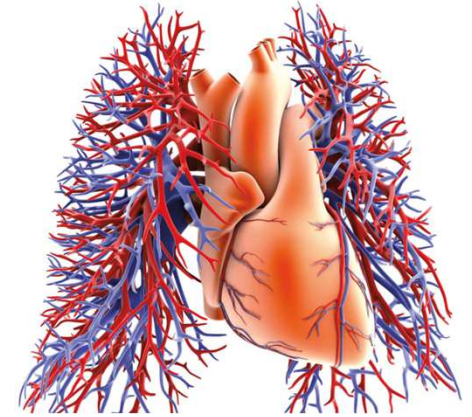


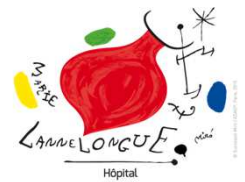
SPIF



Maladies vasculaires obstructives : du fréquent au plus rare

Dr Girault Antoine

7 Octobre 2023 – Coup de Sang à la SPIF



- Pas de conflit d'intérêt

- Remerciements

- Dr Brenot
- Dr Mussot
- Pr Khalil
- Dr Mitilian
- Dr Goulenok
- Pr Fadel

Plan

- Obstruction Artérielle endoluminale
 - Embolie Pulmonaire
 - CPC post embolique
 - Sarcome
 - +/- Raretés
- Maladies inflammatoires de la paroi artérielle et du médiastin
 - Takayashu
 - Médiastinite fibreuse
- Sténose acquises des veines pulmonaires
 - Post ablation de FA
 - Post transplantation

Embolie Pulmonaire

- Maladie vasculaire pulmonaire obstructive la plus fréquente
- 60-100 EP/100 000 hab et par an
- Mortalité hospitalière importante (2-26%)

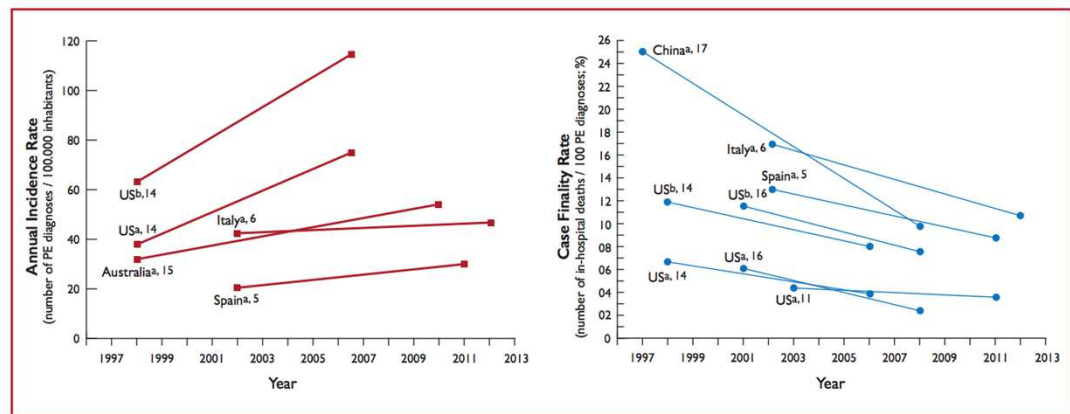


Figure 1 Trends in annual incidence rates (left panel) and case fatality rates (right panel) of pulmonary embolism around the world, based on data retrieved from various references.^{5,6,11,14-17} Reproduced with permission from JACC 2016;67:976-90. PE = pulmonary embolism; US = United States.

^aPE listed as principal diagnosis.

^bAny listed code for PE was considered.

Embolie Pulmonaire- Diagnostic

- Clinique

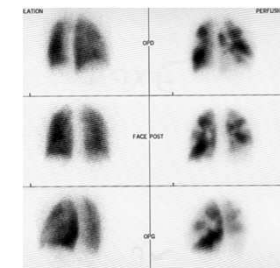
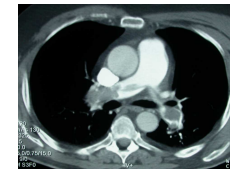
- Biologique

- Radiologique

Items	Clinical decision rule points	
	Original version ⁹¹	Simplified version ⁸⁷
Previous PE or DVT	3	1
Heart rate		
75–94 b.p.m.	3	1
≥95 b.p.m.	5	2
Surgery or fracture within the past month	2	1
Haemoptysis	2	1
Active cancer	2	1
Unilateral lower-limb pain	3	1
Pain on lower-limb deep venous palpation and unilateral oedema	4	1
Age >65 years	1	1
Clinical probability		
<i>Three-level score</i>		
Low	0–3	0–1
Intermediate	4–10	2–4
High	≥11	≥5
<i>Two-level score</i>		
PE-unlikely	0–5	0–2
PE-likely	≥6	≥3

© ESC 2019

D-Dimère cut off ajustés à l'âge



Embolie Pulmonaire Grave

Parameter	Original version ²²⁶	Simplified version ²²⁹
Age	Age in years	1 point (if age >80 years)
Male sex	+10 points	—
Cancer	+30 points	1 point
Chronic heart failure	+10 points	—
Chronic pulmonary disease	+10 points	1 point
Pulse rate ≥110 b.p.m.	+20 points	1 point
Systolic BP <100 mmHg	+30 points	1 point
Respiratory rate >30 breaths per min	+20 points	—
Temperature <36°C	+20 points	—
Altered mental status	+60 points	—
Arterial oxyhaemoglobin saturation <90%	+20 points	1 point

Risk strata ^a	
Class I: ≤65 points very low 30 day mortality risk (0–1.6%) Class II: 66–85 points low mortality risk (1.7–3.5%)	0 points = 30 day mortality risk 1.0% (95% CI 0.0–2.1%)
Class III: 86–105 points moderate mortality risk (3.2–7.1%) Class IV: 106–125 points high mortality risk (4.0–11.4%) Class V: >125 points very high mortality risk (10.0–24.5%)	≥1 point(s) = 30 day mortality risk 10.9% (95% CI 8.5–13.2%)

Table 8 Classification of pulmonary embolism severity and the risk of early (in-hospital or 30 day) death

Early mortality risk	Indicators of risk			
	Haemodynamic instability ^a	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥1	RV dysfunction on TTE or CTPA ^b	Elevated cardiac troponin levels ^c
High	+	(+) ^d	+	(+)
Intermediate	Intermediate-high	++	+	+
	Intermediate-low	–	++	One (or none) positive
Low	–	–	–	Assessment optional; if assessed, negative

BP = blood pressure; CTPA = computed tomography pulmonary angiography; H-FABP = heart-type fatty acid-binding protein; NT-proBNP = N-terminal pro B-type natriuretic peptide; PE = pulmonary embolism; PESI = Pulmonary Embolism Severity Index; RV = right ventricular; sPESI = simplified Pulmonary Embolism Severity Index; TTE = transthoracic echocardiogram.
^aOne of the following clinical presentations (Table 4): cardiac arrest, obstructive shock (systolic BP <90 mmHg or vasopressors required to achieve a BP >90 mmHg despite an adequate filling status, in combination with end-organ hypoperfusion), or persistent hypotension (systolic BP <90 mmHg or a systolic BP drop ≥40 mmHg for >15 min, not caused by new-onset arrhythmia, hypovolaemia, or sepsis).
^bPrognostically relevant imaging (TTE or CTPA) findings in patients with acute PE, and the corresponding cut-off levels, are graphically presented in Figure 3, and their prognostic value is summarized in Supplementary Data Table 3.
^cElevation of further laboratory biomarkers, such as NT-proBNP ≥600 ng/L, H-FABP ≥6 ng/mL, or copeptin ≥24 pmol/L, may provide additional prognostic information. These markers have been validated in cohort studies but they have not yet been used to guide treatment decisions in randomised controlled trials.
^dHaemodynamic instability, combined with PE confirmation on CTPA and/or evidence of RV dysfunction on TTE, is sufficient to classify a patient into the high-risk PE category. In these cases, neither calculation of the PESI nor measurement of troponin or other cardiac biomarkers is necessary.
^eSigns of RV dysfunction on TTE (or CTPA) or elevated cardiac biomarker levels may be present, despite a calculated PESI of I–II or an sPESI of 0.²¹⁴ Until the implications of such discrepancies for the management of PE are fully understood, these patients should be classified into the intermediate-risk category.

Traitement de la défaillance cardiaque droite

Table 9 Treatment of right ventricular failure in acute high-risk pulmonary embolism

Strategy	Properties and use	Caveats
Volume optimization		
Cautious volume loading, saline, or Ringer's lactate, ≤500 mL over 15–30 min	Consider in patients with normal–low central venous pressure (but, for example, to counteract hypovolaemia)	Volume loading can over-distend the RV, worsen ventricular interdependence, and reduce CO ¹⁹
Vasopressors and inotropes		
Norepinephrine, 0.2–1.0 µg/kg/min ²⁴⁰	Increases RV inotropy and systemic BP, promotes positive ventricular interactions, and restores coronary perfusion gradient	Excessive vasoconstriction may worsen tissue perfusion
Dobutamine, 2–20 µg/kg/min ¹⁴¹	Increases RV inotropy, lowers filling pressures	May aggravate arterial hypotension if used alone, without a vasopressor; may trigger or aggravate arrhythmias
Mechanical circulatory support		
Veno–arterial ECMO/extracorporeal life support ^{13,123,238}	Rapid short-term support combined with oxygenator	Complications with use over longer periods (>5–10 days), including bleeding and infections; no clinical benefit unless combined with surgical embolectomy; requires an experienced team

CO = cardiac output; BP = blood pressure; ECMO = extracorporeal membrane oxygenation; RV = right ventricular; ¹⁹epinephrine is used in cardiac arrest.

Stratégies de désobstruction pulmonaire

Fibrinolyse

Embolectomie

Traitement Percutanée



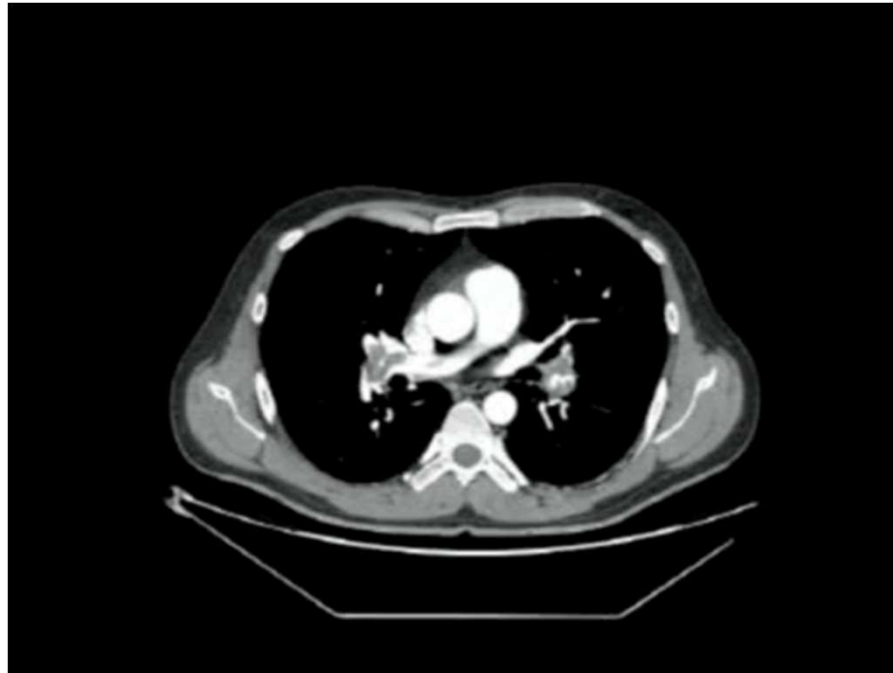
Embolie Pulmonaire – Place de la chirurgie

- EP Massive + arrêt cardiaque ou choc hémodynamique
- EP Massive + Contre indication aux fibrinolytiques
 - Antécédents d'hémorragie cérébrale
 - Saignement récent
 - Tumeur SNC
 - Trauma crânien ou neurochirurgie < 2 mois
- EP Massive avec échec des fibrinolytiques
- EP Massive avec embolies paradoxales



Embolie Pulmonaire Grave

- Embolectomie Chirurgicale



Embolie Pulmonaire Grave

Adult cardiac

Outcomes After Surgical Pulmonary Embolectomy for Acute Pulmonary Embolus: A Multi-Institutional Study

Presented at the Poster Session of the Fifty-Second Annual Meeting of The Society of Thoracic Surgeons, Phoenix, 23-27, 2016.

W. Brent Keeling MD^a, Thor Sundt MD^b, Marzia Leocche MD^c, Yutaka Okita MD^d, Jose Binonga PhD^e, Yi Lasojanak MSPH^f, Lishan Aklog MD^g, Omar M. Lattouf MD^h, SPEAR Working Group

The Incidence and Outcomes of Surgical Pulmonary Embolectomy in North America

Presented at the Clinical Congress of the American College of Surgeons, San Diego, CA, Oct 22-26, 2017.

Zachary N. Kon MD^a, Chetan Pasrija MD^b, Gregory J. Bittle MD^b, Sreekanth Vemulapalli MD^c, Maria V. Grau-Sepulveda MD, MPH^c, Roland Matsouaka PhD^c, Kristopher B. Deatrck MD^b, Bradley S. Taylor MD^b, James S. Gammie MD^b, Bartley P. Griffith MD^b

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- Résultats: Morbi-mortalité 4-30%

Predictive factors for an increased 3-month mortality rate

Variable	Hazard ratio (95% CI)
Age >70 years	1.6 (1.1-2.3)
Cancer	2.3 (1.5-3.5)
Clinical congestive heart failure	2.4 (1.5-3.7)
Chronic Obstructive pulmonary disease	1.8 (1.2-2.7)
Systolic blood pressure <90 mm Hg	2.9 (1.7-5.0)
Respiratory rate <20/min	2.0 (1.2-3.2)
Right-ventricular hypokinesis	2.0 (1.3-2.9)

Embolie Pulmonaire Grave

- Place de la traitement percutané

Recommendations	Class ^b	Level ^c
It is recommended that anticoagulation with UFH, including a weight-adjusted bolus injection, be initiated without delay in patients with high-risk PE.	I	C
Systemic thrombolytic therapy is recommended for high-risk PE. ²⁸²	I	B
Surgical pulmonary embolectomy is recommended for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed. ^{d 281}	I	C
Percutaneous catheter-directed treatment should be considered for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed. ^d	IIa	C
Norepinephrine and/or dobutamine should be considered in patients with high-risk PE.	IIa	C
ECMO may be considered, in combination with surgical embolectomy or catheter-directed treatment, in patients with PE and refractory circulatory collapse or cardiac arrest. ^{d 252}	IIb	C

Embolie Pulmonaire

- Traitement percutanée
 - Fibrinolyse in situ
 - Thromboaspiration / fragmentation

Embolie Pulmonaire

A Prospective, Single-Arm, Multicenter Trial of Catheter-Directed Mechanical Thrombectomy for Intermediate-Risk Acute Pulmonary Embolism



The FLARE Study

Thomas Tu, MD,^{a,*} Catalin Toma, MD,^{b,*} Victor F. Tapson, MD,^c Christopher Adams, MD,^d Wissam A. Jaber, MD,^e Mitchell Silver, DO,^f Sameer Khandhar, MD,^g Rohit Amin, MD,^h Mitchell Weinberg, MD,ⁱ Tod Engelhardt, MD,^j Monica Hunter, MD,^k David Holmes, MD,^l Glenn Hoots, MD,^m Hussam Hamdalla, MD,ⁿ Robert L. Maholic, MD,^o Scott M. Lilly, MD, PhD,^p Kenneth Ouriel, MD,^q Kenneth Rosenfield, MD,^r for the FLARE Investigators

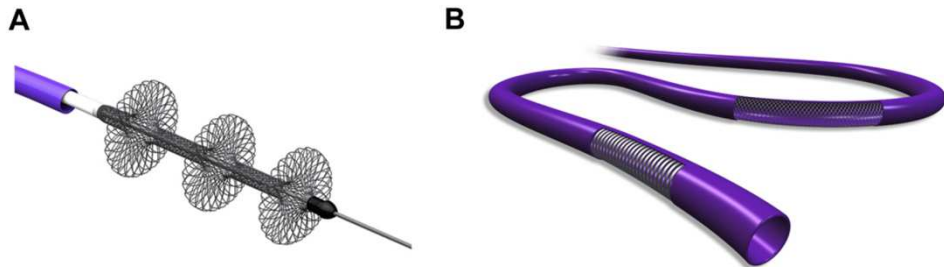
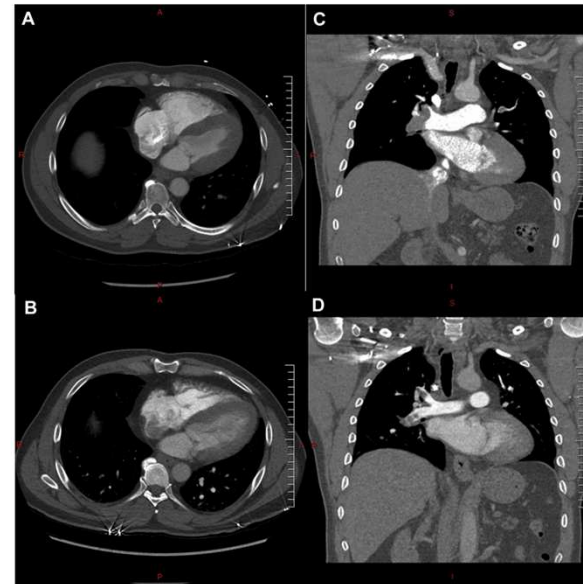


FIGURE 3 Pre- and Post-Thrombectomy Perioperative Images in a FLARE Patient



(B) Marked improvement in right ventricular/left ventricular ratio post-thrombectomy compared with (A) (pre-thrombectomy). Coronal sections illustrating decreased central clot burden and reduced pulmonary artery (PA) caliber post-thrombectomy indicative of reduced PA pressures (D) compared with pre-procedural computed tomography (C).

JACC: CARDIOVASCULAR INTERVENTIONS

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Embolie Pulmonaire

- Place de la chirurgie dans le traitement des embolies pulmonaires graves
- Place du traitement percutané reste à définir
 - EP graves +/- à l'ECMO
 - EP à risque intermédiaire

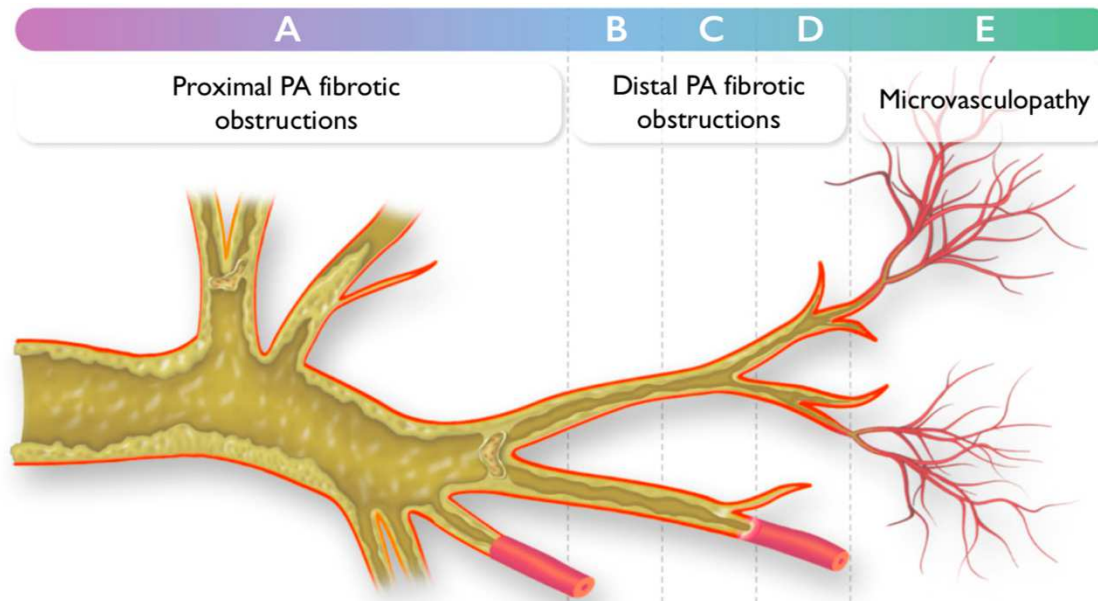
Embolie Pulmonaire

- Quand suspecter un CTEPH?
 - Antécédent de dyspnée ou embolie pulmonaire
 - PAPs > 50 mmHg
 - Angio-Scanner

CPC post embolique

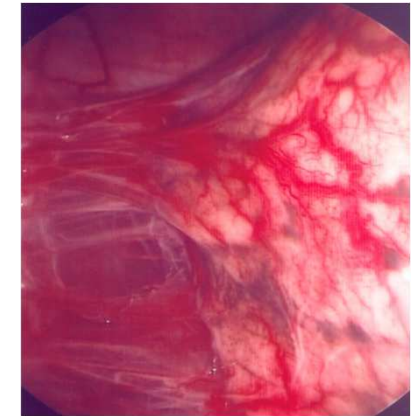
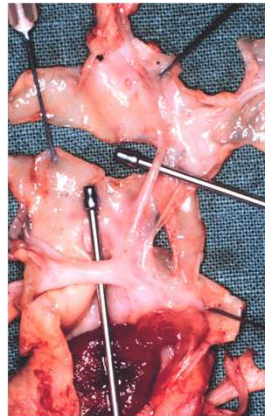
- 0,1 à 0,5% de EP
- 1000 patients par an en France
- HTAP symptomatique avec défauts V/P persistant à 3mois d'une anticoagulation
- HTAP pré capillaire: mPAP>20 – PAPO<15 – RVP>2UW

CPC post embolique



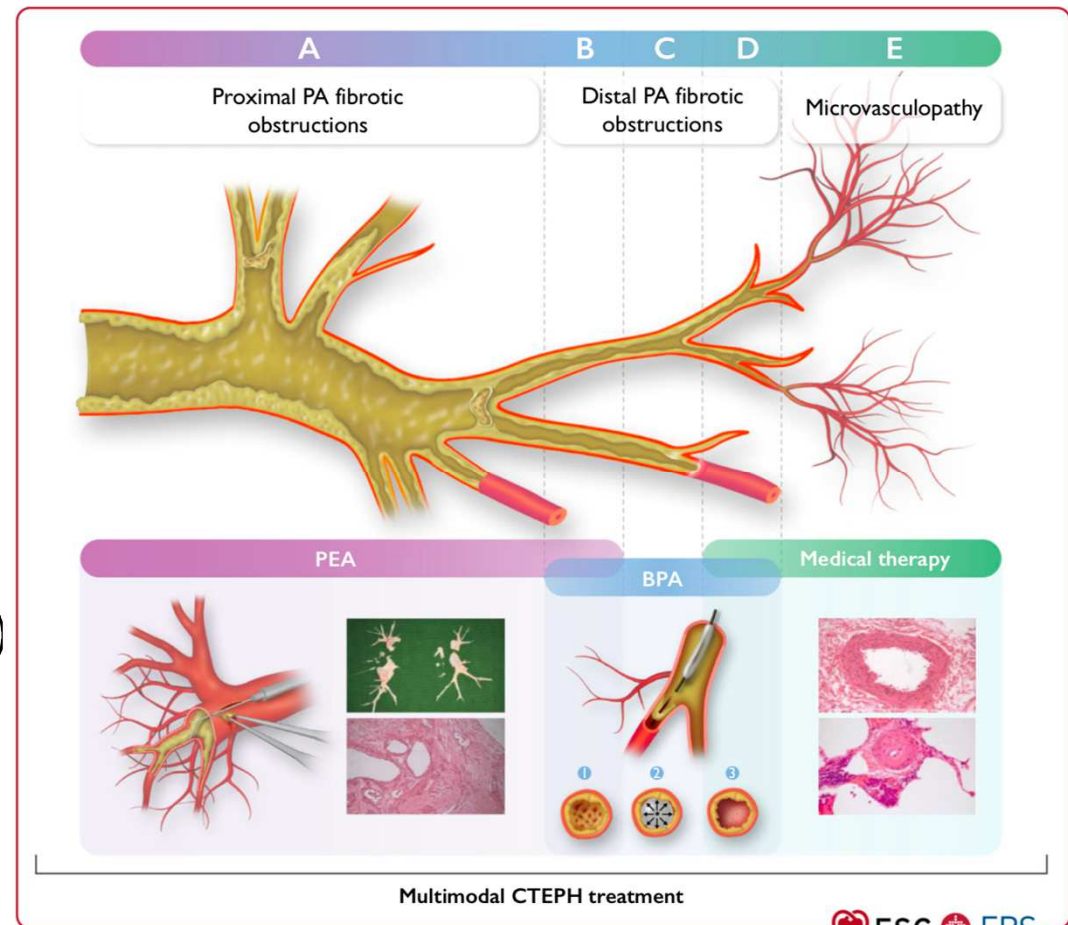
CPC post embolique

- Aspect scannographique
 - Epaissement de paroi artérielle marginé
 - String – web (pathognomonique de CPC post embolique)
 - Circulation veineuse collatérale

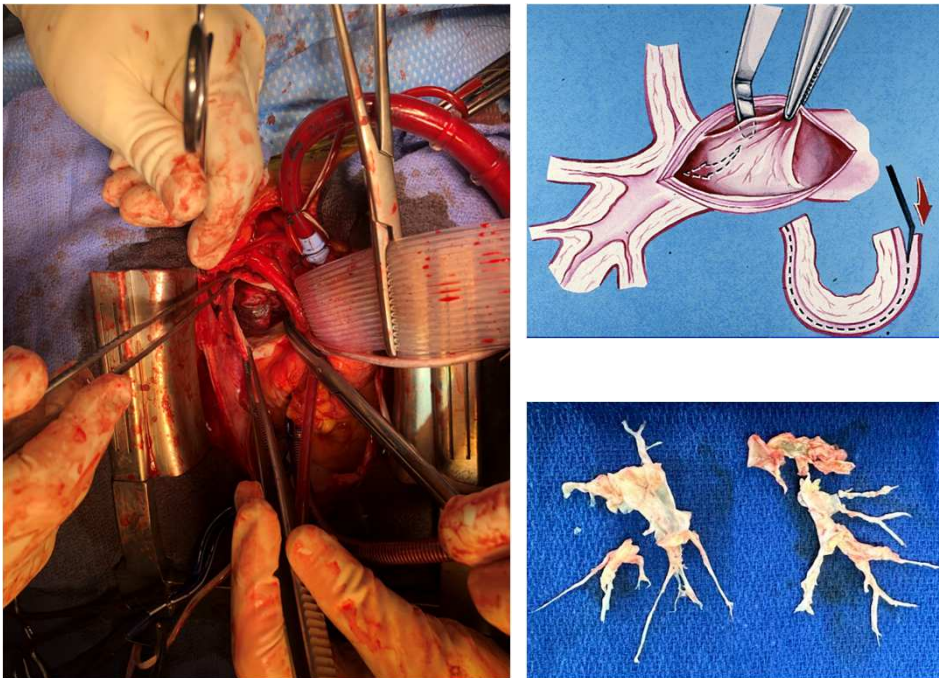


CPC post embolique – Prise en Charge

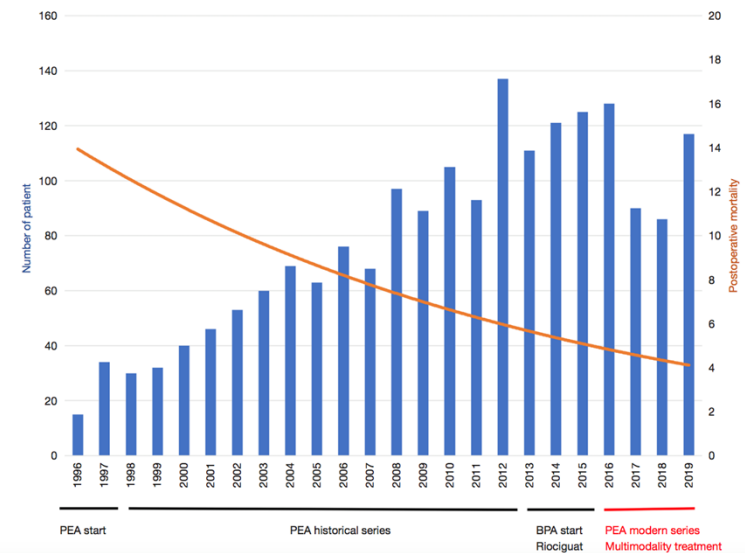
- Centre expert
- Traitement Multimodal
 - Médical :
 - Treprostinil (prostaglandine)
 - Riociguat (GMPC)
 - Sildénafil (i5PDE)
 - Bosentan (voie de l'endothéline)
 - BPA
 - Endarterectomie



CPC post embolique



Pulmonary thromboendarterectomy: The Marie Lannelongue Hospital experience



Sarcome

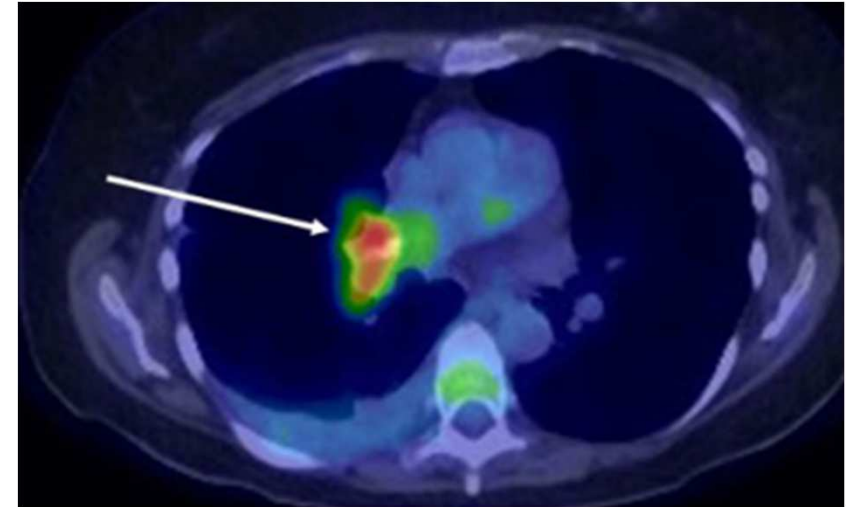
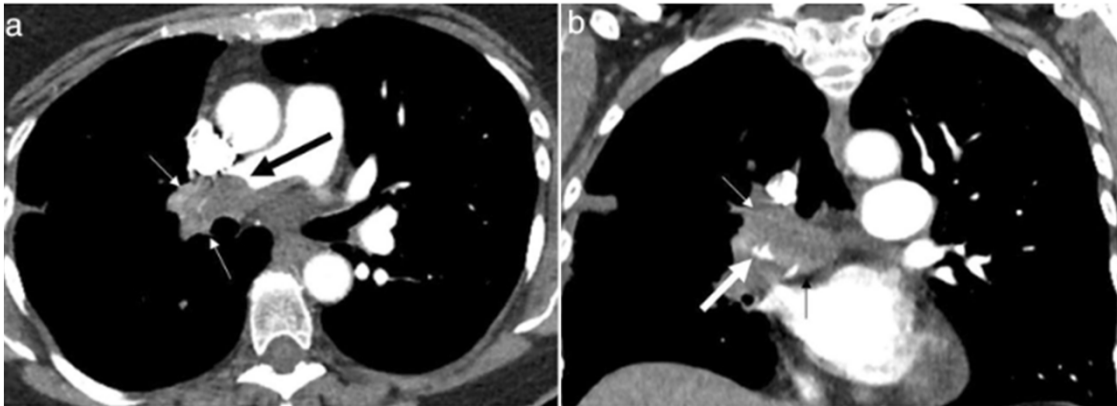
- Incidence 0,001% à 0,03%
- Age moyen 45-55 ans
- F/H 2/1



- Survie 12-18mois après le début des symptômes
- Survie moyenne au diagnostic sans chirurgie <2mois

Sarcome

- Aspect scannographique:
 - Defect endoluminal
 - Atteinte proximale tronc valve pulmonaire
 - Wall eclipsing sign:
 - disparition de la paroi artérielle
 - extension au delà de la paroi pulmonaire



Journal of Thrombosis and Thrombolysis (2021) 52:1129–1132
<https://doi.org/10.1007/s11239-021-02464-w>

LETTER TO THE EDITOR

Primary pulmonary artery sarcoma versus pulmonary thromboembolism: a multimodal imaging comparison

Ellen Kronzer¹ · Steven I. Robinson² · Douglas A. Collins³ · Robert D. McBane II^{4,5} 



Sarcome

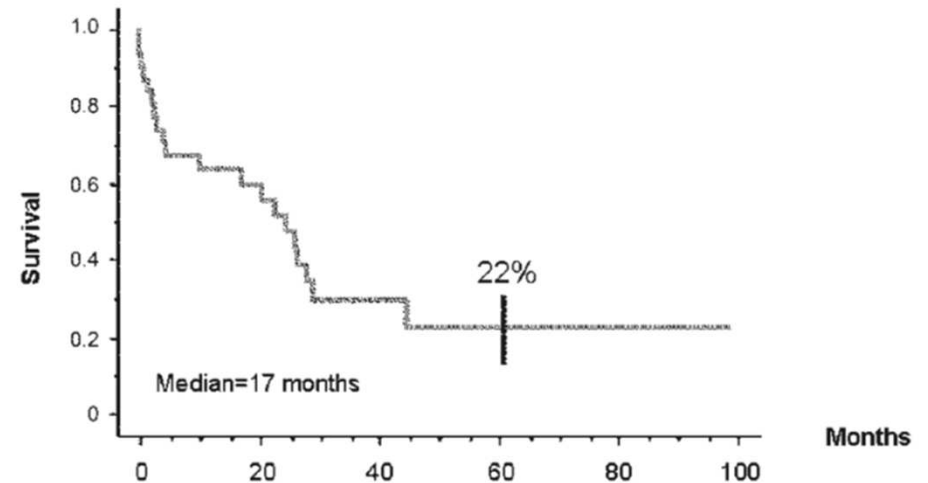
European Journal of Cardio-Thoracic Surgery 43 (2013) 787–793
doi:10.1093/ejcts/ezs387 Advance Access publication 27 July 2012

ORIGINAL ARTICLE

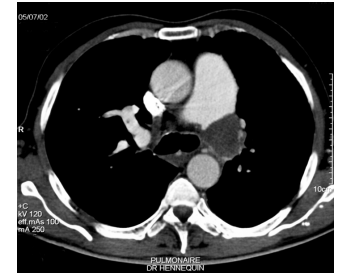
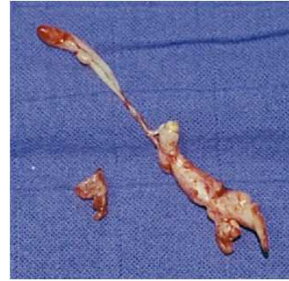
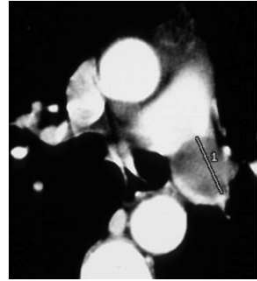
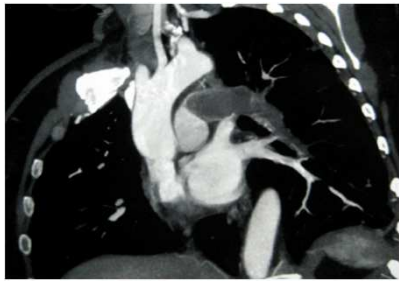
Retrospective institutional study of 31 patients treated for pulmonary artery sarcoma[†]

Sacha Mussot^{a,*}, Maria-Rosa Ghigna^a, Olaf Mercier^a, Dominique Fabre^a, Elie Fadel^b, Axel Le Cesne^b,
Gerald Simonneau^c and Philippe Dartevelle^a

- 58% traitement Néoadjuvant
 - Chimiothérapie (15/31)
 - Radiothérapie (2/31)
 - Radiochimiothérapie (1/31)



Obstruction Intra Artérielle



- Corps étrangers:
 - Cathéter
 - Implanon

Takayashu

- Incidence 1-3 cas / million d'habitants /an
- Prédominance féminine (France 4,8/1)
- Début de la maladie entre 20-40ans
- Atteinte des artères de gros calibre: Pan artérite gigantocellulaire à prédominance médio-adventitielle
 - Inflammation adventitielle à la phase aigue
 - Fibrose et calcification cicatricielle à la phase occlusive

Takayashu

- Signes évocateurs patients <50ans:
 - Claudication du membre supérieur
 - Abolition des pouls d'un membre supérieur
 - HTA réno-vasculaire
 - Souffle carotidien ou sous clavier
- Imagerie évocatrice d'aortite



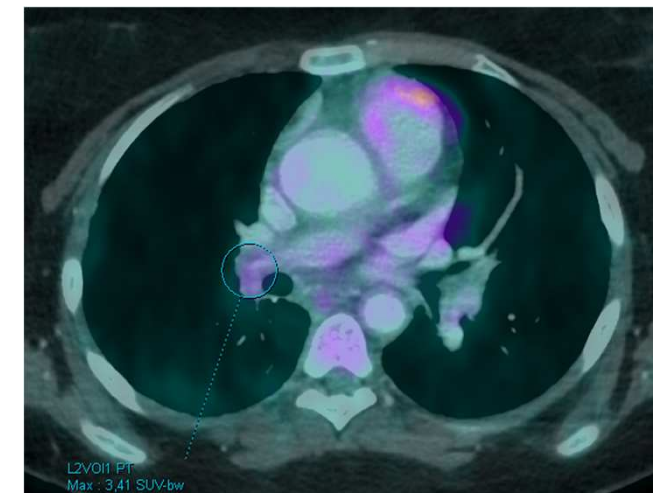
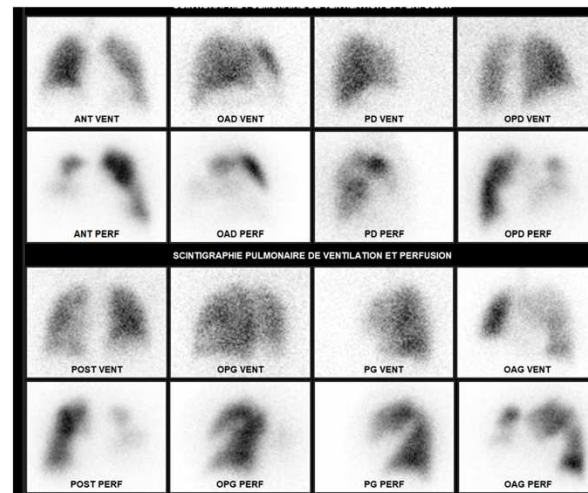
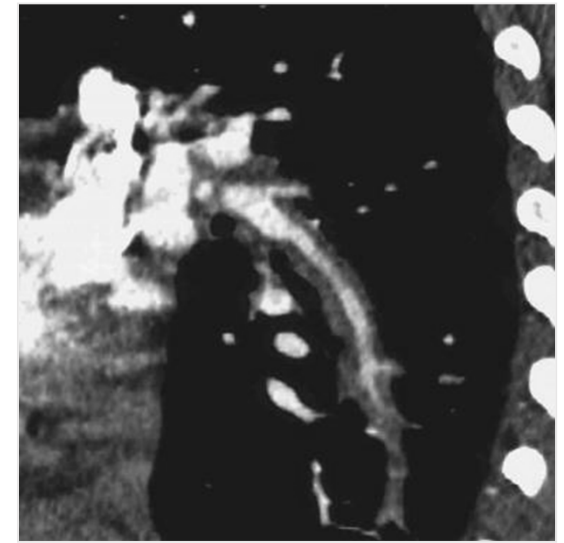
Takayashu

- Circonstance de découverte
 - Phase systémique – préocclusive – inflammatoire
 - Fievre arthralgies myalgies carotidodynie
 - Phase vasculaire = occlusive
 - Arche aortique et TSA
 - Aorte thoracoabdominale et vaisseaux viscéraux
 - Artère pulmonaire dans 50% des cas
 - Asymptomatique
 - Douleur
 - Dyspnée
 - Hémoptysie
 - HTAP
 - Atteinte coronaire 5-15%



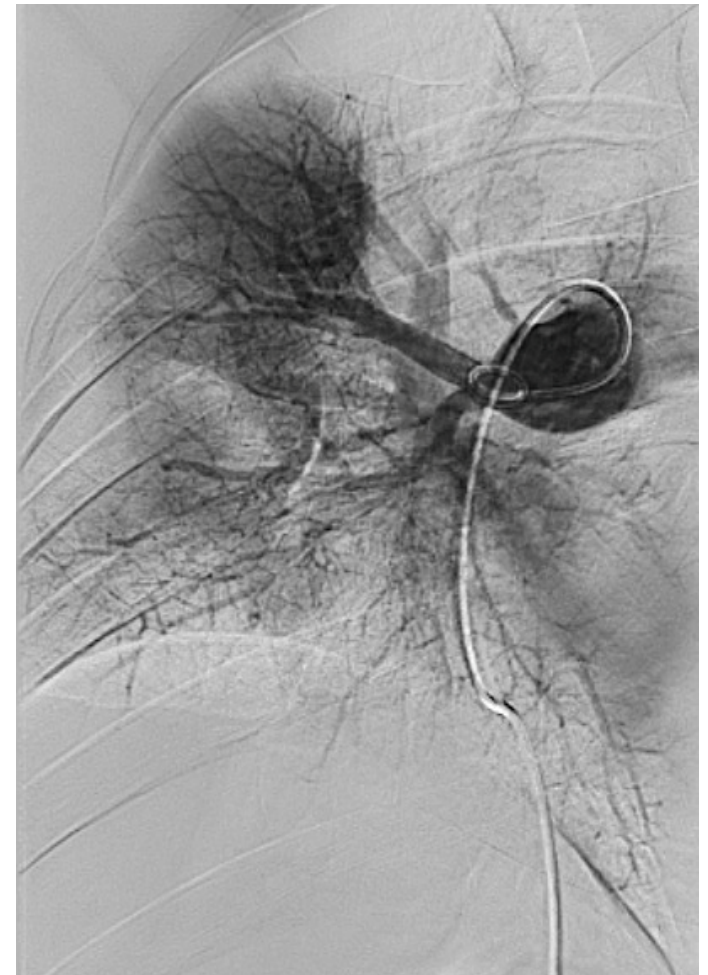
Takayashu

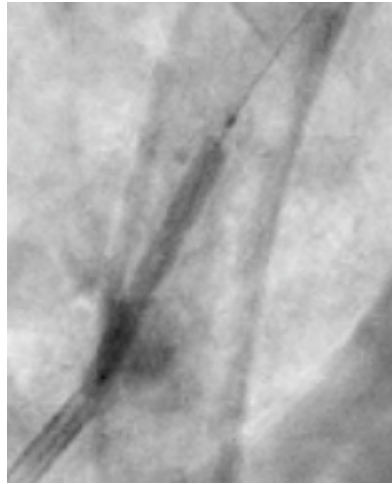
- Syndrome inflammatoire biologique aspécifique
- Imagerie
 - TDM et TEP scanner etudie l'activité inflammatoire
- Critères d'ISHIKAWA et ACR
- Traitement Corticoide
 - Méthotrédaxate
 - Azathioprine
 - antiTNF
 - Tocilizumab

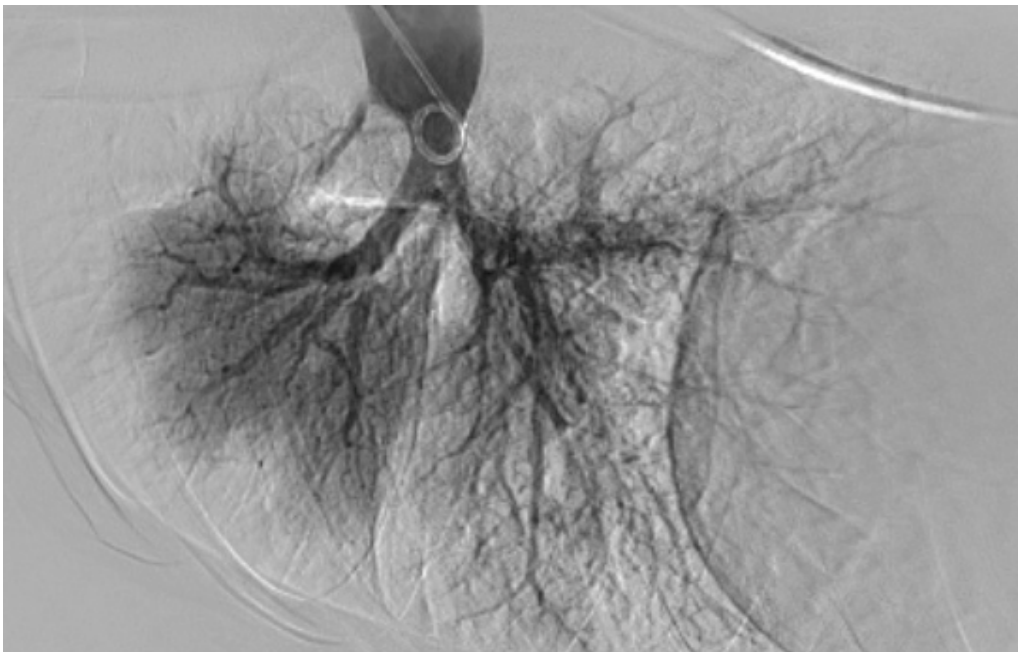
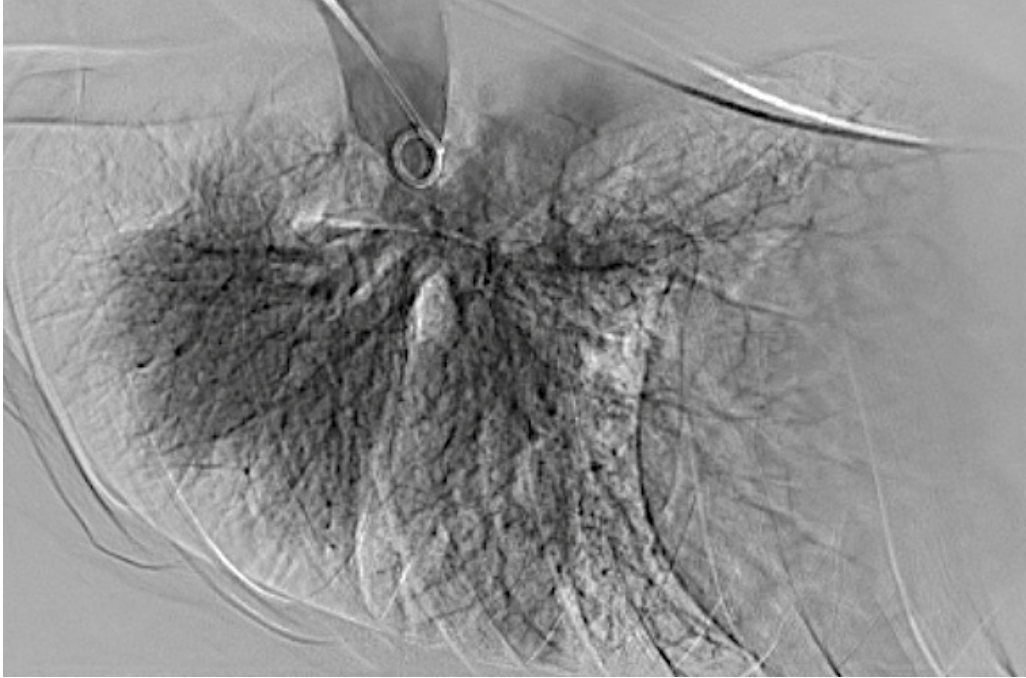


Takayashu revascularisation

- en dehors de la phase inflammatoire







Médiastinite Fibreuse

JACC: ASIA

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VOL. 2, NO. 3, 2022

STATE-OF-THE-ART REVIEW

Pulmonary Hypertension Caused by Fibrosing Mediastinitis



Aqian Wang, MD,^a Hongling Su, MD,^a Yichao Duan, MD,^b Kaiyu Jiang, MD,^a Yu Li, MD, PhD,^c Mingjun Deng, MD,^d Xiaozhou Long, MD,^e Haijun Wang, MD,^f Min Zhang, MD, PhD,^g Yan Zhang, MD, PhD,^h Yunshan Cao, MD, PhDⁱ

- Maladie rare
- Prévalence inconnue

TABLE 1 The Etiologies of Fibrosing Mediastinitis

Idiopathic¹⁹

Infection associated⁷⁻¹⁰

Histoplasmosis capsulatum
Tuberculosis
Aspergillosis
Mucormycosis
Blastomycosis
Actinomycosis
Nocardiosis
Coccidioidomycosis
Cryptococcosis

Non-infection associated¹¹⁻¹⁴

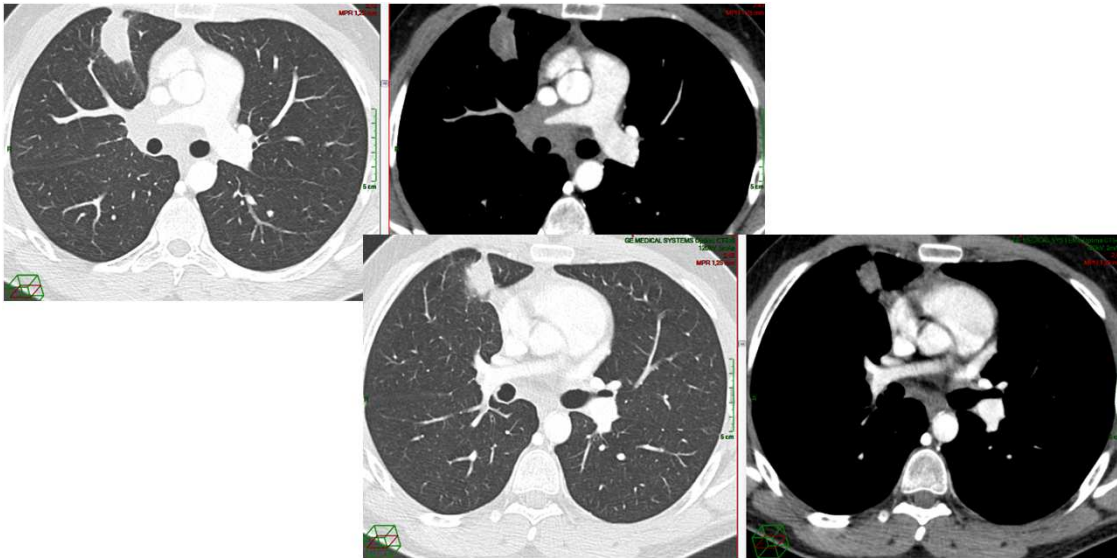
Sarcoidosis
Immunoglobulin G4-related disease
Behçet disease
Systemic sclerosing disease
Rheumatic fever
Hodgkin disease
Silicosis
Trauma

Iatrogenic¹⁵⁻¹⁸

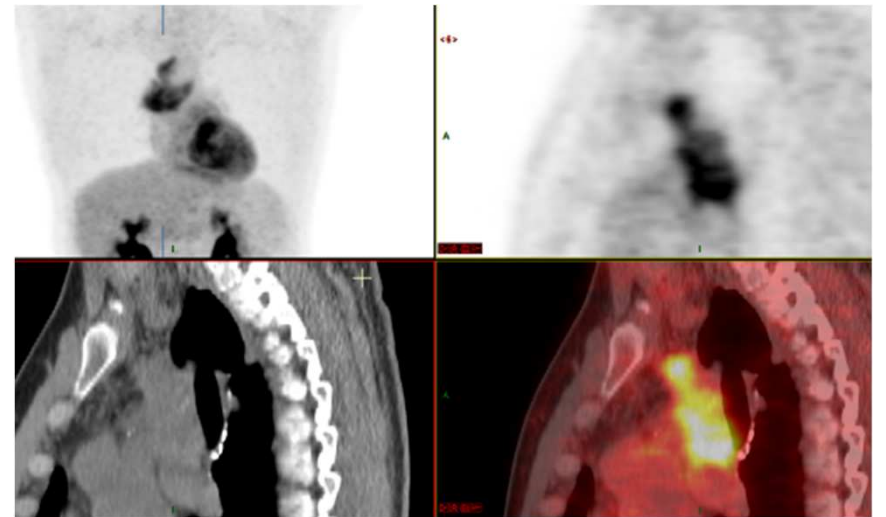
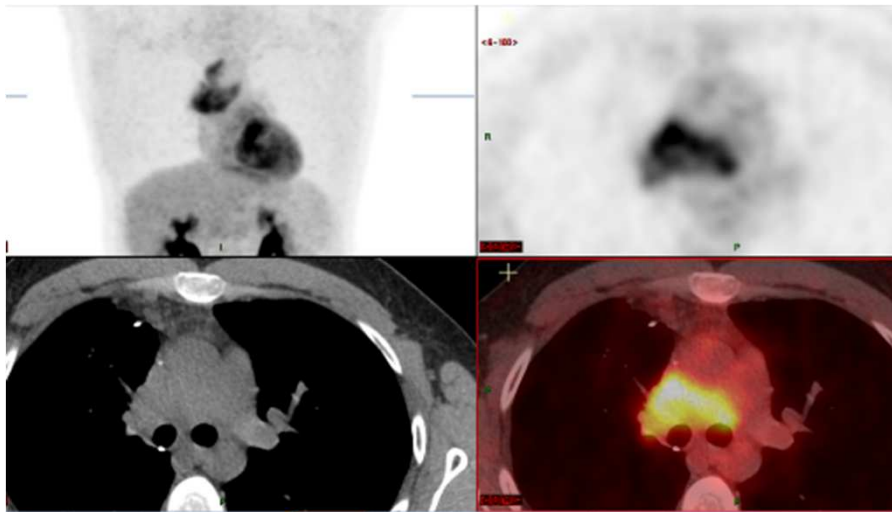
Radiotherapy
Chest surgery
Esophageal fistula
Methysergide maleate
Minimally-invasive procedures in the mediastinum (endoscopic ultrasound-guided fine-needle aspiration, drainage tube placement)

Médiastinite Fibreuse

- Aspect sannographique:
 - Aspect d'infiltration tissulaire du médiastin
 - Engainement des vaisseaux, bronches +/- oesophage

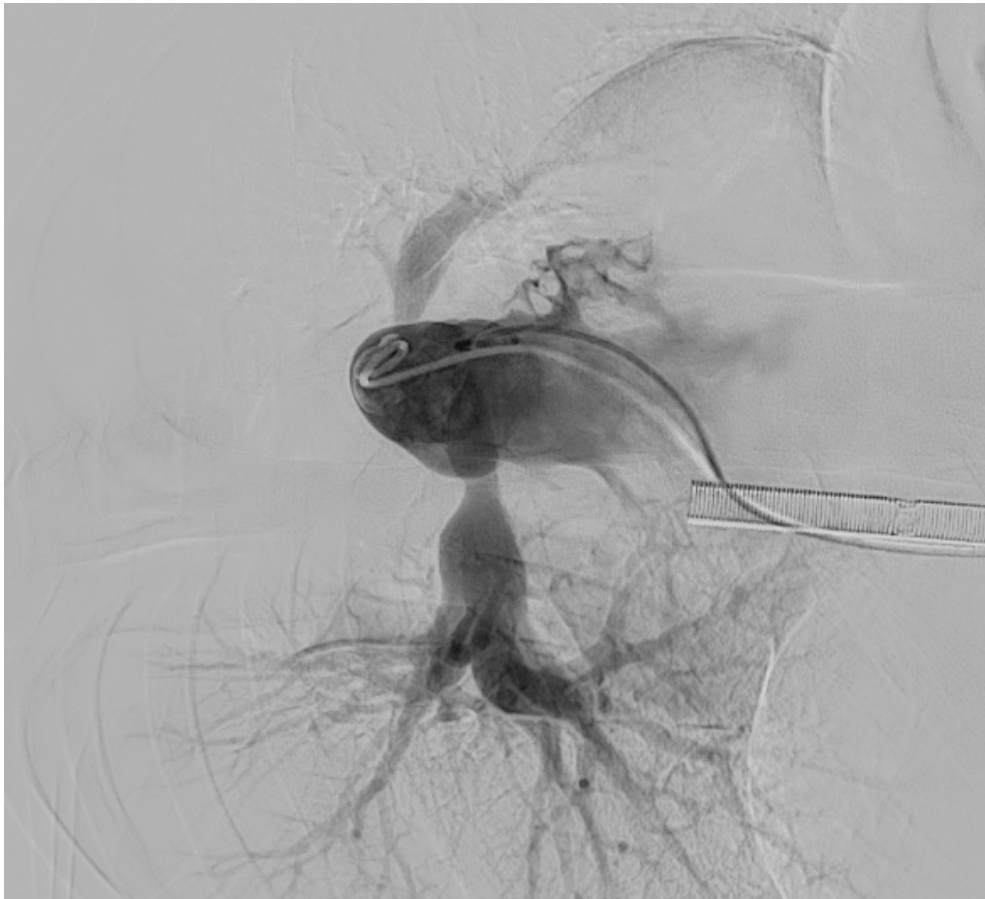
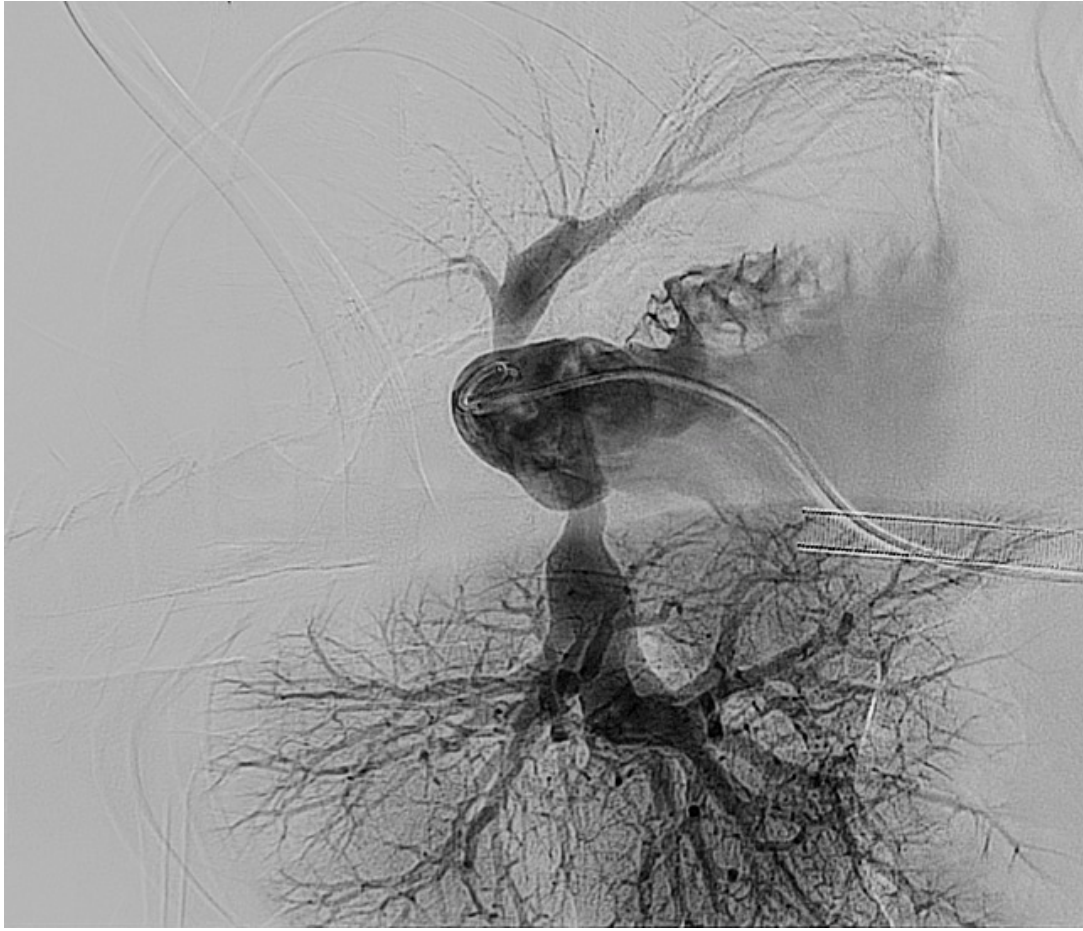


Médiastinite Fibreuse



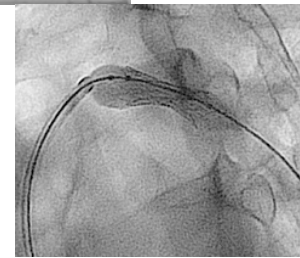
Médiastinite Fibreuse

- Diagnostic histologie fibrose paucicellulaire
- Traitement étiologique
 - Antifongique
 - Antituberculeux
 - Corticothérapie (IgG4 et Sarcoidose)
- Traitement Symptomatique
 - Endovasculaire
 - Chirurgical

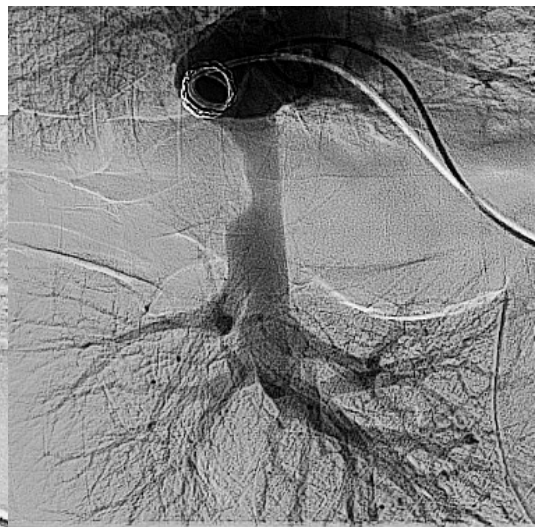


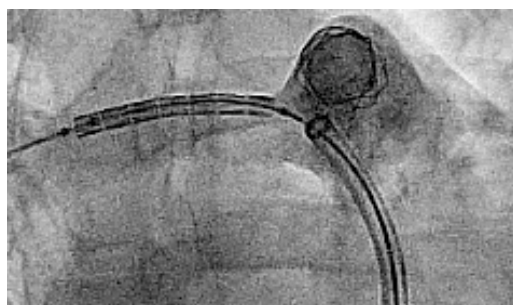
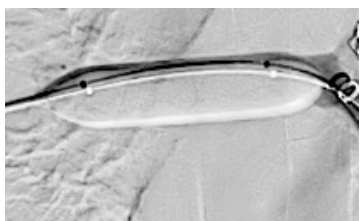
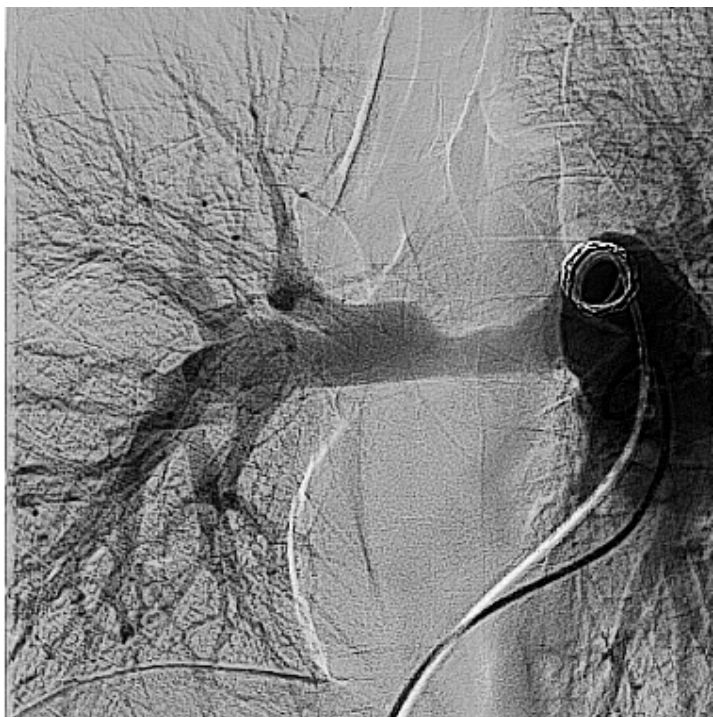


Post ballon 7 mm



Post Stent
OPTIMUS CoCr 23 mm
sur BIB 12 mm ;
Réexpansion à 14 mm





Pré-dilatation 10, puis
12 mm via intro 8F
dans intro 12f

Stenting OPTIMUS CoCr 33 mm sur
ballon BIB 14 mm



Sténose Acquise des Veines Pulmonaires

- 2 étiologies:
 - Radiofréquence pour Ablation de FA (incidence ?)

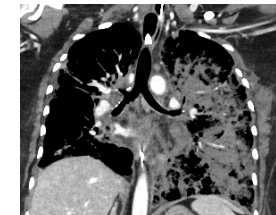
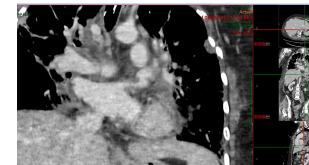
PATIENTS CHARACTERISTICS		Mayo Clinic (2016)*	Leipzig (2018)**	Cleveland Clinic (2019)***
Patients number	27	124/113 interventions	39	199
	10/2009 → 01/2022	02/2000 → 11/2014	01/2004 → 09/2017	01/2000 → 12/2016
Age (mean±SD)	50 ± 14	50.1 ± 11.4	62.1 ± 9.0	55 ± 12
Male n(%)	21 (78%)	95 (77%)	50 (60%)	155 (78%)
Number of ablation	1±0.8	1 (1.2)		1 (1.8)
Delay in diagnostic	8.1±6.6	7	10.2 ± 8.0	
Symptoms	Dyspnea 23 (85%)	NYHA 1/2/3/4 0/11/12/0	71 (69%)	143 (83%)
	Haemoptysis 12 (44%)	3 bronchial embolisation	28 (27%)	22 (13%)
	Toux 7 (26%)		46 (45%)	55 (32%)
	Chest pain 6 (22%)		23 (22%)	31 (18%)
PH (PAP≥25 mmHg)	12 (44%)	all 2 or more stenosed PV	?	13 (33%)
mean PAP	25.6±11.2	?		
CO	6.27±1.22	?		

*Fender EA et al, *Circulation* 2016;134:1812–21

**Schoene et al. *J ACC Cardiovasc Interv* 2018;11, 1626-16

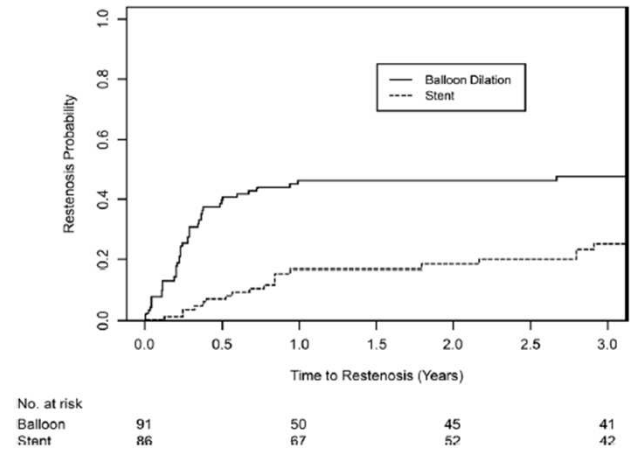
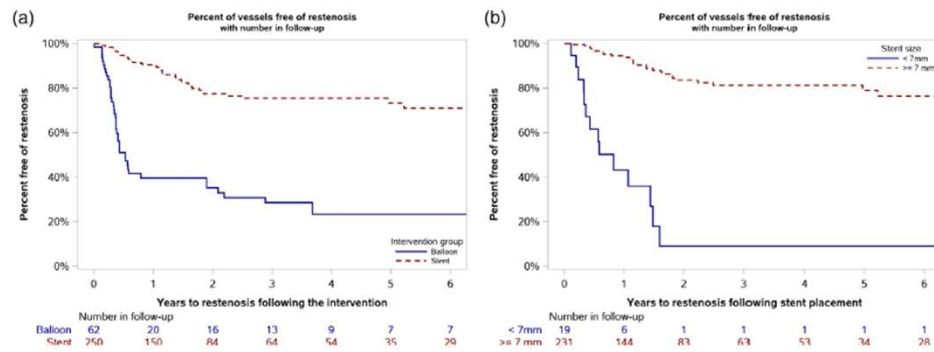
***Suntharos P et al. *Catheter Cardiovasc Interv.* 2019;1–9

- Post transplantation (<1% des greffes)

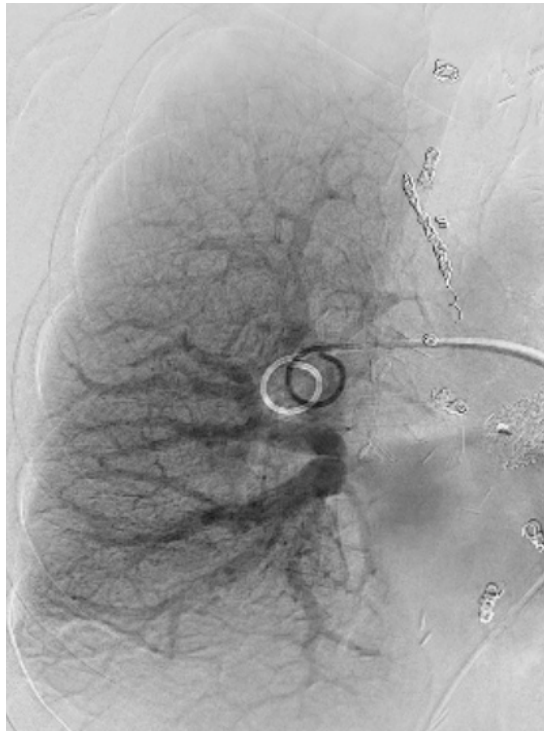


Sténose des Veines Pulmonaires post Rf

- Taux de récurrence stent vs angioplastie



Sténose des Veines Pulmonaires post Rf



Sténose des Veines Pulmonaires post Rf

- Expérience de Marie Lannelongue
 - 27 patients (28 Angiopalstie– 7 pour resténose)
 - Anesthésie Locale
 - 46 veines traitées avec un taux de succès de 91% (4 occlusions infranchissables)
 - 27 stents
- Traitement Post-intervention
 - Anticoagulation et antiagrégation plaquettaire
 - Durée?? Au moins 1 an

Merci