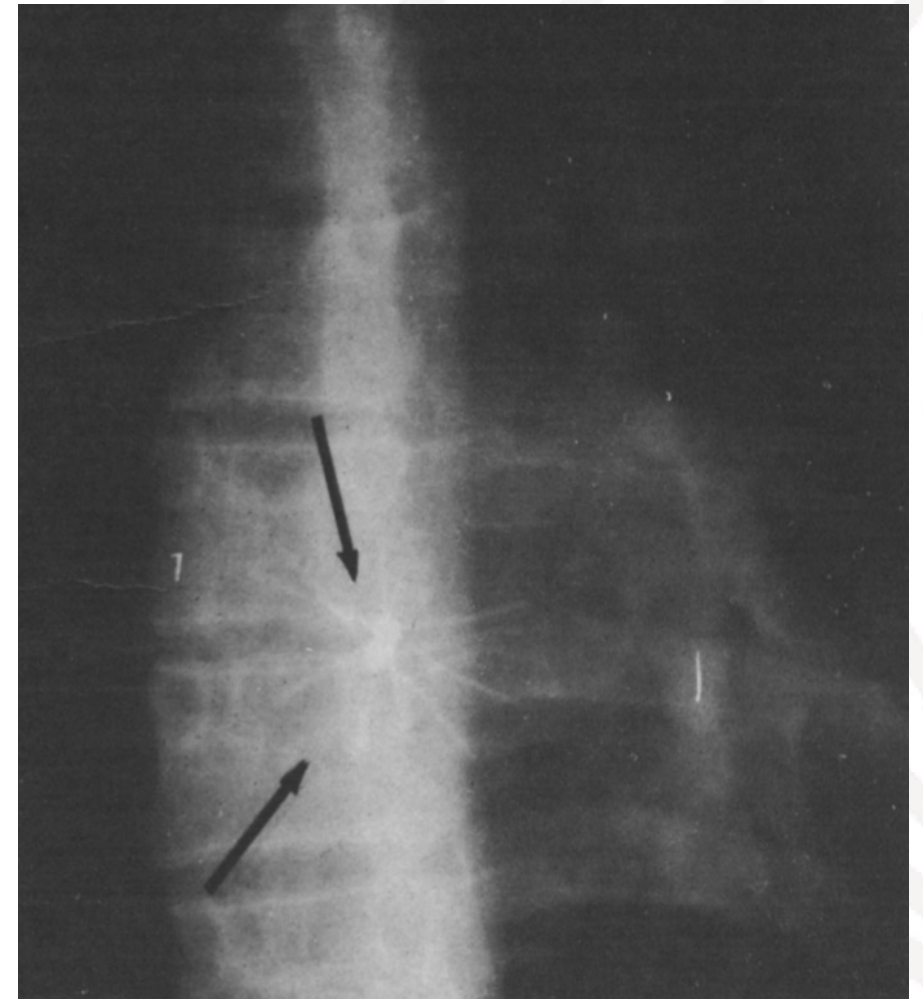
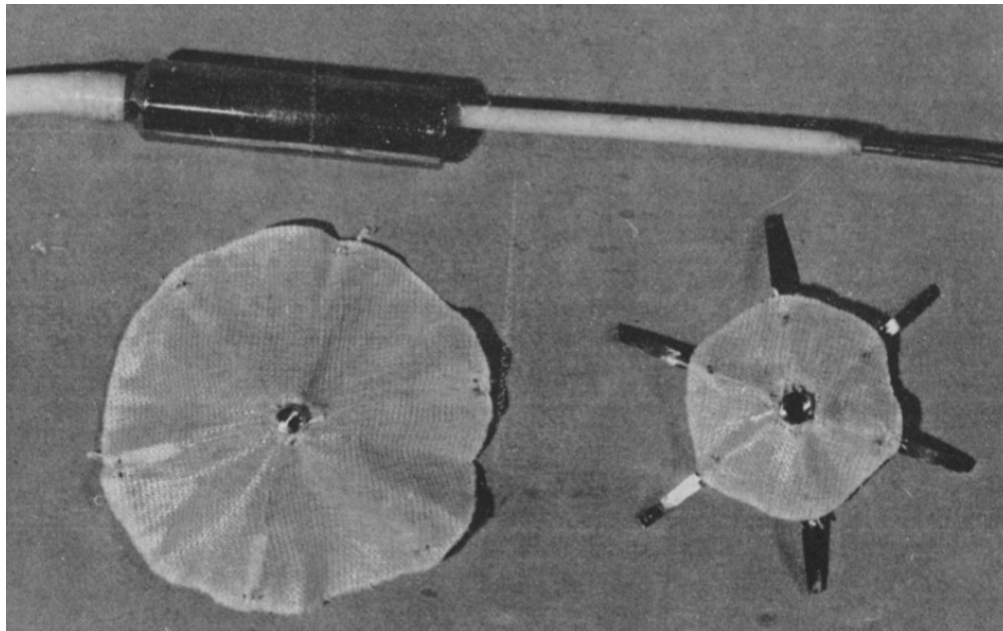
Secundum Atrial Septal Defect

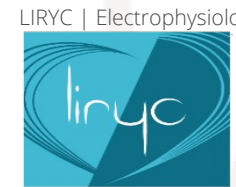
Nonoperative Closure During Cardiac Catheterization

Terry D. King, MD; Sandra L. Thompson, RN; Charles Steiner, MD; Noel L. Mills, MD

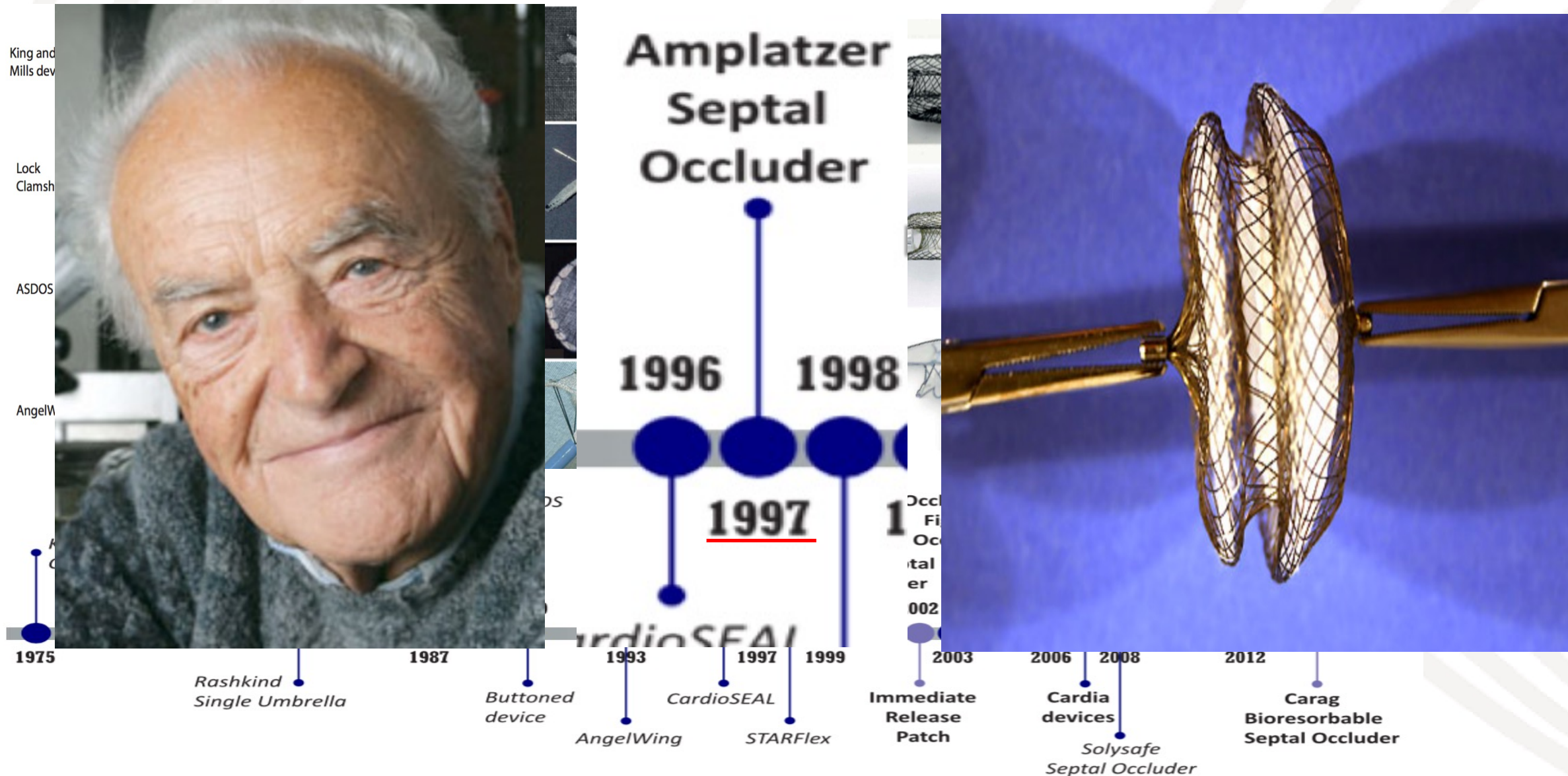
- A 17-year-old girl had clinical and cardiac catheterization findings compatible with a secundum atrial septal defect. During cardiac catheterization, the atrial septal defect was sized and closed using a transvenous umbrella technique.

(*JAMA* 235:2506-2509, 1976)



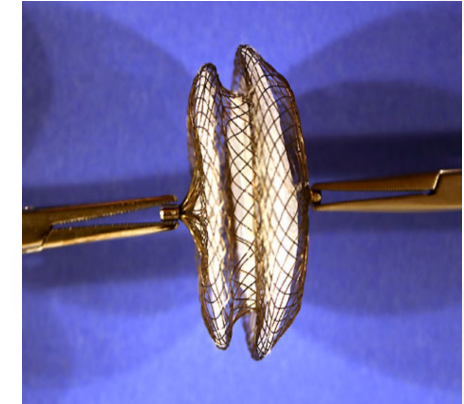
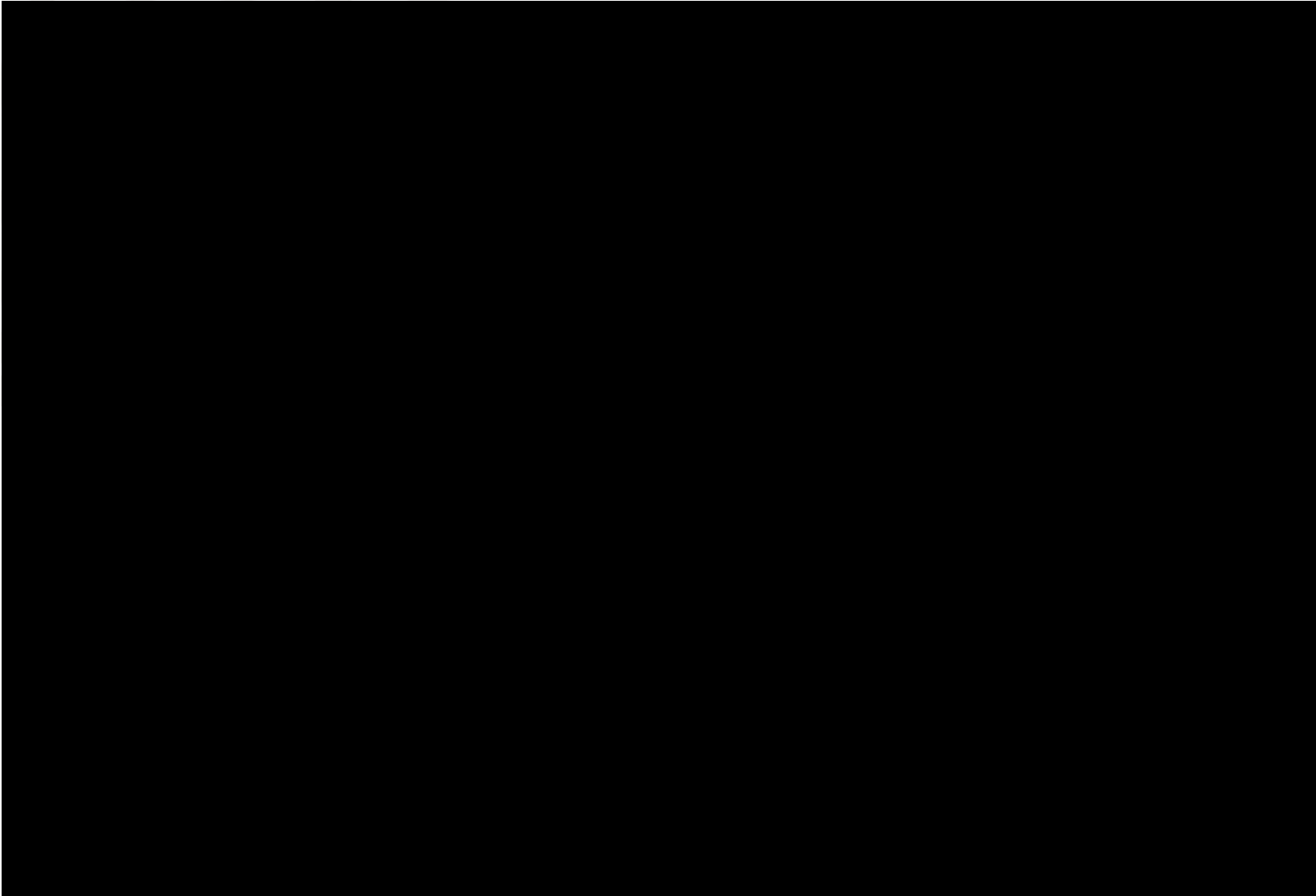


FERMETURE PERCUTANÉE – LA RUPTURE





AMPLATZER SEPTAL OCCLUDER



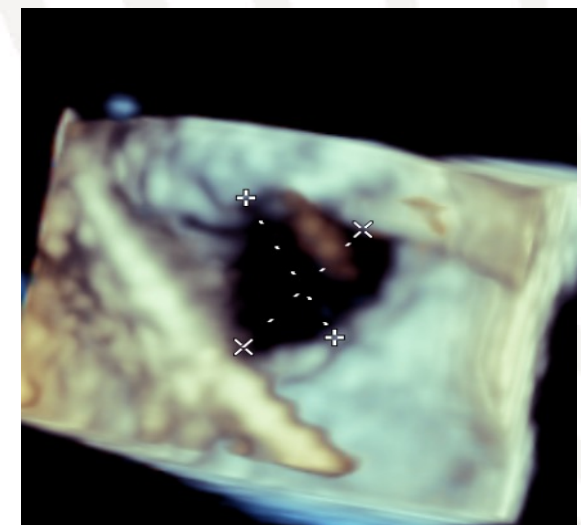
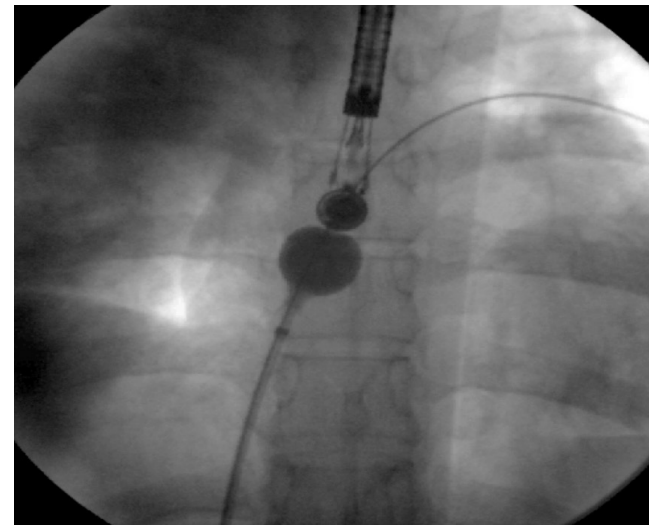
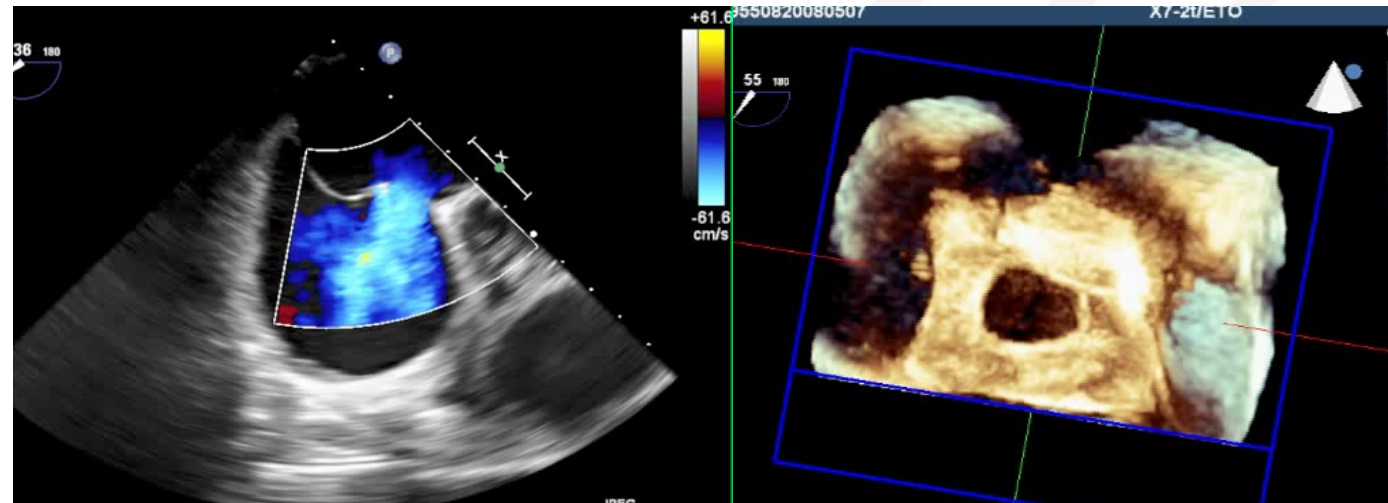
Nitinol (55% Ni + 45 % Ti)
+
Polyéthylène téréphtalate

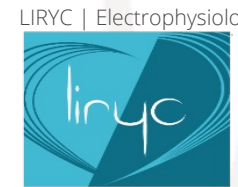
Mémoire de forme
Recapturable
Biocompatibilité
Profil



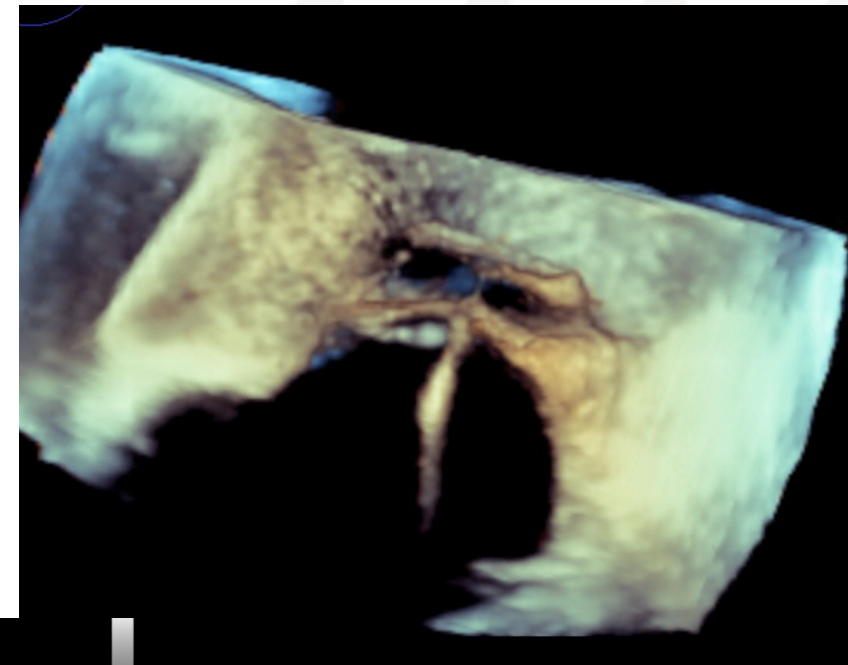
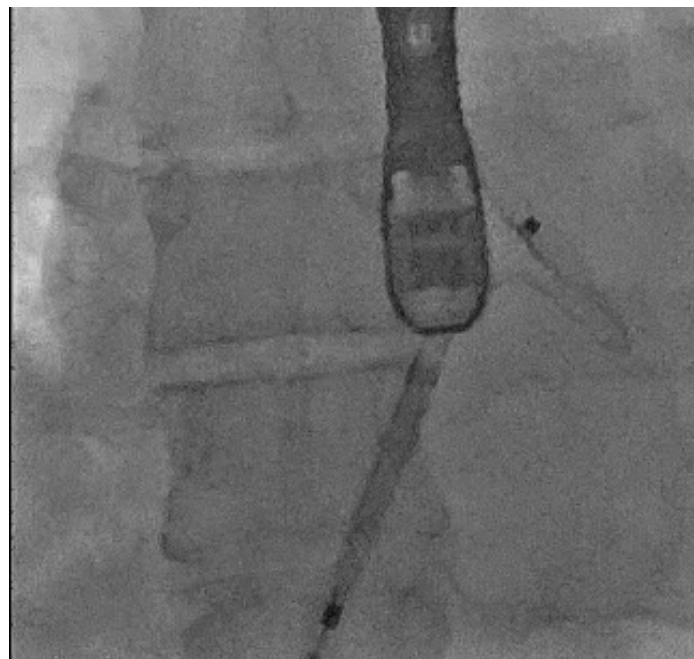
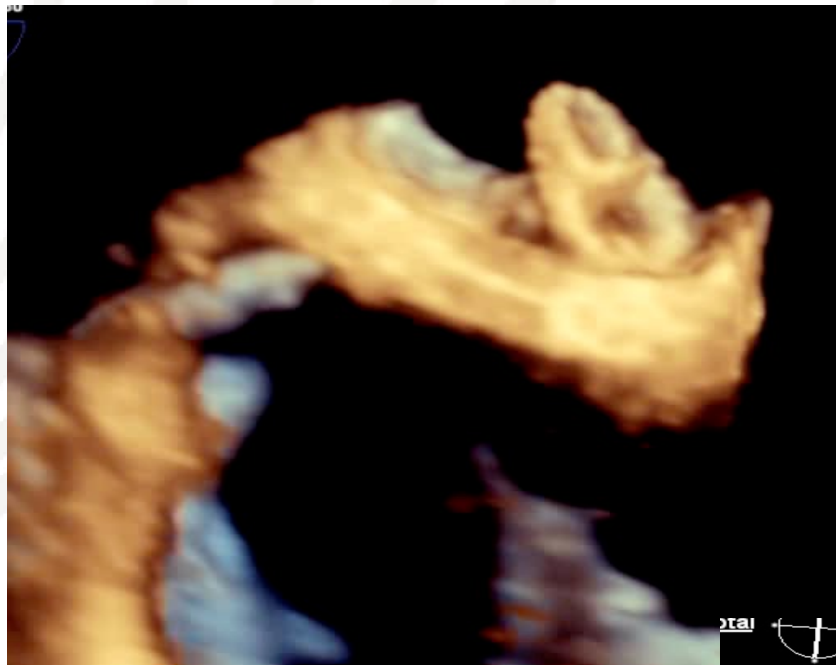
FERMETURE PERCUTANÉE - PROCÉDURE

- Sous AG/AL
- Contrôle ETO (ETT, ICE)
- Accès veine fémorale
- Traitement anti-thrombotique (HNF, AAP)
- Trajet: VFD-OD-CIA-OG-VP => guide VP
- Calibration au ballon et/ou échographique
- Taille prothèse = taille défaut + 2-4mm
- Déploiement
- Test stabilité prothèse

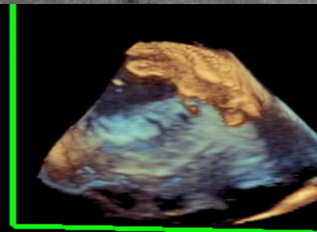




FERMETURE PERCUTANÉE - PROCÉDURE



185



0C
4C

Délai 0ms

65 bp



FERMETURE PERCUTANÉE - RÉSULTATS

RÉSULTATS

Patients n = 1158 (91.6%)

Suivi Médian : 3.5 ans (0.5 – 18; IQR: 1 – 7; 13% > 10 ans)

Vivants (n, %)	1158 (100)
Asymptomatique (n, %)	1118 (96)
Érosion cardiaque	0 (0)
Arythmies	8 (0.69)
AVC	2 (0.17)
Bloc atrio-ventriculaire	0 (0)
Insuffisance cardiaque	0 (0)
Endocardite infectieuse	0 (0)
Hypertension pulmonaire	2 (0.17)

COMPLICATIONS À LONG TERME
(n=12; 1.04%; 95% CI: 0.5% - 1.6%)



GROSSESSE

- 69 femmes (8.5%) => 78 grossesses
- Délai Médian 10 ans (2 – 15)
- Pas de complications péri-partum





COMPLICATIONS AU LONG COURS

Review

Long-term Complications After Transcatheter Atrial Septal Defect Closure: A Review of the Medical Literature

Zakaria Jalal, MD,^{a,b,c} Sebastien Hascoet, MD,^{a,d} Alban-Elouen Baruteau, MD, PhD,^{a,e}
Xavier Iriart, MD,^b Bernard Kreitmann, MD, PhD,^b Younes Boudjemline, MD, PhD,^{a,f,g} and
Jean-Benoit Thambo, MD, PhD^{a,b,c}

ÉROSION
CARDIAQUE

VALVULOPATHIES

THROMBOSES

AVC

ALLERGIE AU
NICKEL

TROUBLES
CONDUCTIFS

ARYTHMIES
ATRIALES

ENDOCARDITE

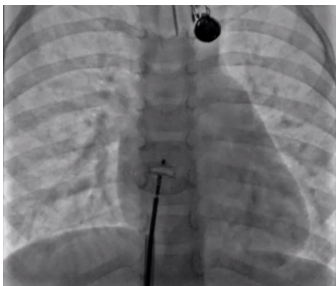
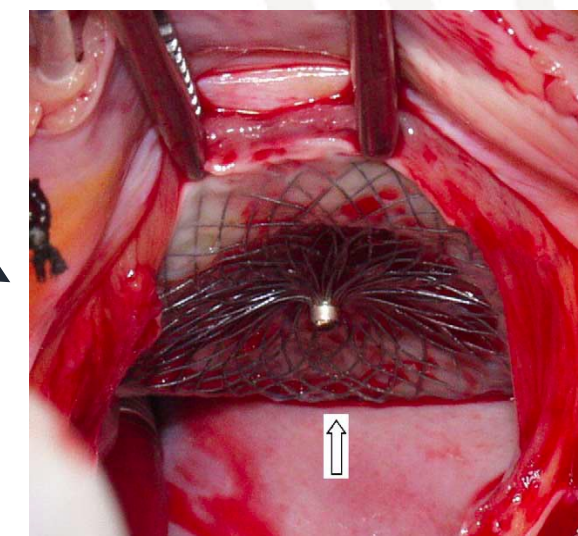
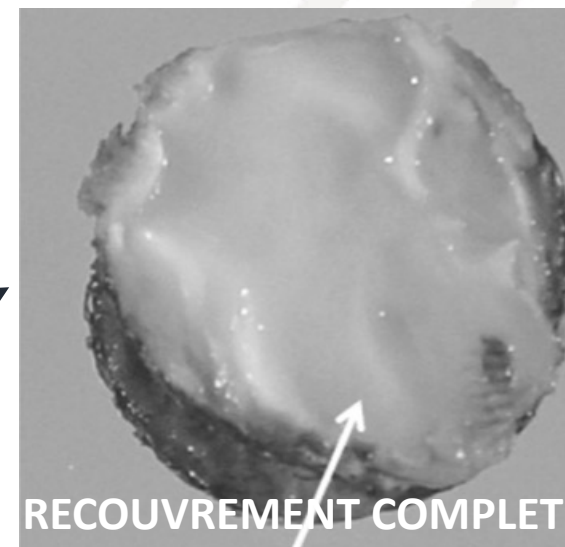
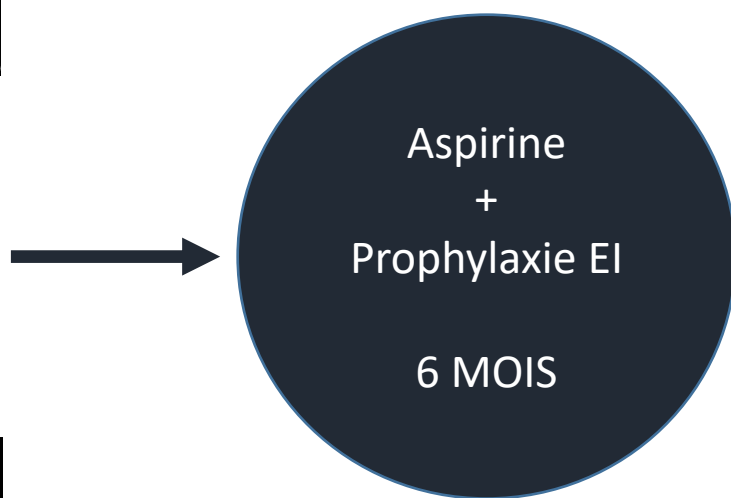
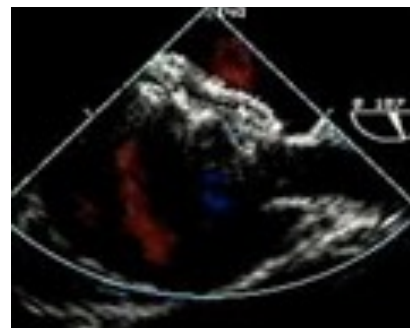
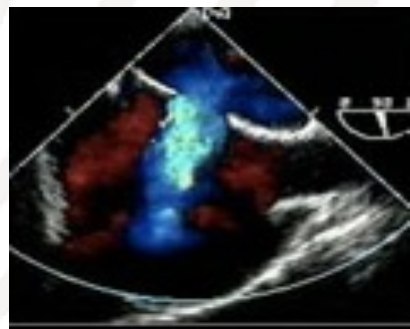


Table 1. Summary of the main long-term complications after percutaneous ASD

Complication	Incidence	Delay from closure	Complications
Cardiac erosion	0.04%-0.28%	Up to 9 y	Death (0.05%) Stroke
Device thrombosis	0.8%-1.2%	Up to 2 y	Stroke (10%-15%)
Atrial arrhythmias	11% 10 years after closure	—	Stroke
Complete AV block	5 published cases	Up to 4 y	—
Infective endocarditis	6 published cases	Up to 4 y	—

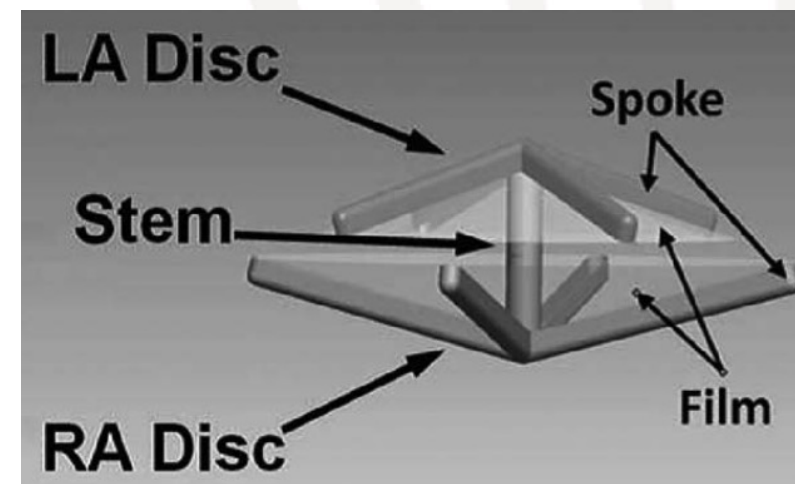
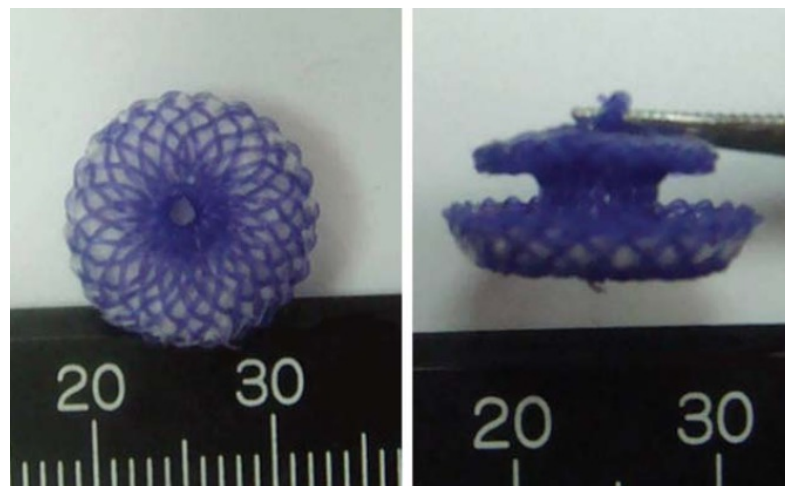
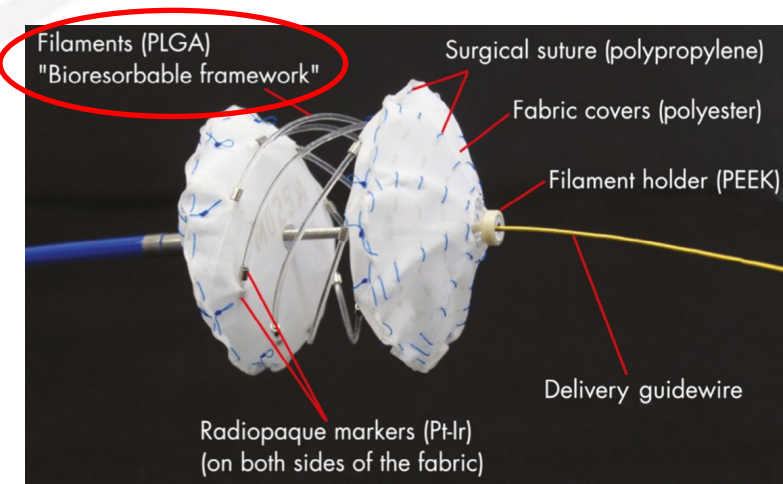
PROBLÉMATIQUE





DISPOSITIF IDÉAL

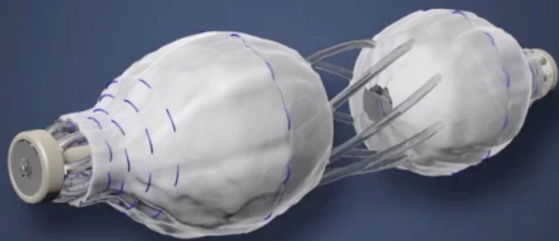
- Si les tissus du patient prennent la place et la fonction du dispositif => indispensable?
- DISPOSITIFS BIORÉSORBABLE
- Résorption partielle ou totale





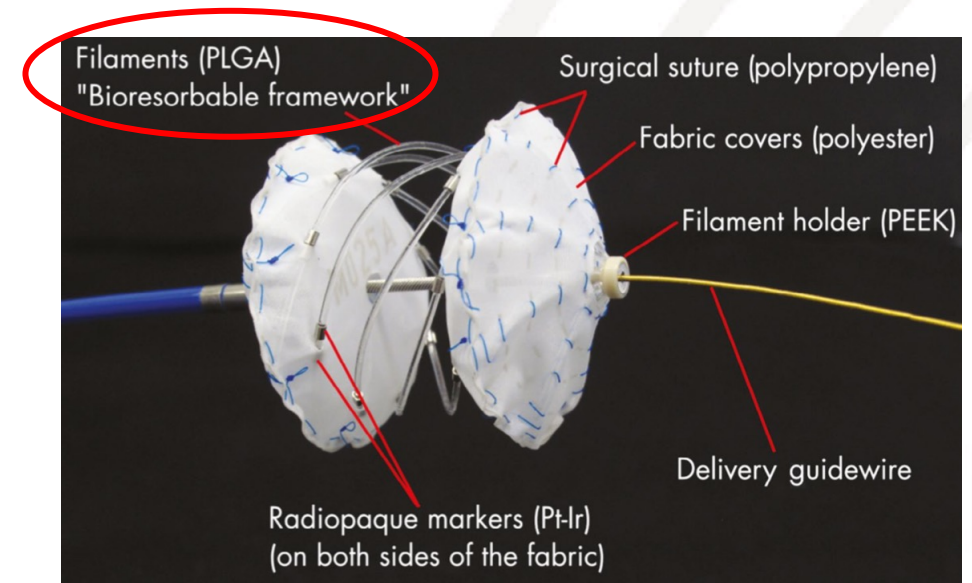
ReSEPT OCCLUDER

ReSept Occluder - AtHeart



CARAG
leading medtech engineers

Courtesy of Jerome Bernhard



- Bioabsorbable PLGA framework
- PLGA degradation 6 – 24 months
- Polyester membrane, No metal
- 3 sizes: suitable for ASD up to 25mm

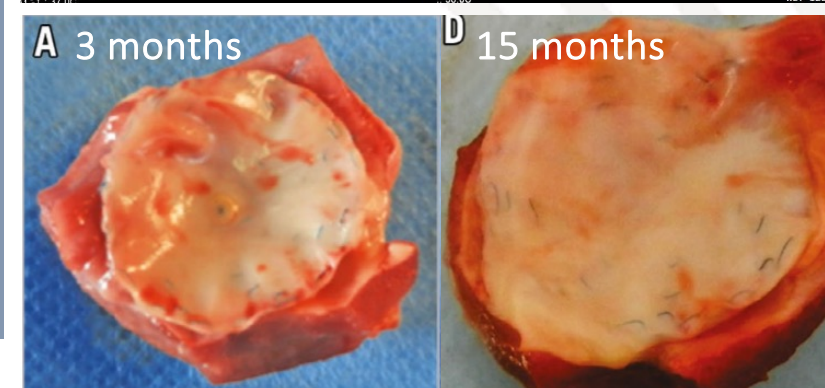
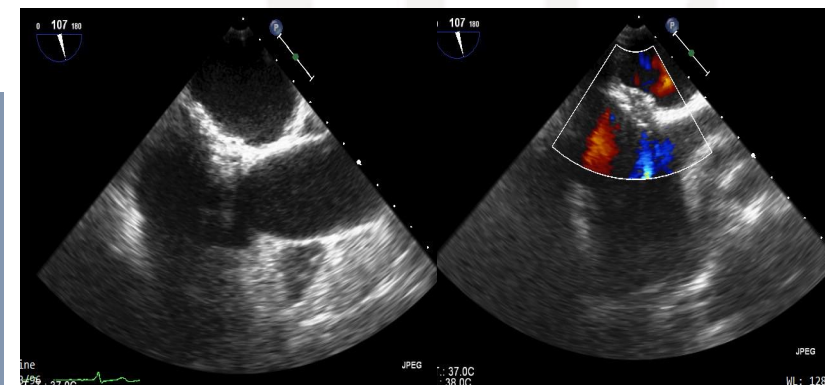
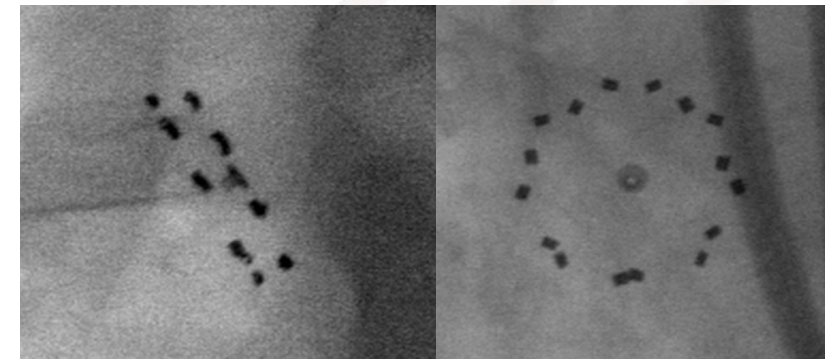


RESEPT OCCLUDER



Safety and Efficacy Study of reSept ASD Occluder for Treating Secundum ASD (ASCENT ASD)

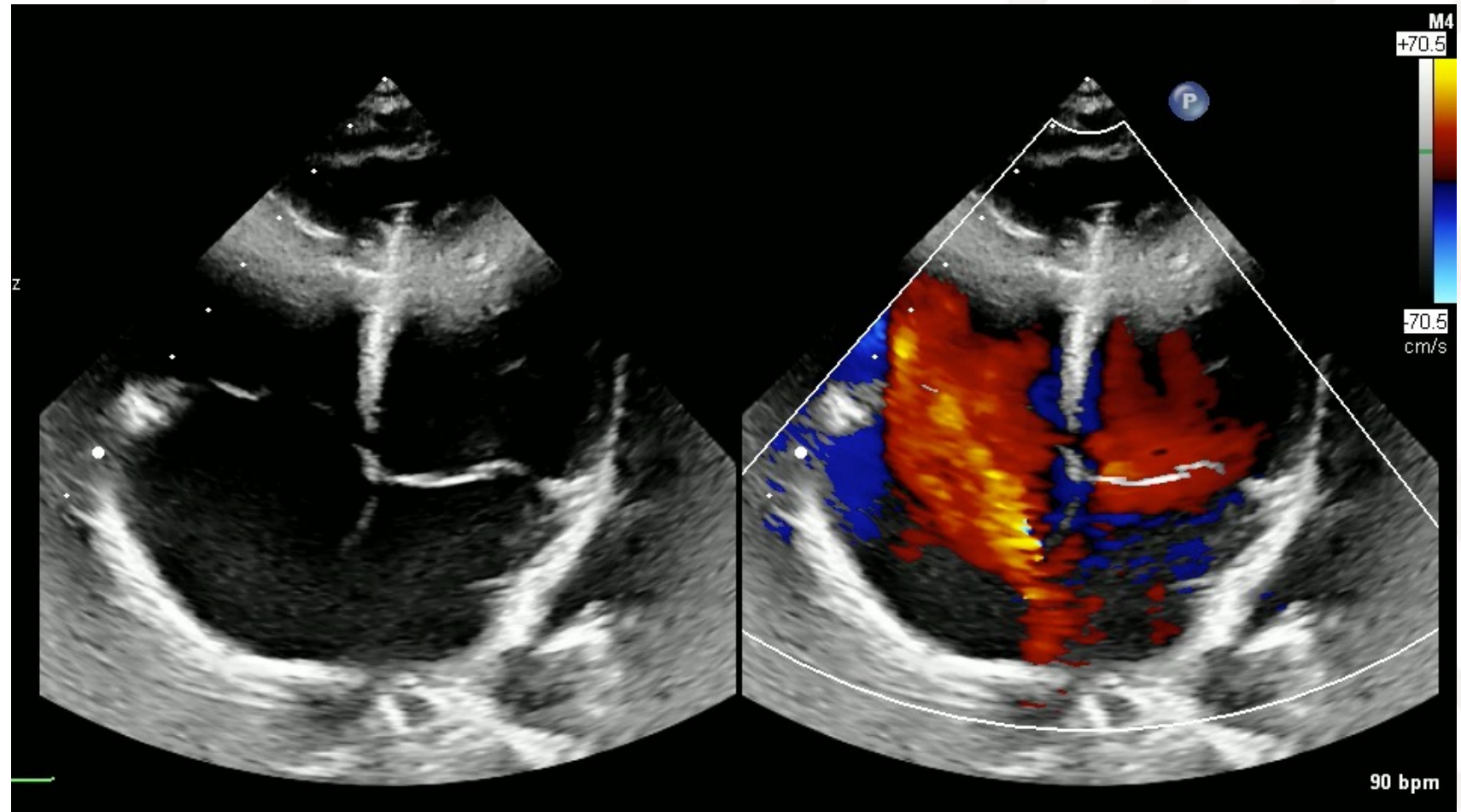
- > 15kg, CIA de 4 à 19mm avec shunt significatif
- Suivi 12 mois
- Efficacité, réinterventions, complications
- PREMIÈRE IMPLANTATION FRANCE/EUROPE CHU DE BORDEAUX
- 2 patients de 11 et 51 ans

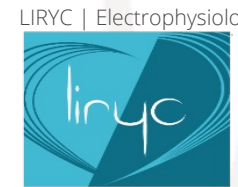




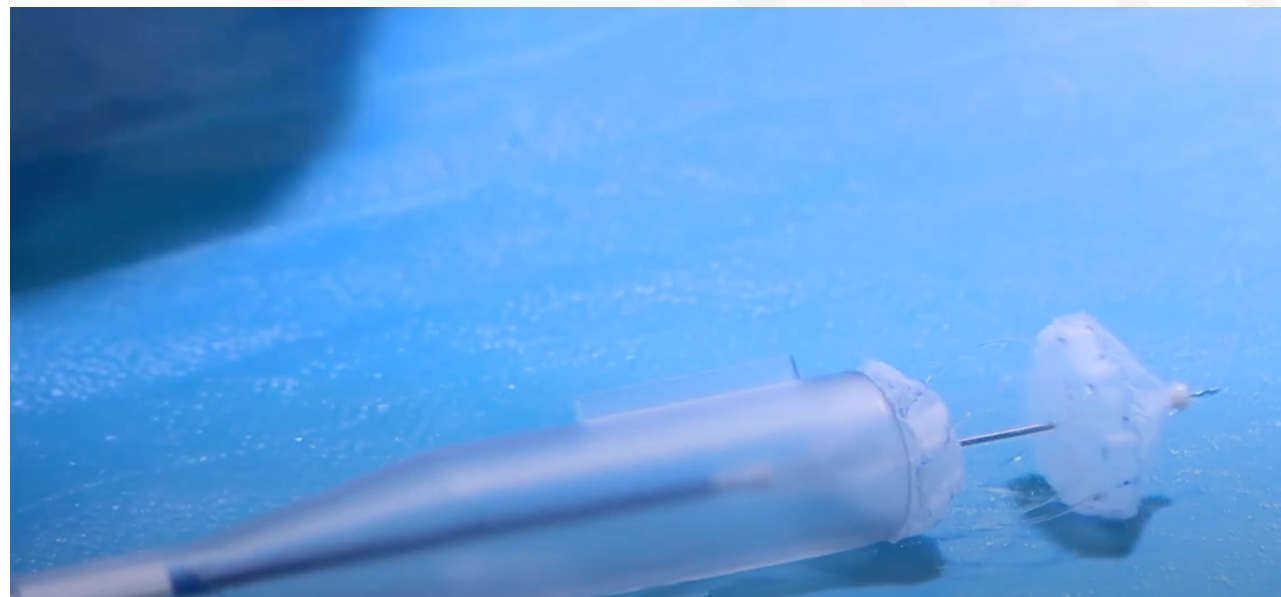
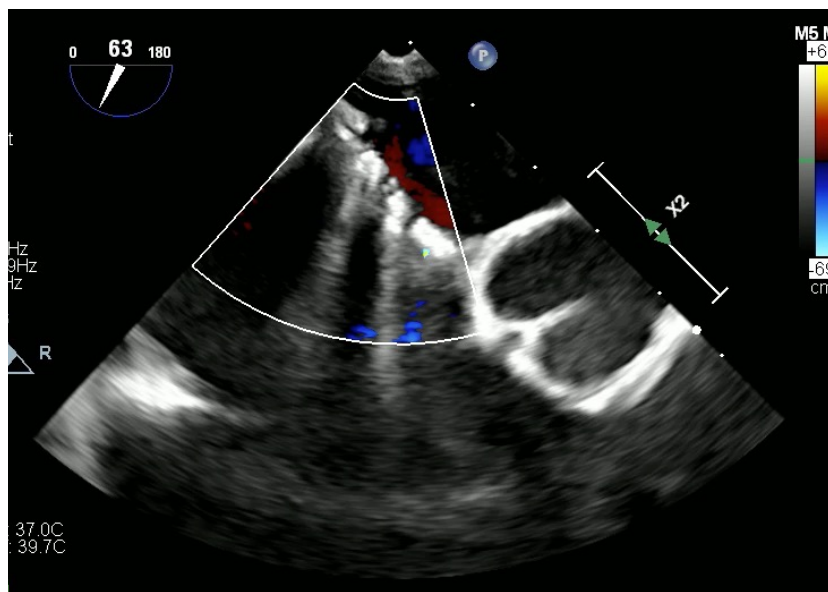
ReSEPT OCCLUDER

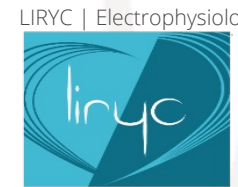
- Léo, 11 ans,
- 32 kg - 140 cm
- NYHA 2
- CIA OS 10 x 12-mm
- Berges > 5mm





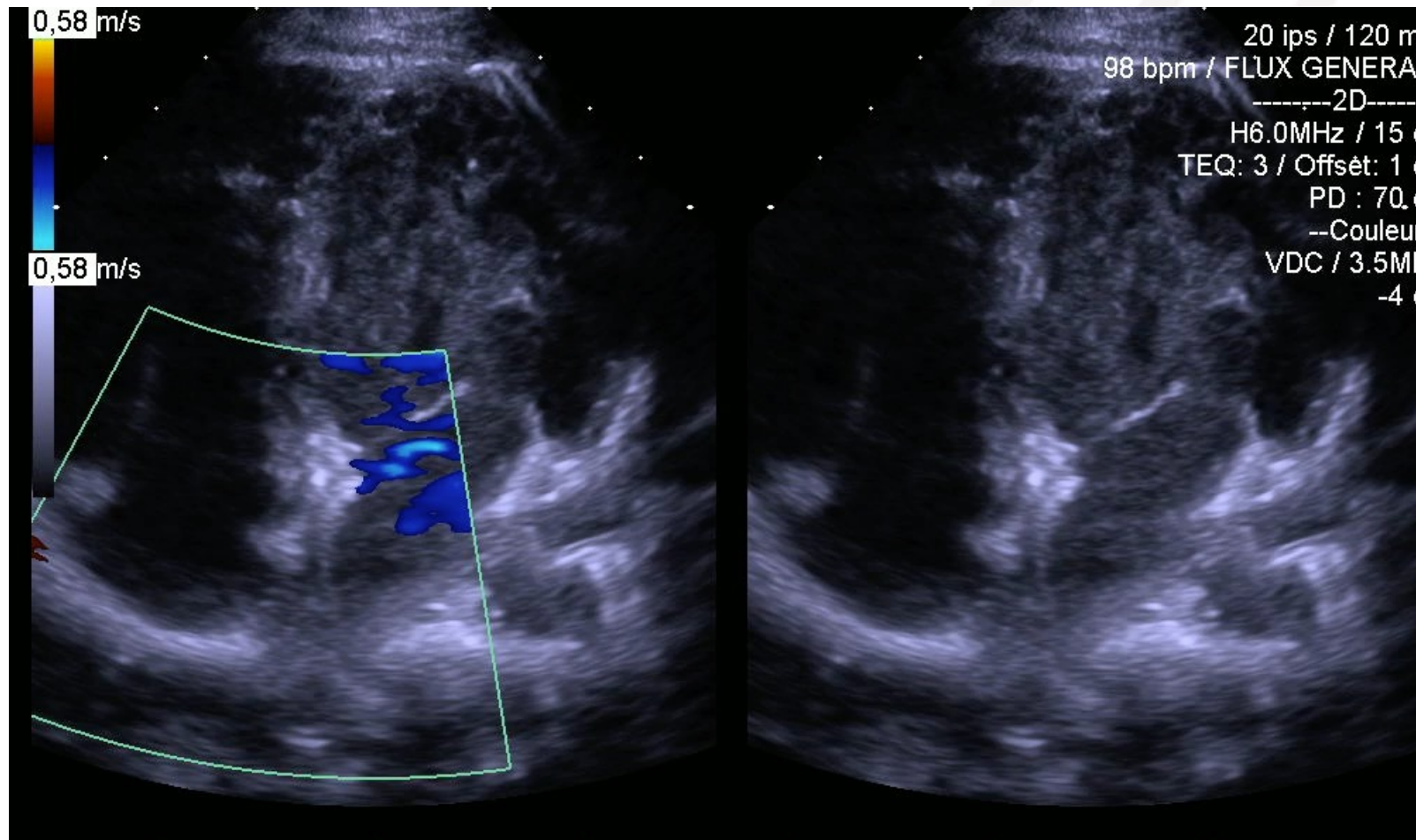
ReSEPT OCCLUDER



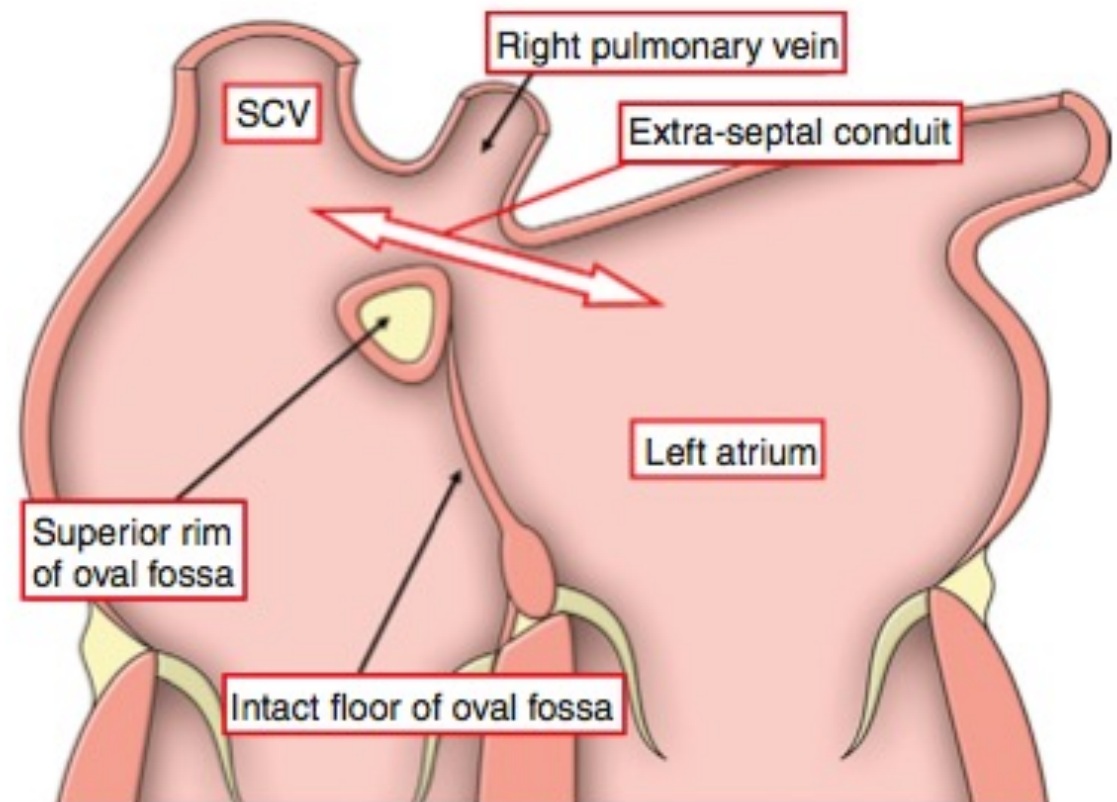
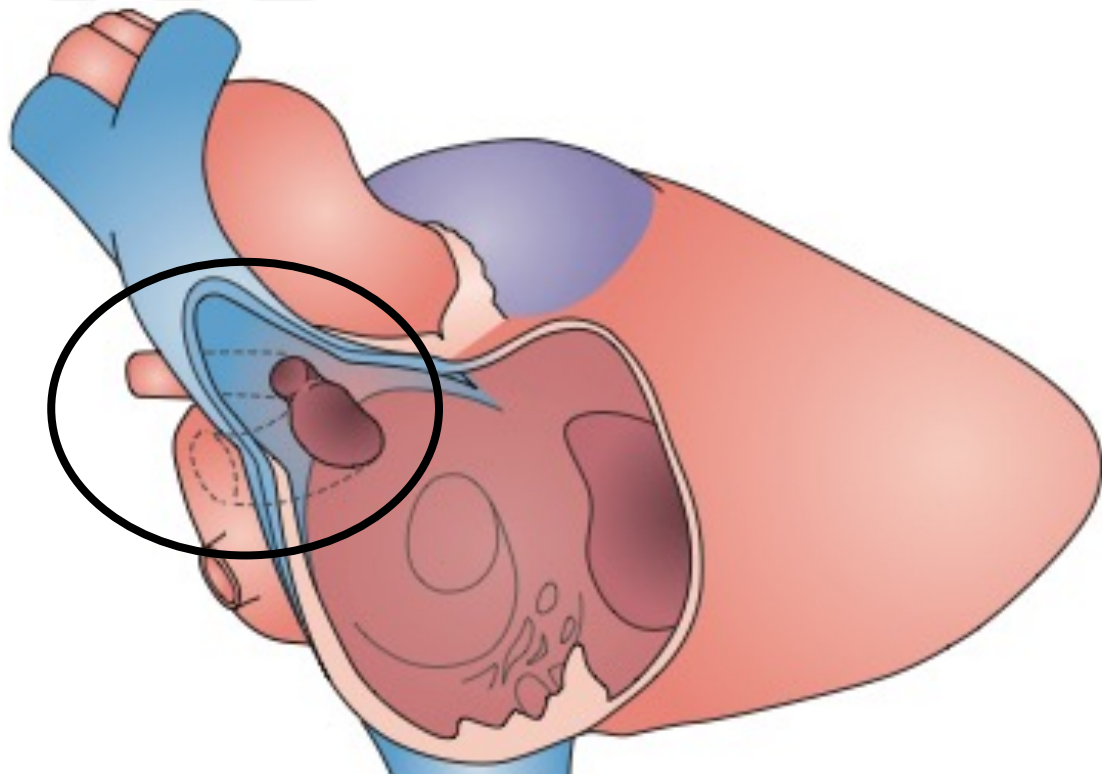


RESEPT OCCLUDER

- Sortie J1
- Pas de complication
- Suivi à M6: RAS

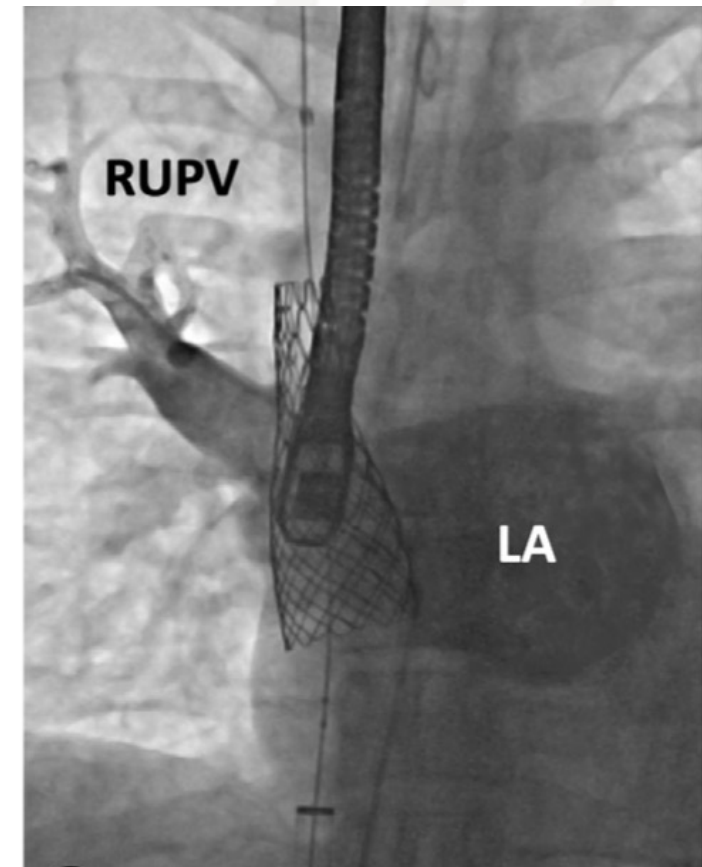
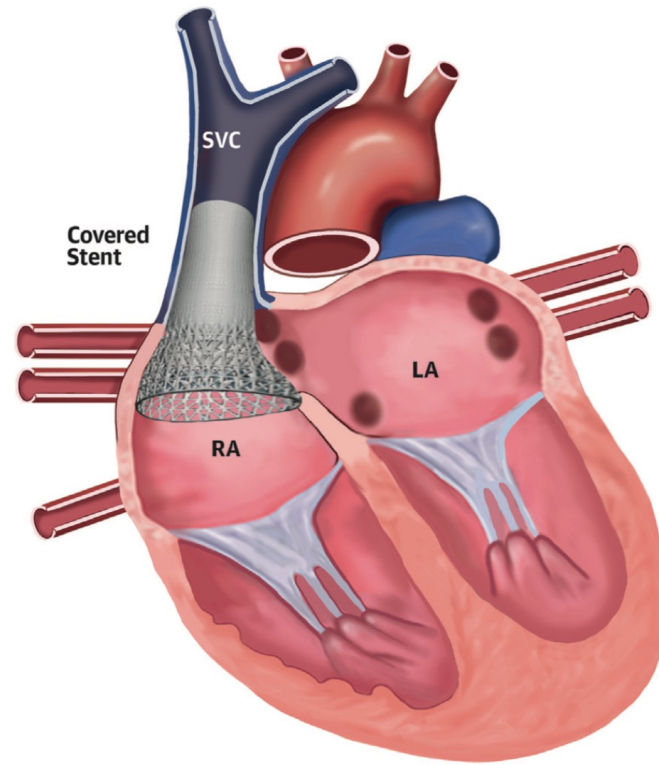
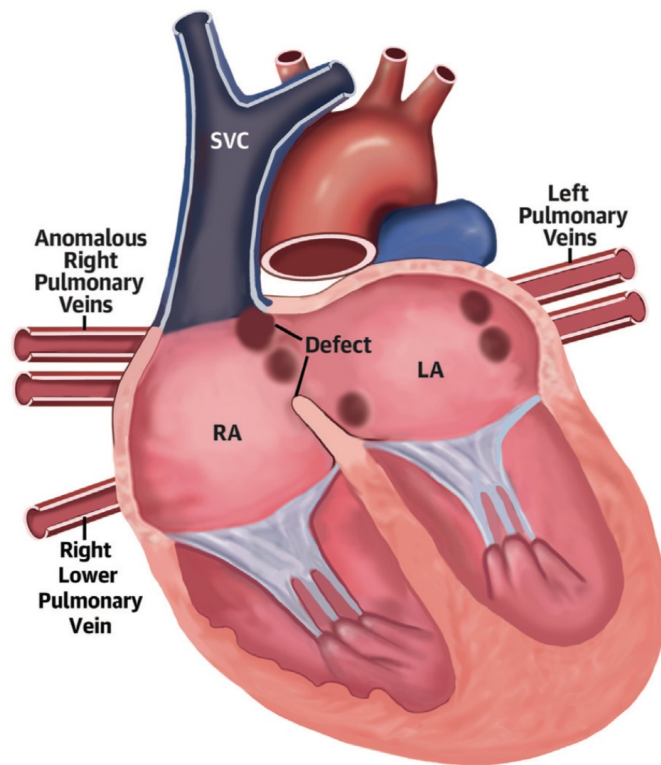


ANOMALOUS CONNECTION OF RIGHT PULMONARY VEINS AT CAVOATRIAL JUNCTION



CIA SINUS VENOSUS – APPROCHE PERCUTANEE

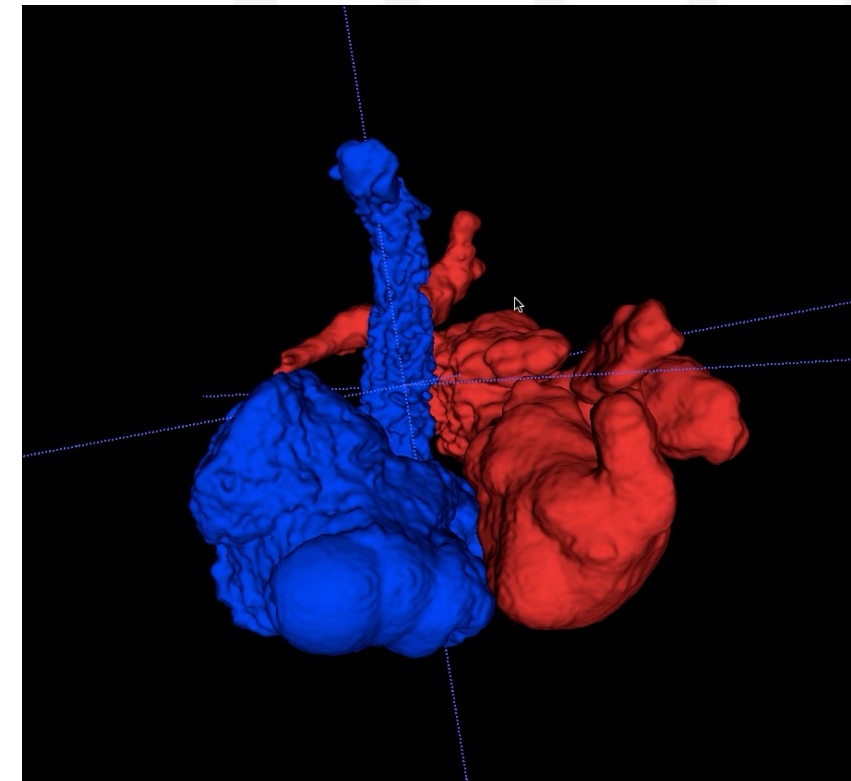
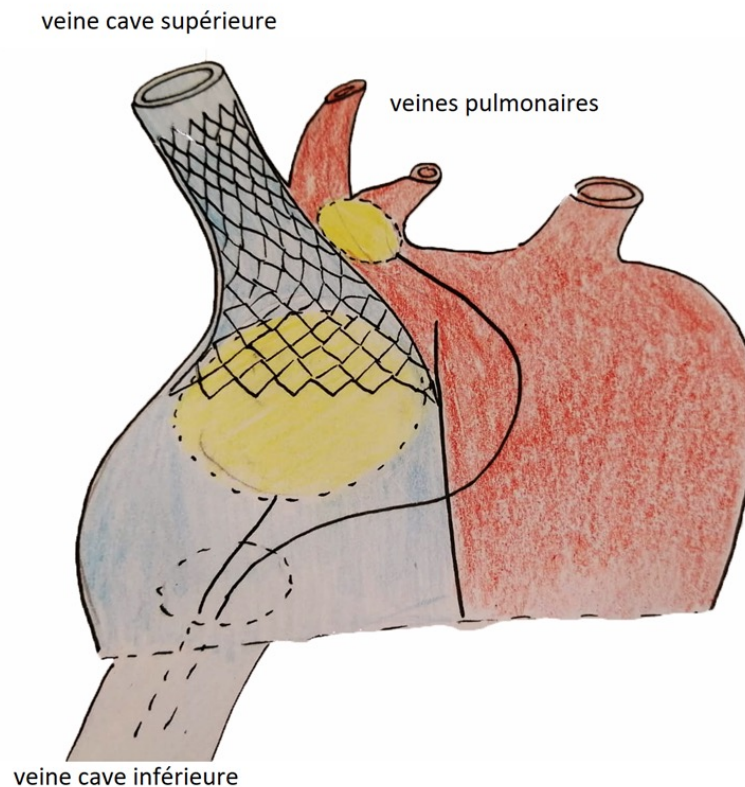
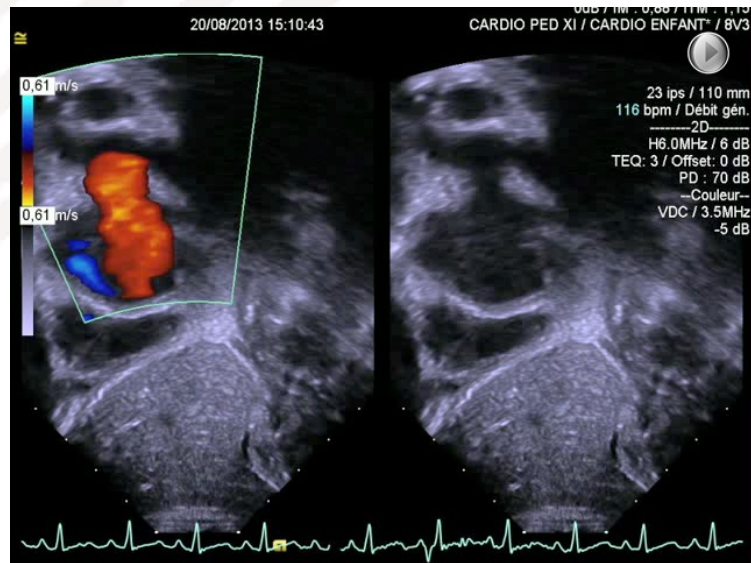
ACTUALITÉS ET INNOVATIONS



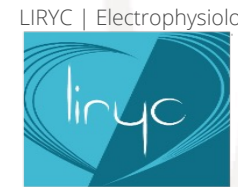


CIA SINUS VENOSUS – APPROCHE PERCUTANEE

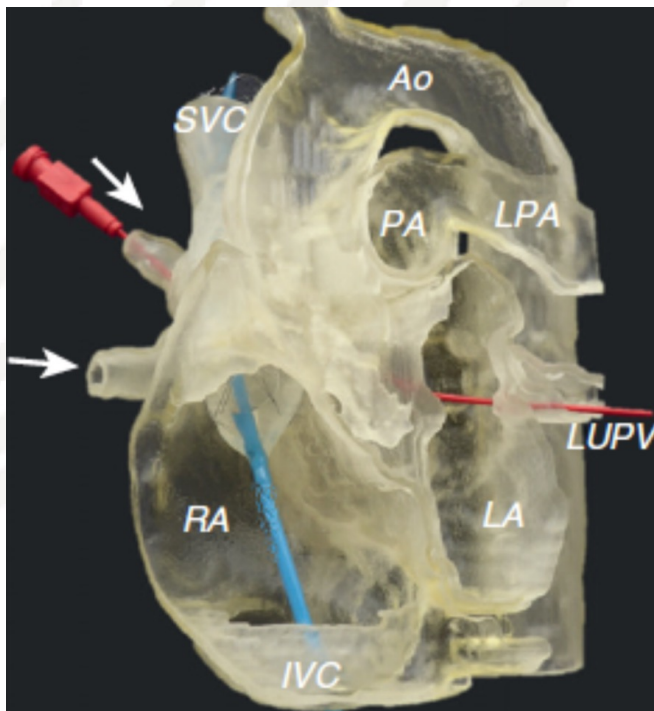
STENT COUVERT JONCTION SVC – OD => Tunellisation SVC-RA



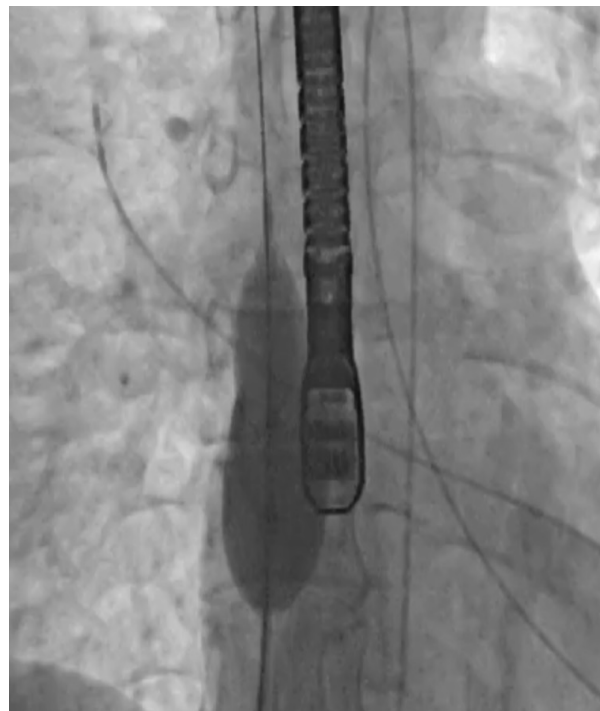
Courtesy Sebastien Hascoet



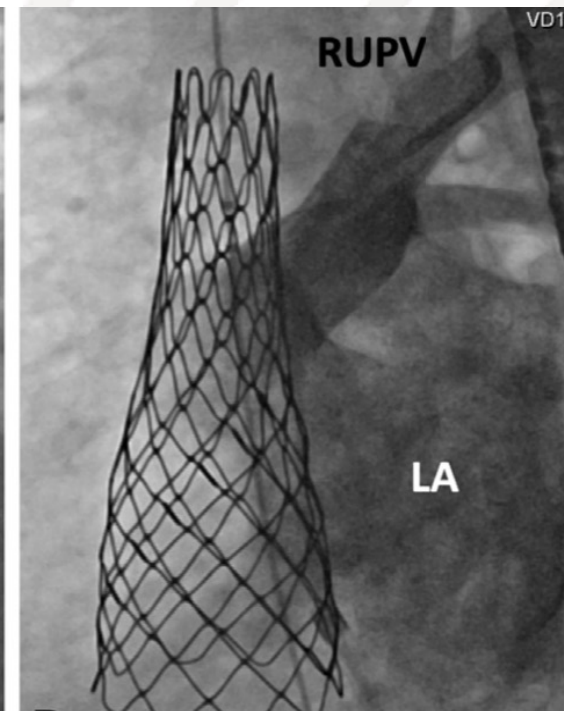
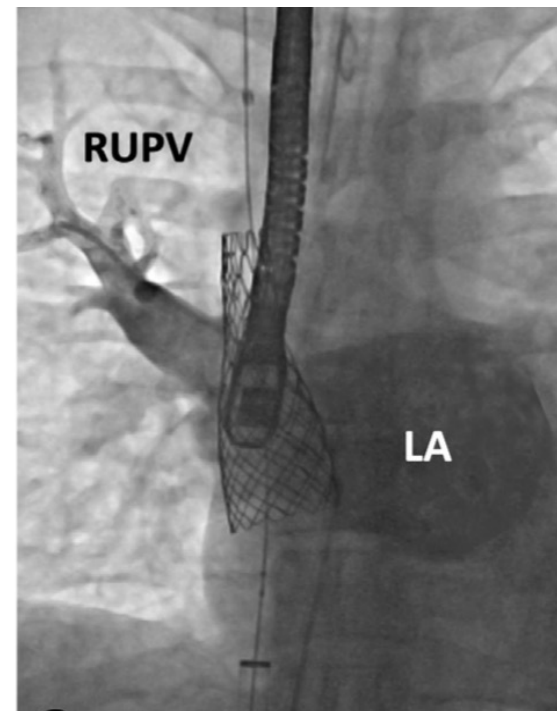
CIA SINUS VENOSUS – APPROCHE PERCUTANEE



3D-PRINTED
MODEL



IN-VIVO
ASSESSMENT



SHUNT CLOSURE
RUPV PATENCY



ORIGINAL RESEARCH ARTICLE

Covered Stent Correction for Sinus Venosus Atrial Septal Defects, an Emerging Alternative to Surgical Repair: Results of an International Registry

- **Taux de succès** : 97,4 % (371 patients sur 381 ont eu un stent correctement implanté).
- Embolisation (OD ou VD) : 10 patients (2.6%), de 8 centres différents. 6 embolisations per procédure et 4 à J1
- Shunt résiduel :
 - absent 51%
 - trivial 32%
 - petit 9%
 - modéré 2%

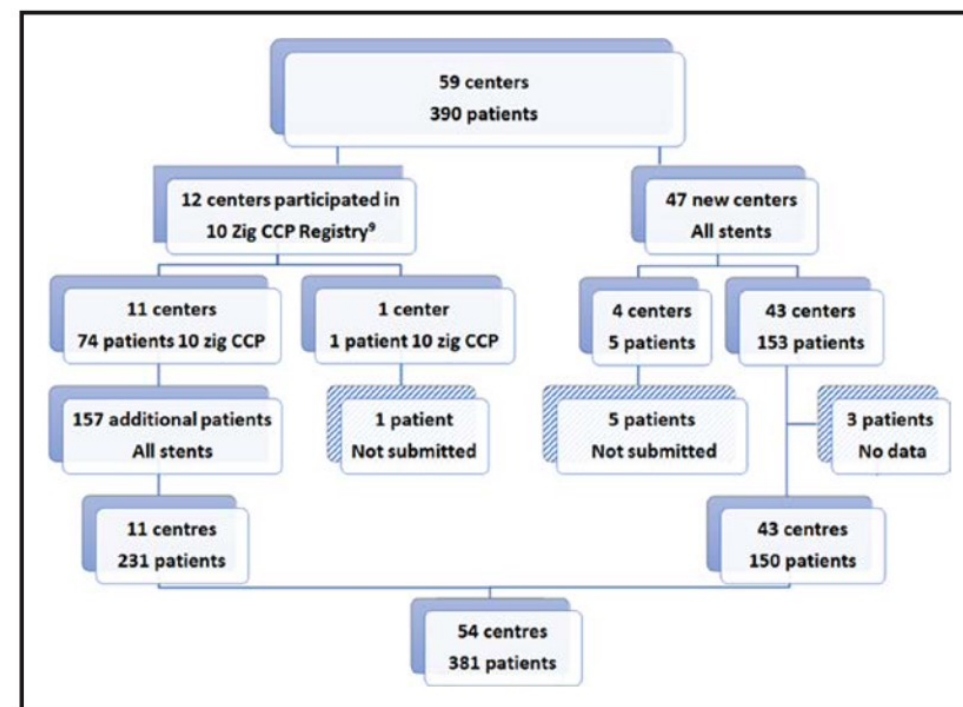


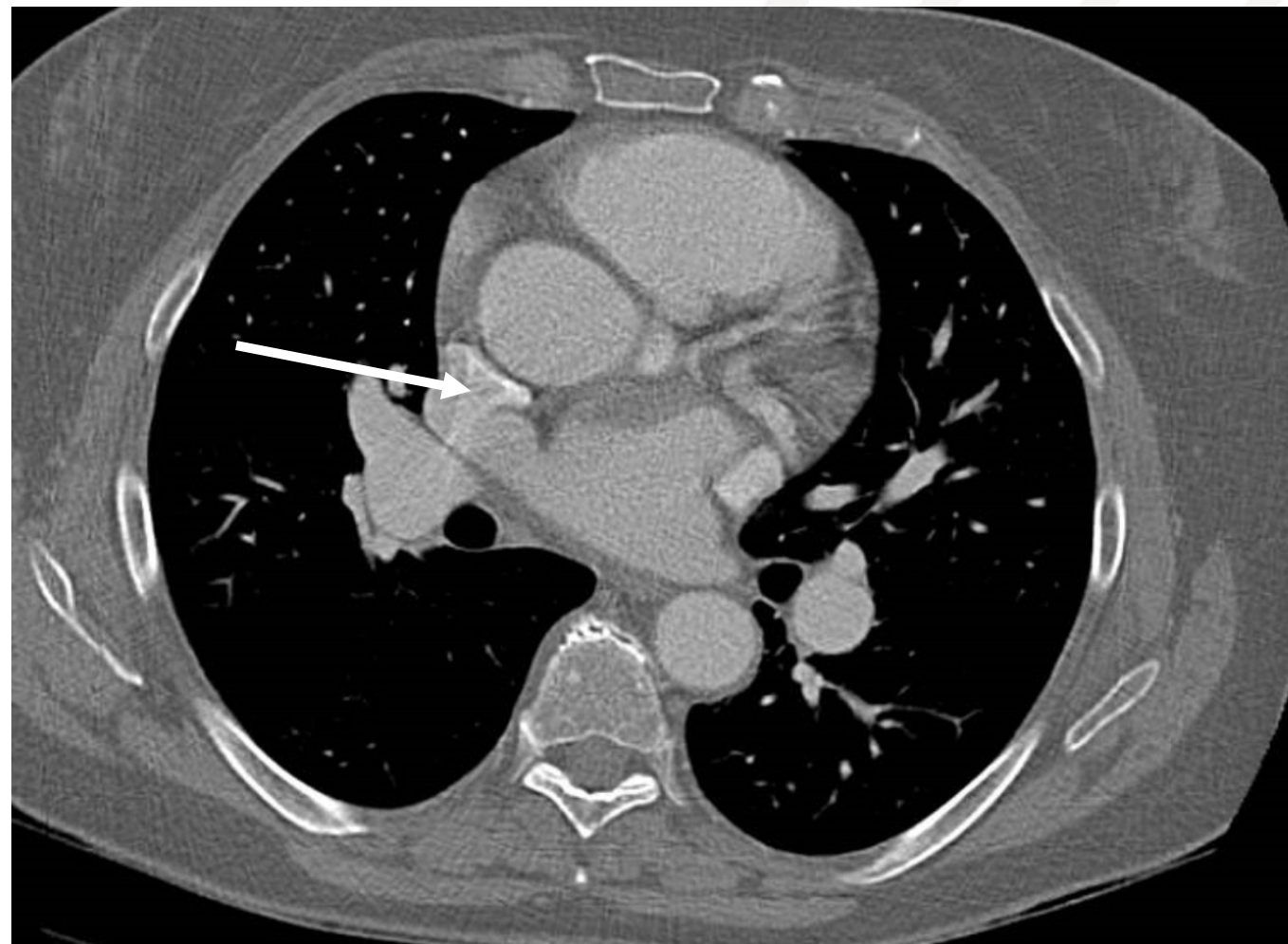
Figure 1. Study enrollment.

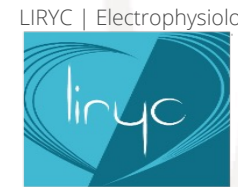
Study enrollment flowchart showing the majority of procedures were undertaken by 11 of 12 of the centers from the original 10-zig Covered Cheatham Platinum (CCP) Registry.⁹ The 43 new centers contributed 39% of the procedures. Of 390 known patients, data were submitted on 381.



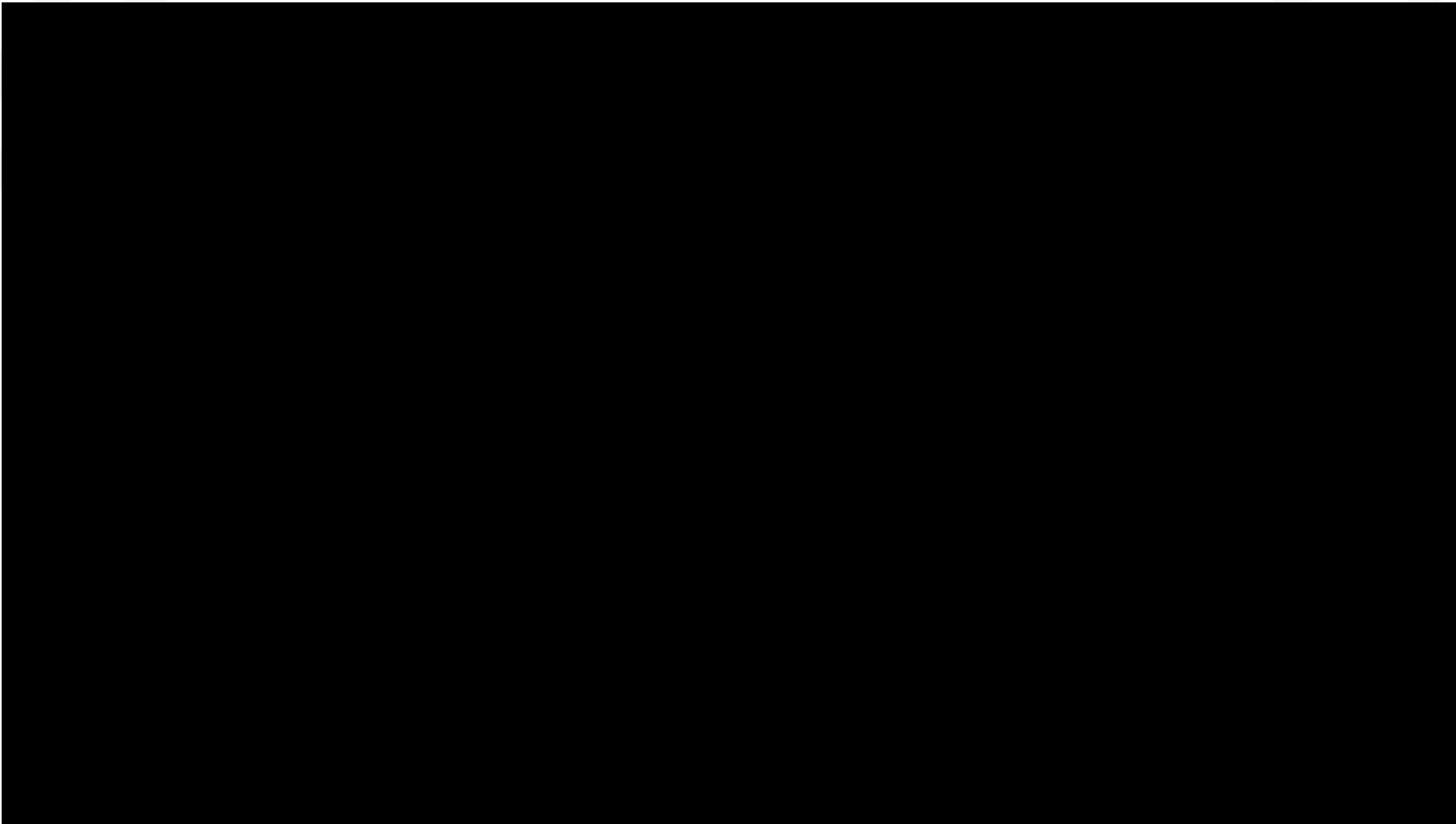
CIA SINUS VENOSUS – APPROCHE PERCUTANEE

- Mme I. 69 ans
- CIA SV, NYHA II fort
- VCSG => VCSD 12-14mm
- KT: PAP: 38/14/24, RVP=0.8 UW
- $Q_p/Q_s=2.6$
- Coronaires normales





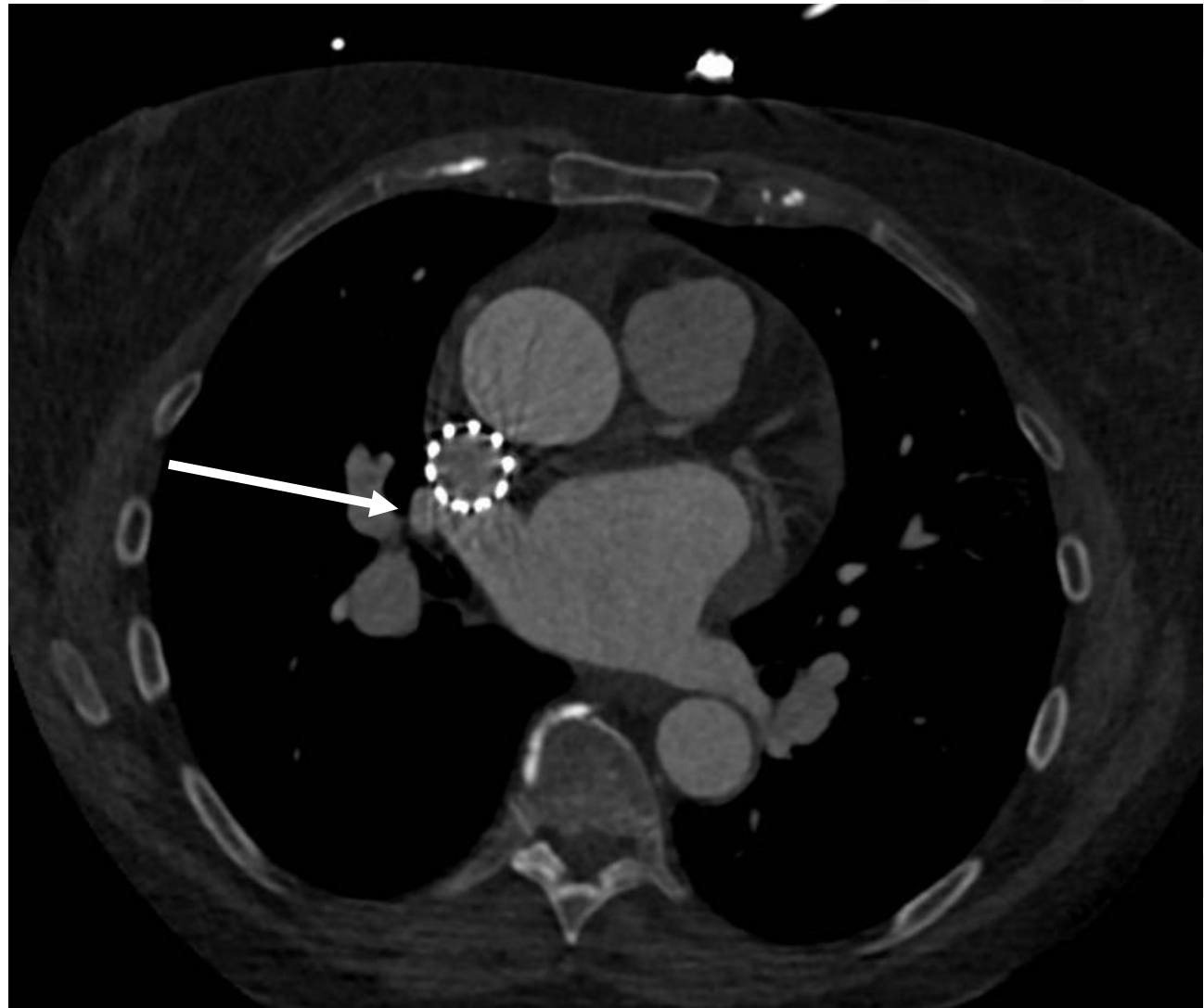
CIA SINUS VENOSUS – APPROCHE PERCUTANEE



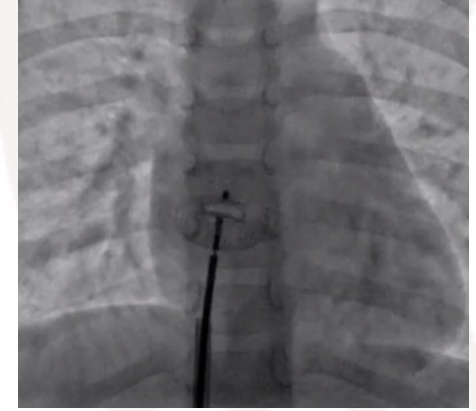
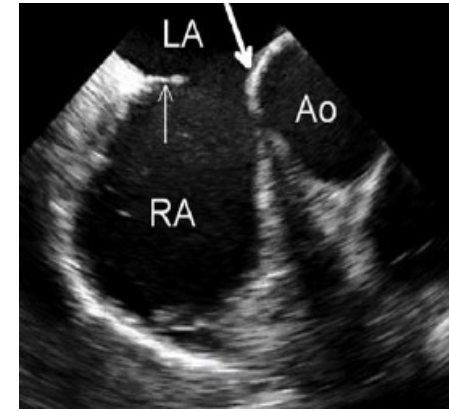
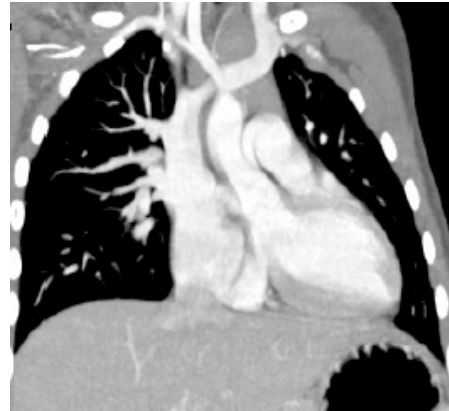
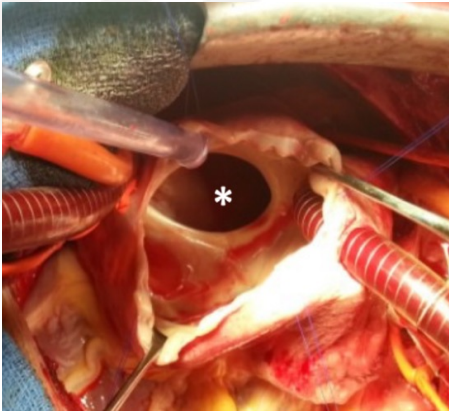


CIA SINUS VENOSUS – APPROCHE PERCUTANEE

- Contrôle 3 mois
- NYHA I
- Pas de complication
- TDM: VPSD ok



MERCI POUR VOTRE ATTENTION



Zakaria Jalal – MD, PhD

Service des cardiopathies congénitales de l'enfant et de l'adulte

Hôpital cardiologique Haut Lévéque - Bordeaux