# Pulmonary endarterectomy

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# Conflicts of Interest SG

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Speaker´s and/or consulting fees from Actelion, Bayer, MSD and Pfizer

# CTEPH Treatment Options 2009

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EUROPEAN SOCIETY OF CARDIOLOGY®

European Heart Journal (2009) **30**, 2493–2537
doi:10.1093/eurheartj/ehp297

**ESC/ERS GUIDELINES**

| | | |
|---|---|---|
| Surgical pulmonary endarterectomy is the recommended treatment for patients with CTEPH | I | C |
| PAH-specific drug therapy selected CTEPH patients candidates for surgery or PH after pulmonary end | | C |

off label use

Galiè N *et al. Eur Heart J* 2009; *Eur Respir J* 2009

# CTEPH treatment options in 2018

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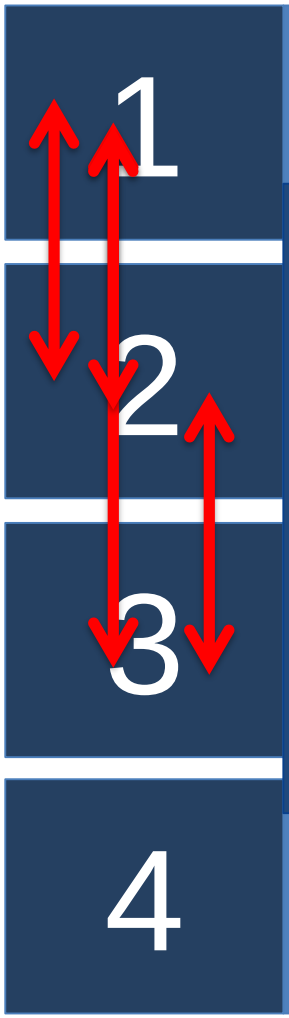


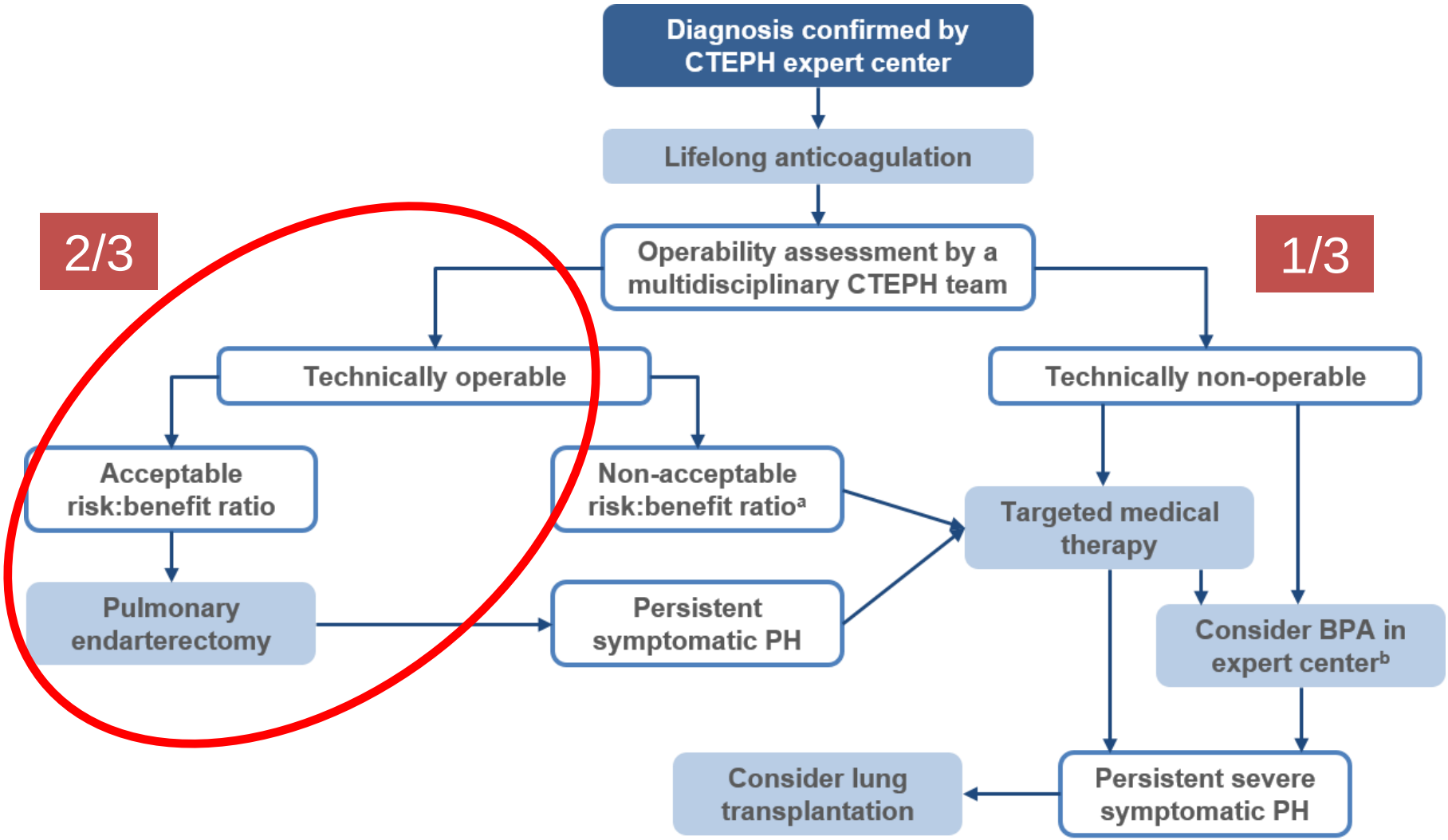

PEA (advances in distal endarterectomy) (I C)

Many complex treatment options will need many complex treatment decisions.

Combination of treatment modalities

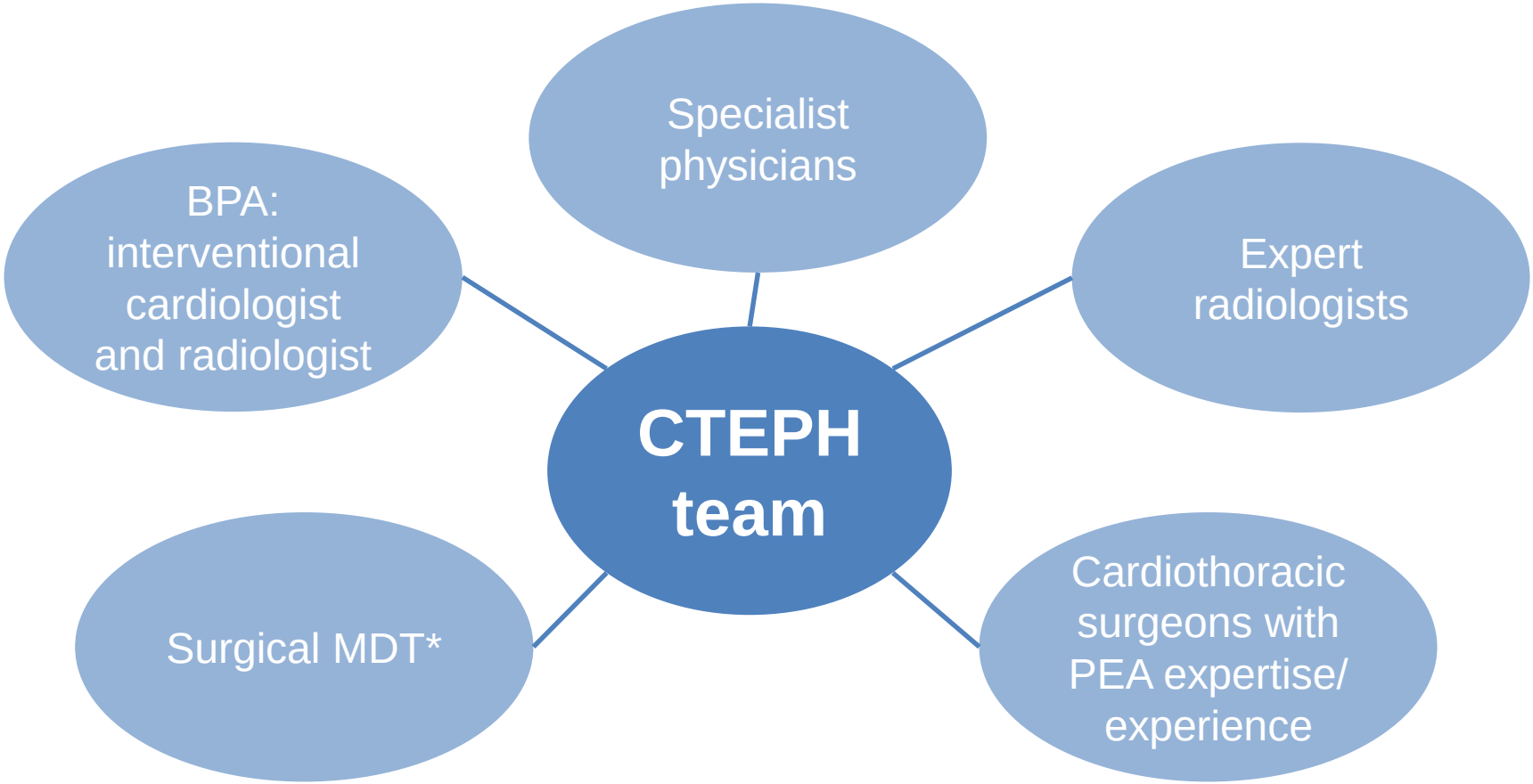
# Treatment algorithm for CTEPH

European Heart Journal
doi:10.1093/eurheartj/ehv317
ESC/ERS GUIDELINES
2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension




[a]Technically operable patients with non-acceptable risk:benefit ratio can be considered also for BPA.
[b]In some centers medical therapy and BPA are initiated concurrently.
Galiè N *et al. Eur Heart J* 2016;37:67–119; *Eur Respir J* 2015;46:903–75.

# What is a “CTEPH team”?




**Significant learning curve for all disciplines!**

*Anesthesiologist, perfusionist, ECMO team, intensive care physician, nurse, respiratory therapist.
ECMO, extracorporeal membrane oxygenation; MDT, multidisciplinary team.

# Localization of PA obstructions is critical for therapeutic decisions (Germany 2018)

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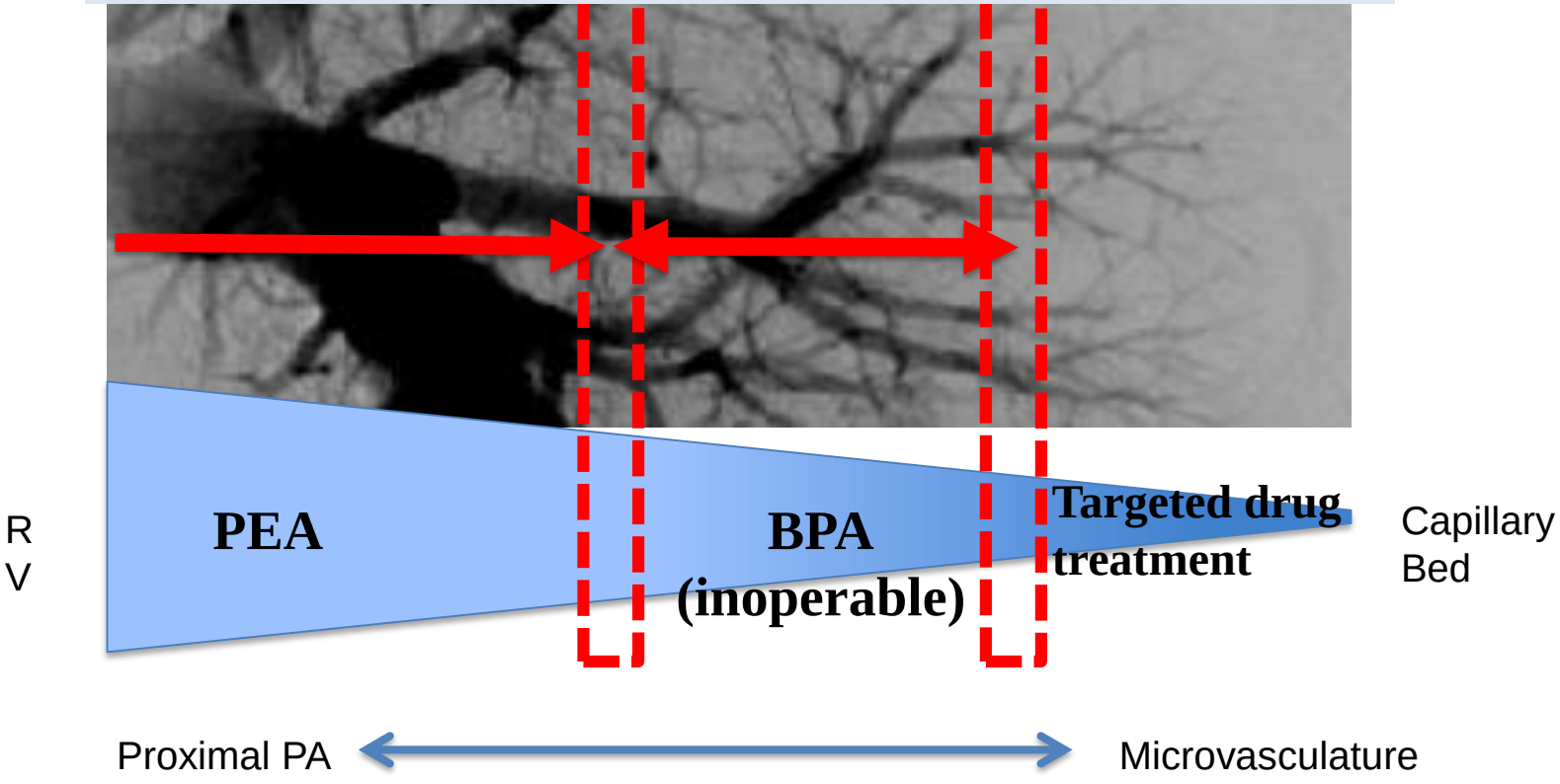
and these are dependent on CTEPH center experience with surgery, BPA, and medical treatment



# Case #1: MA, m., 46 y.

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6/2016: acute pulmonary embolism

1/2017: FC III, diagnosis: CTEPH
(echocardiography, V/Q scan, CTPA, pulmonary angiography)
RHC (PVR 621 dynes)

4/2017: Balloon pulmonary angioplasty right lung (no PEA available in the country)

10/2017: referral for PEA

# Case #1: MA, m., 46 y.

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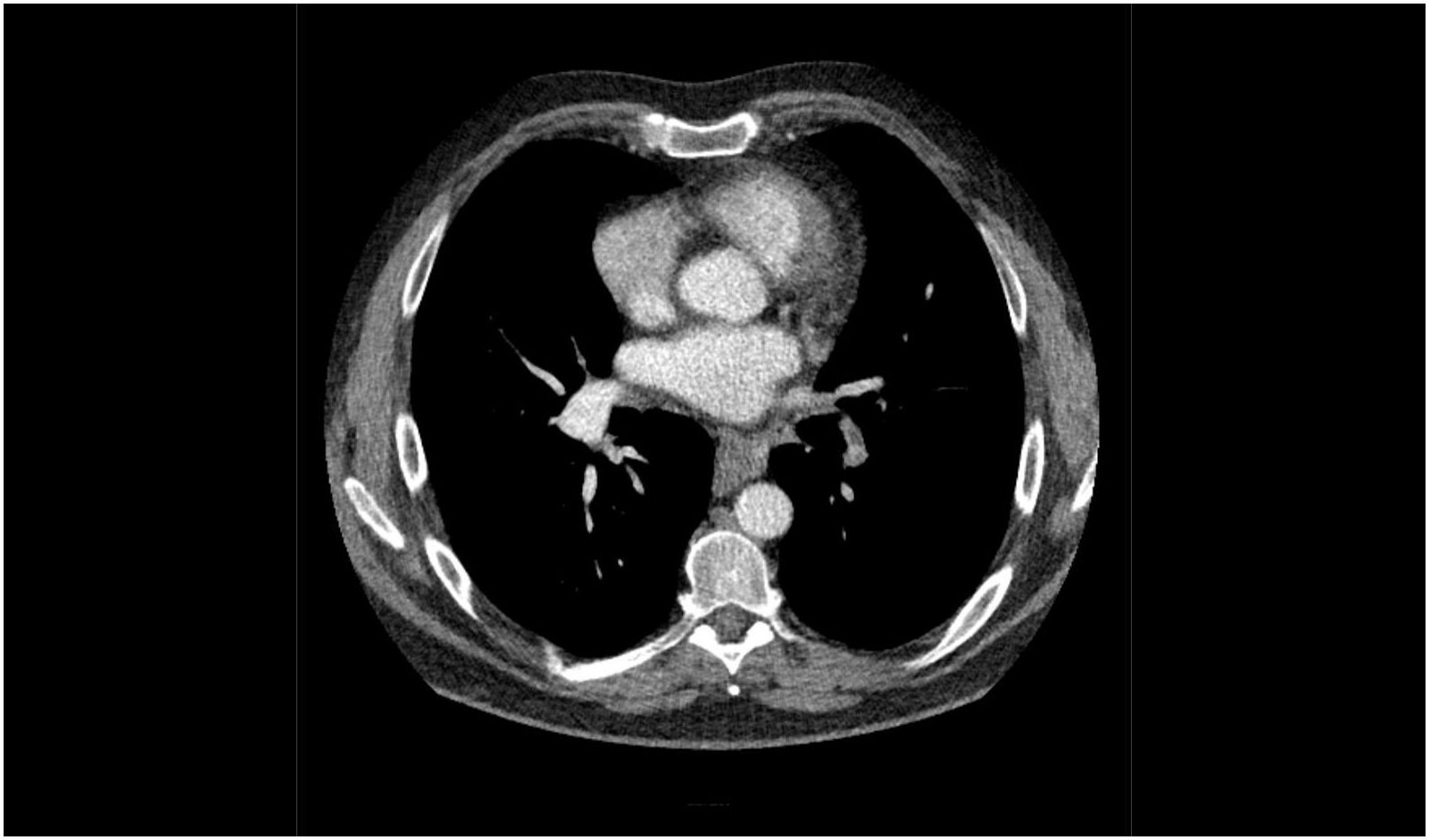
## 4/2017: CT pulmonary angiography



# Case #1: MA, m., 46 y.

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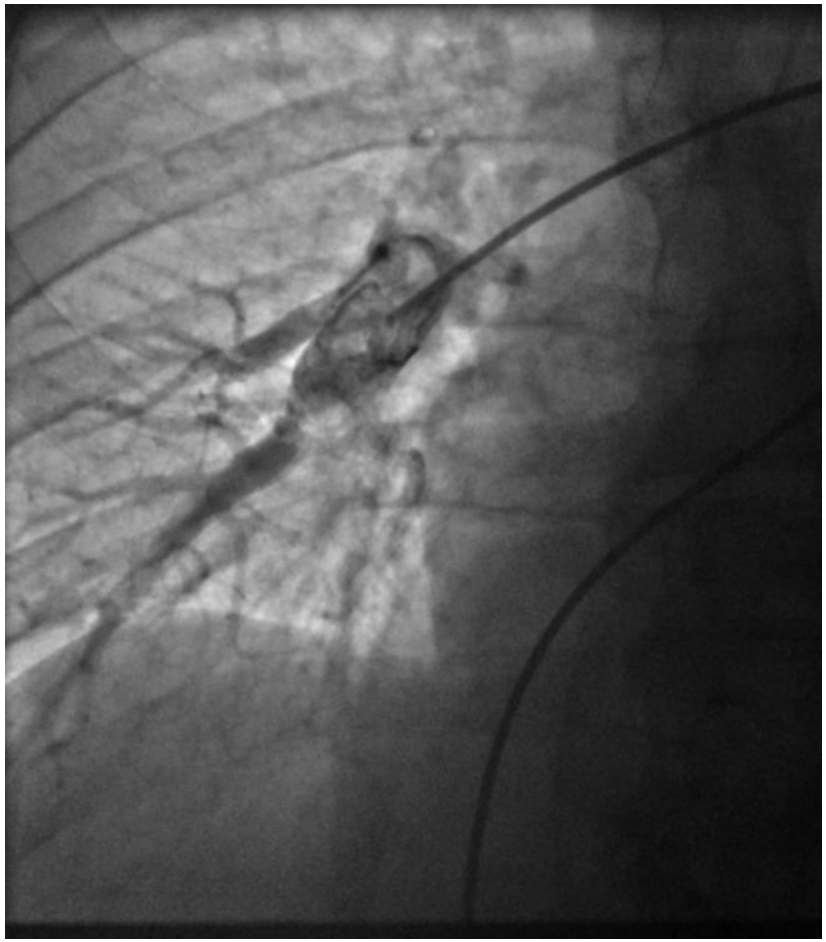
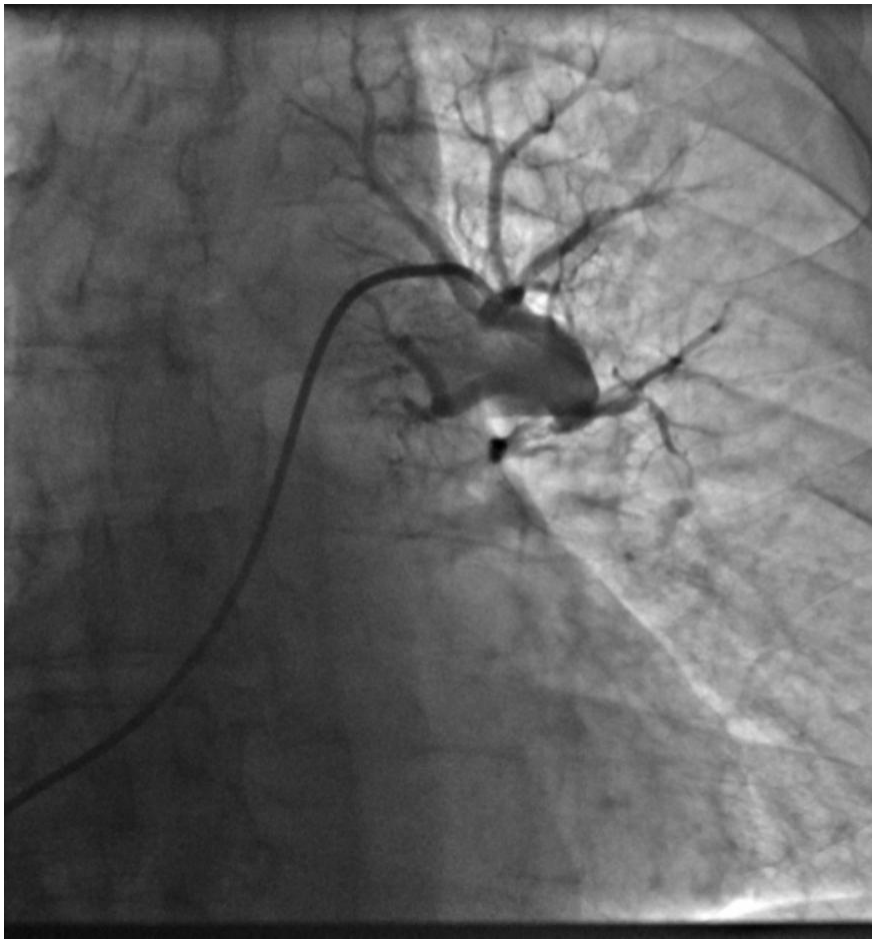
## 4/2017: pulmonary angiography





# Case #1: MA, m., 46 y.

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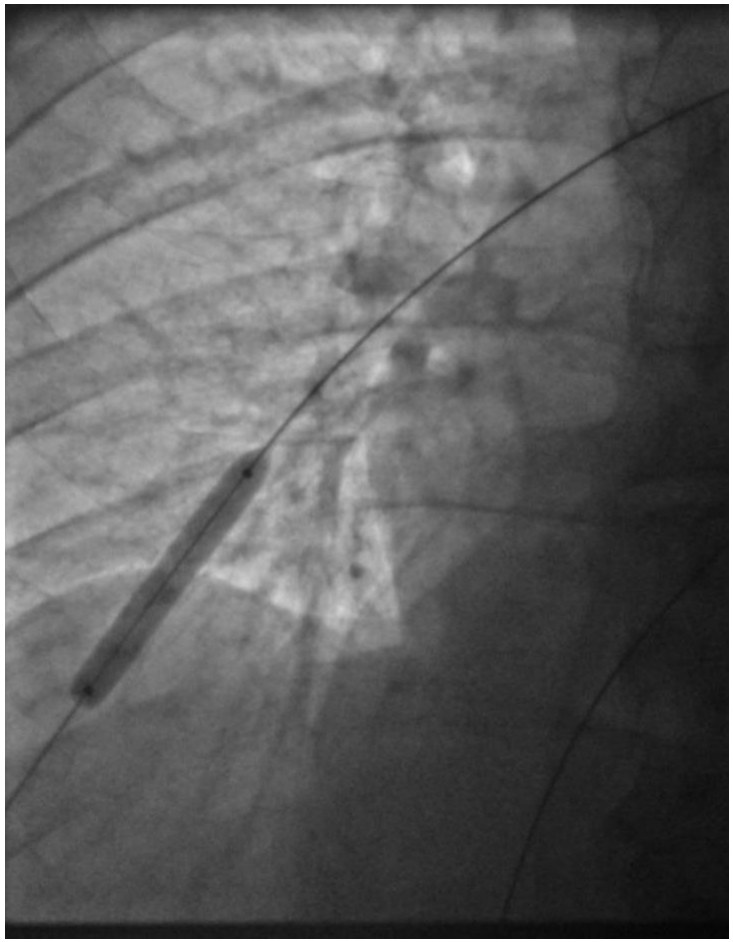
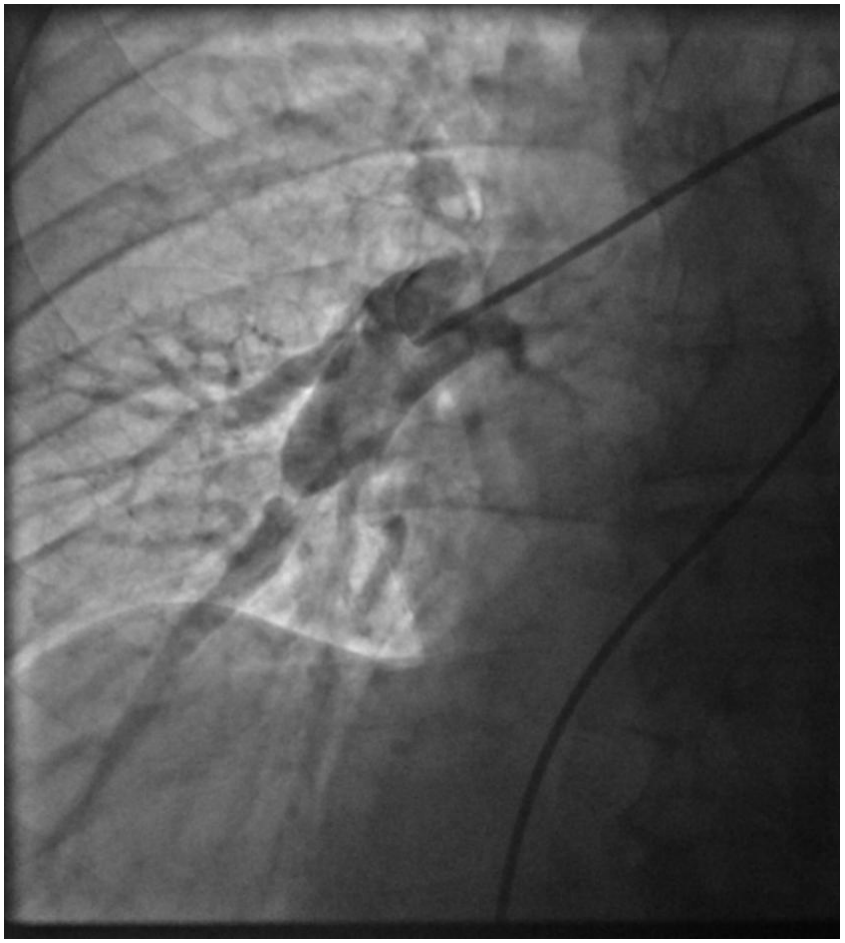
## 4/2017: failed balloon pulmonary angioplasty





# Case #1: MA, m., 46 y.

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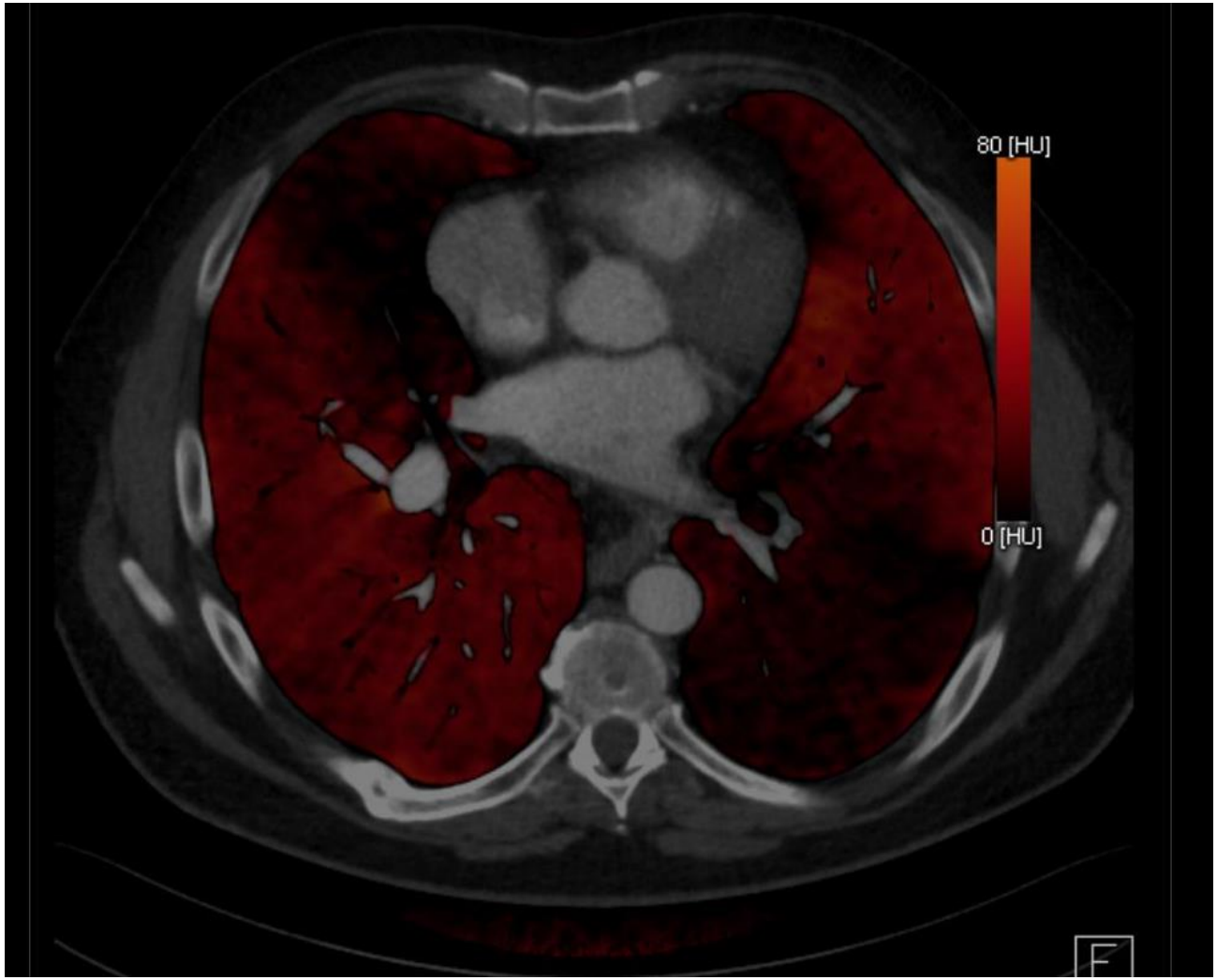
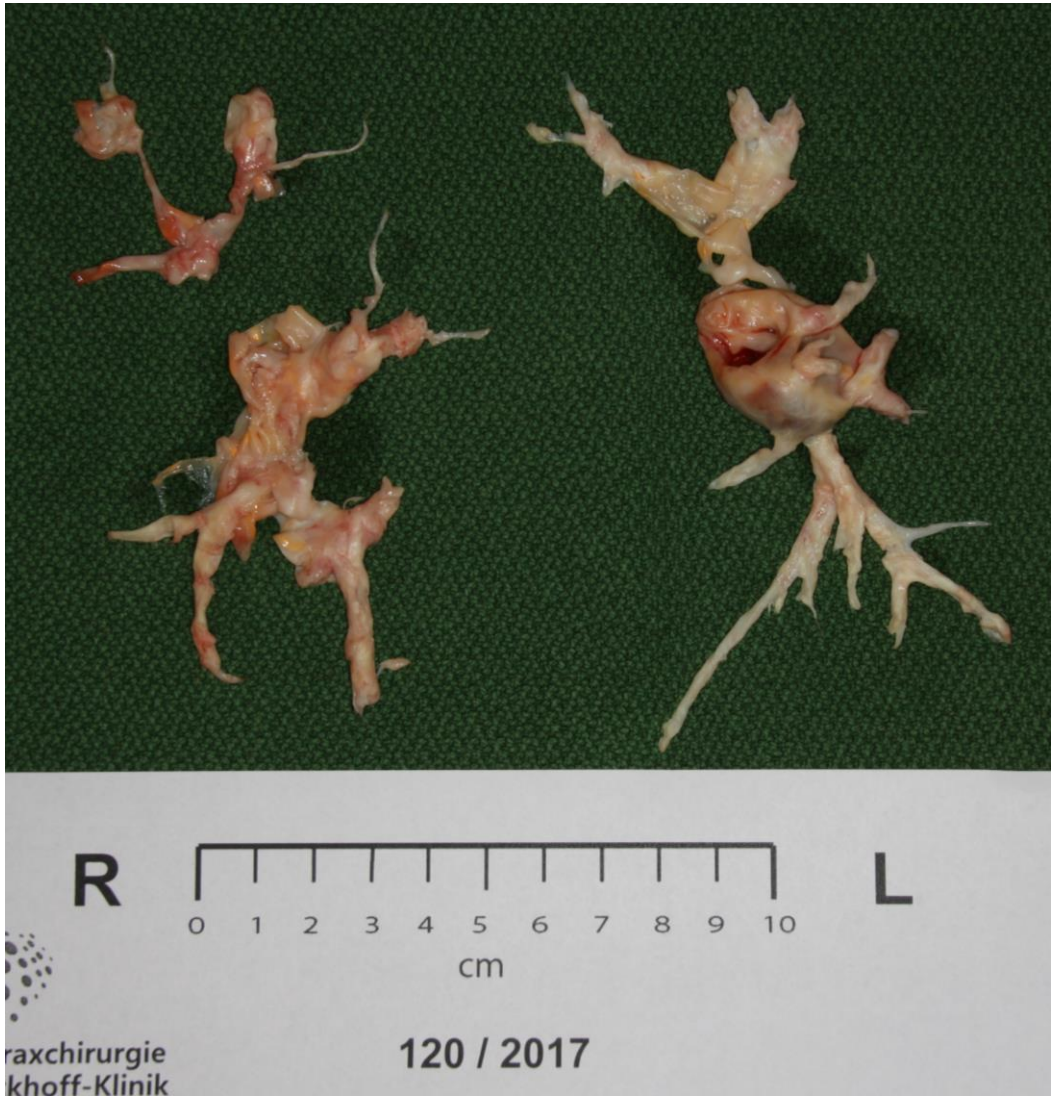
## 10/2017: dual energy CT perfusion imaging



# MA, m, 46 y.

No option for medical or interventional treatment!



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- Why should every CTEPH patient be individually evaluated and treated at a CTEPH/PEA expert center?

# PEA is the only curative treatment option

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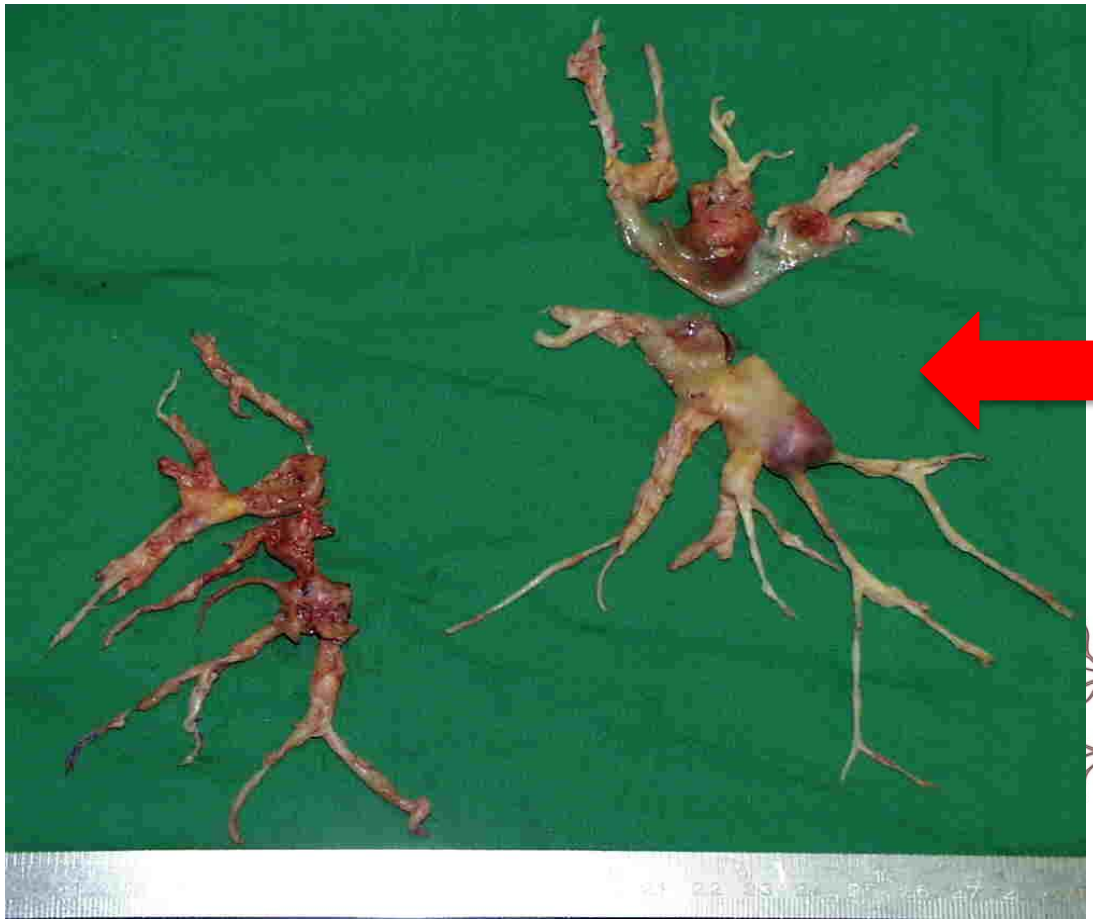
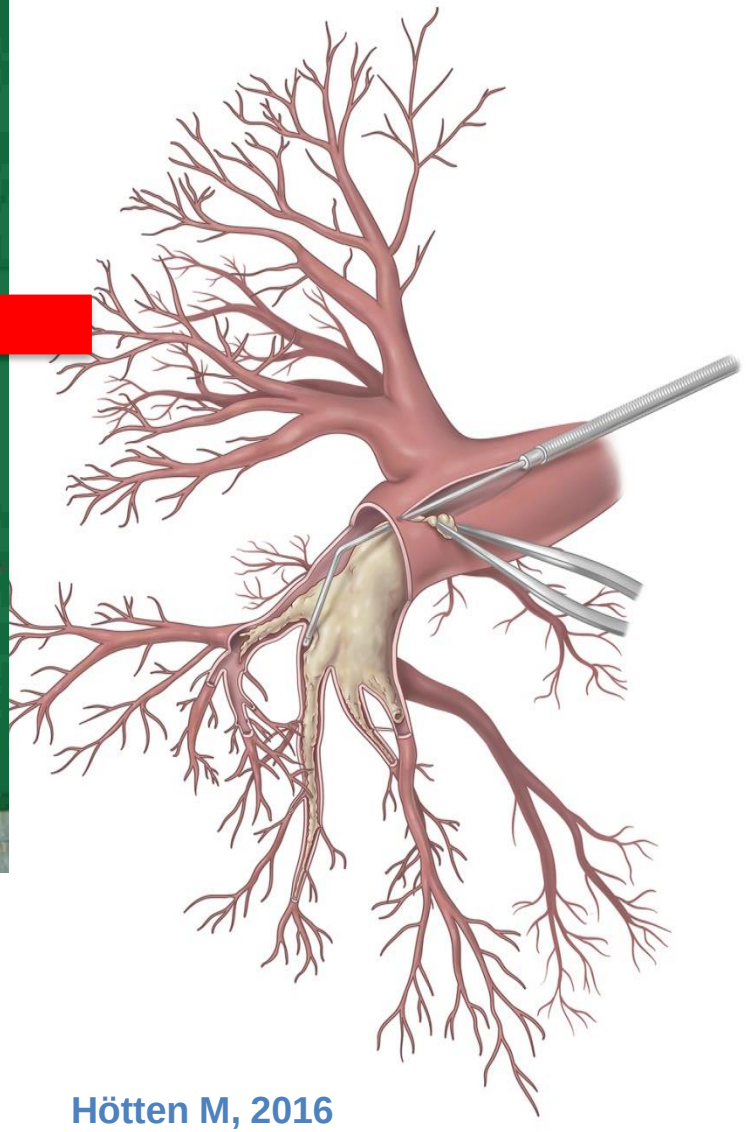
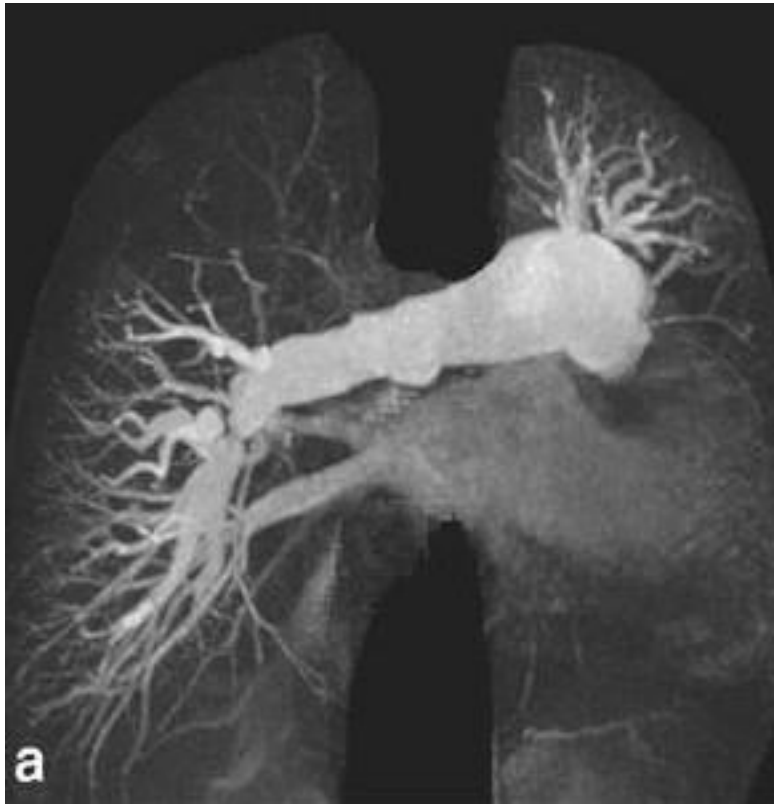




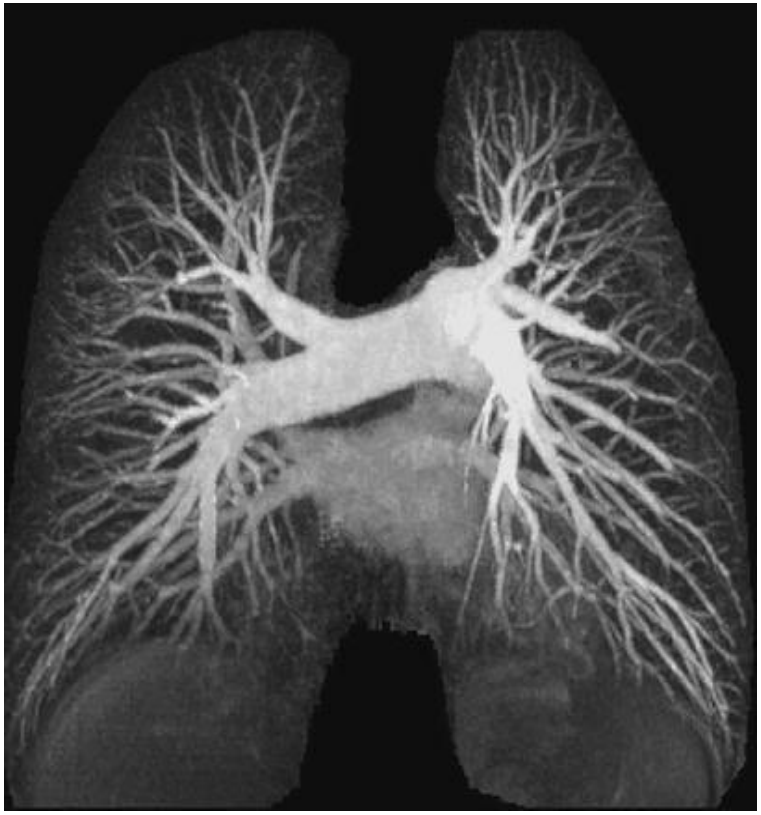
Hötten M, 2016

# PEA Surgery, 11.4.2012

# MR Angiography



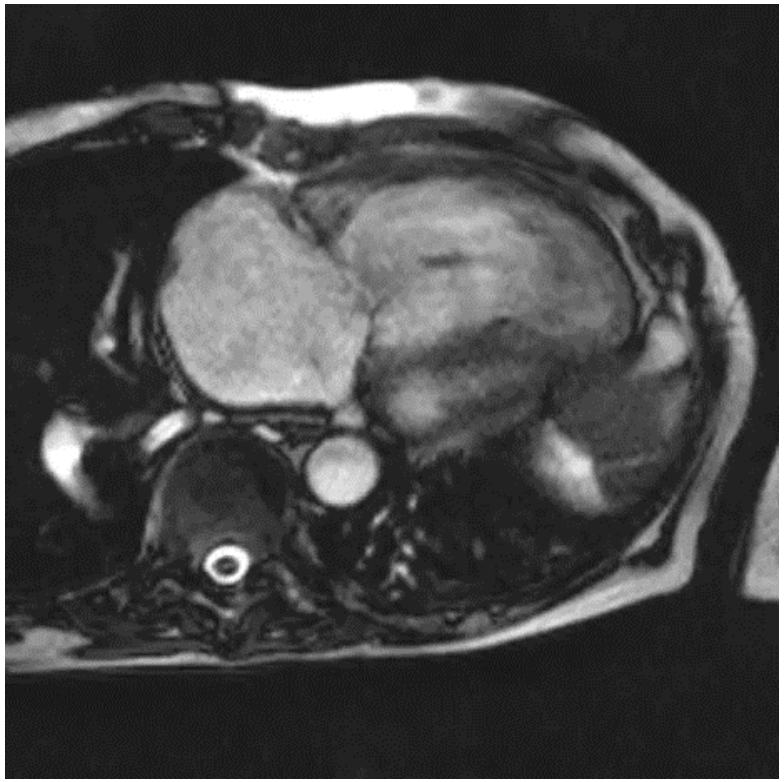

pre-op.



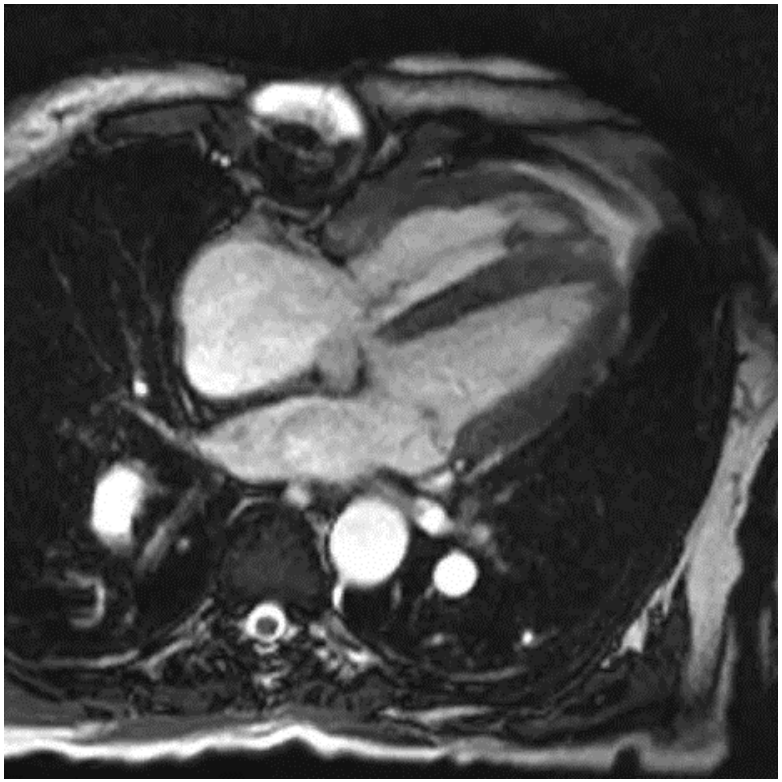
post-op.

# Instant improvement of RV-Function

# (S.H. 69 y., f., FC IV)

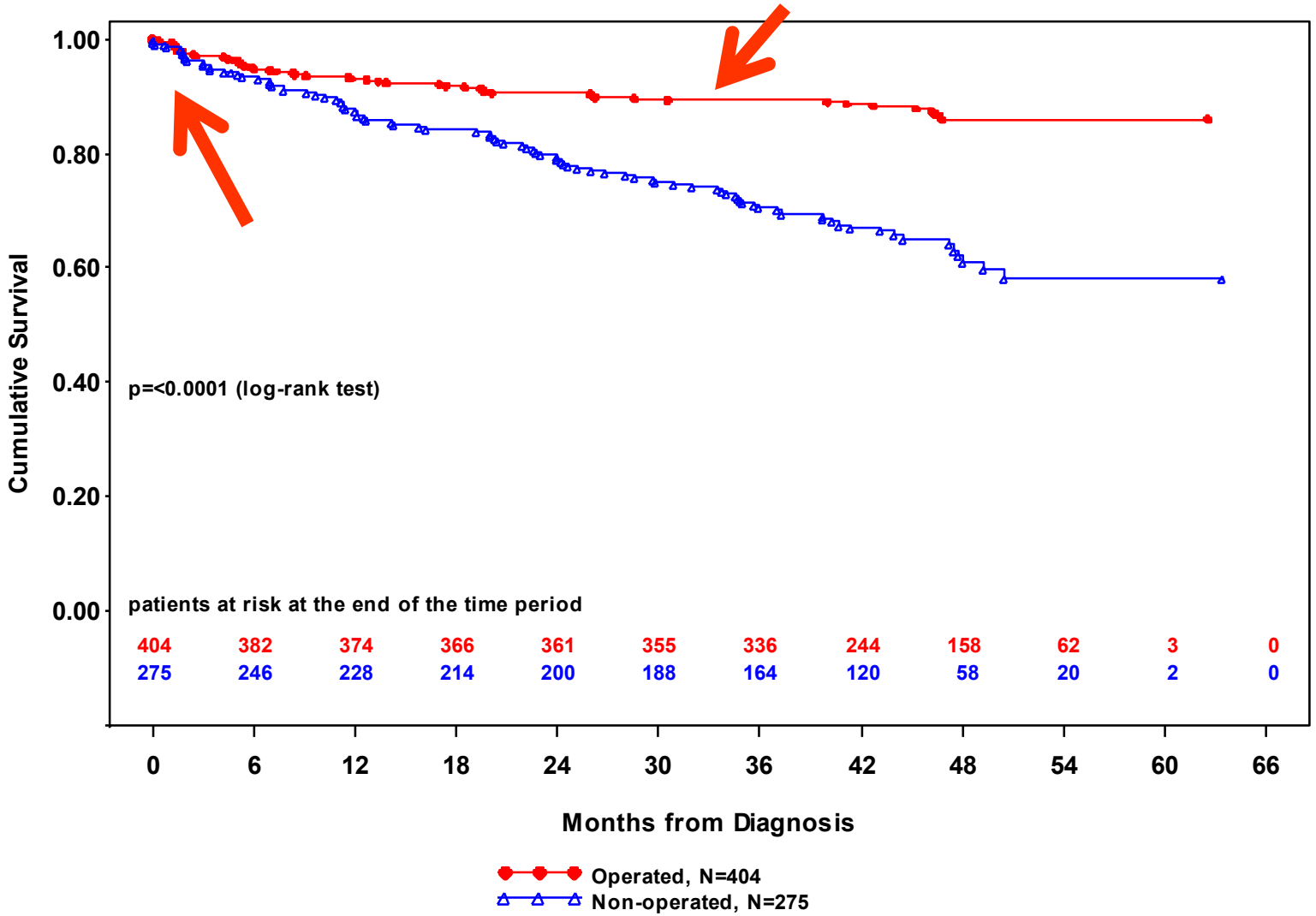


preop. 6.1.2003



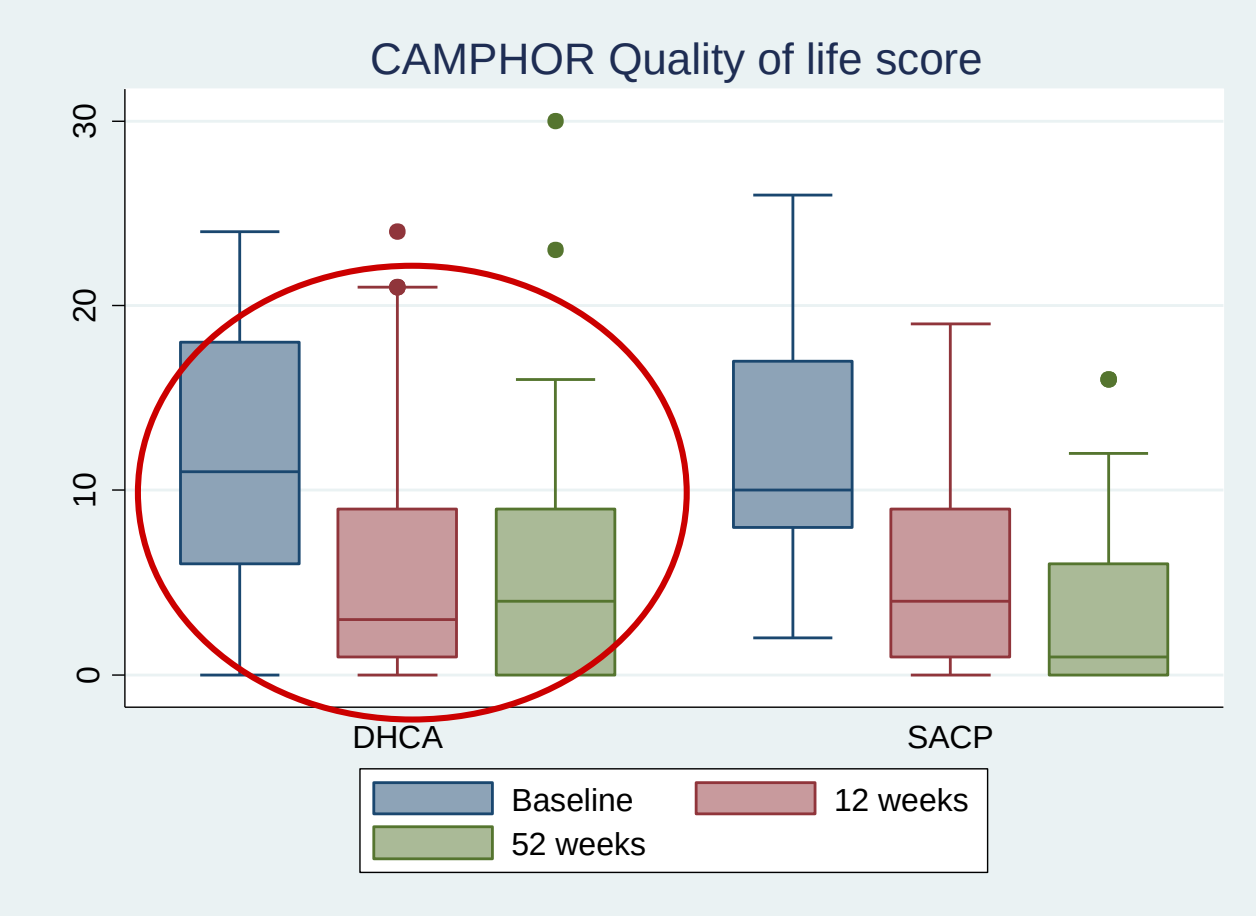
postop. 21.1.2003

# KM survival estimates Operated vs. non-operated




Simonneau G, *et al. Am J Respir Crit Care Med* 2013; 187:A5365

# Quality of Life after PEA




Vuylsteke et al *Lancet* 2011;378:1379

# Case #2: ML, m., 26 y.

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6/2016: progressive dyspnea, no acute event

1/2017: FC III, diagnosis: “distal” CTEPH
(echocardiography, V/Q scan, CTPA, pulmonary angiography)
RHC (PVR 882 dynes)

2/2017: rapid deterioration: initiation of Riociguat

5/2017: referral for PEA vs. BPA vs. LTx
(FC IV, RV-EF < 20 %)

# Case #2: ML, m., 26 y.

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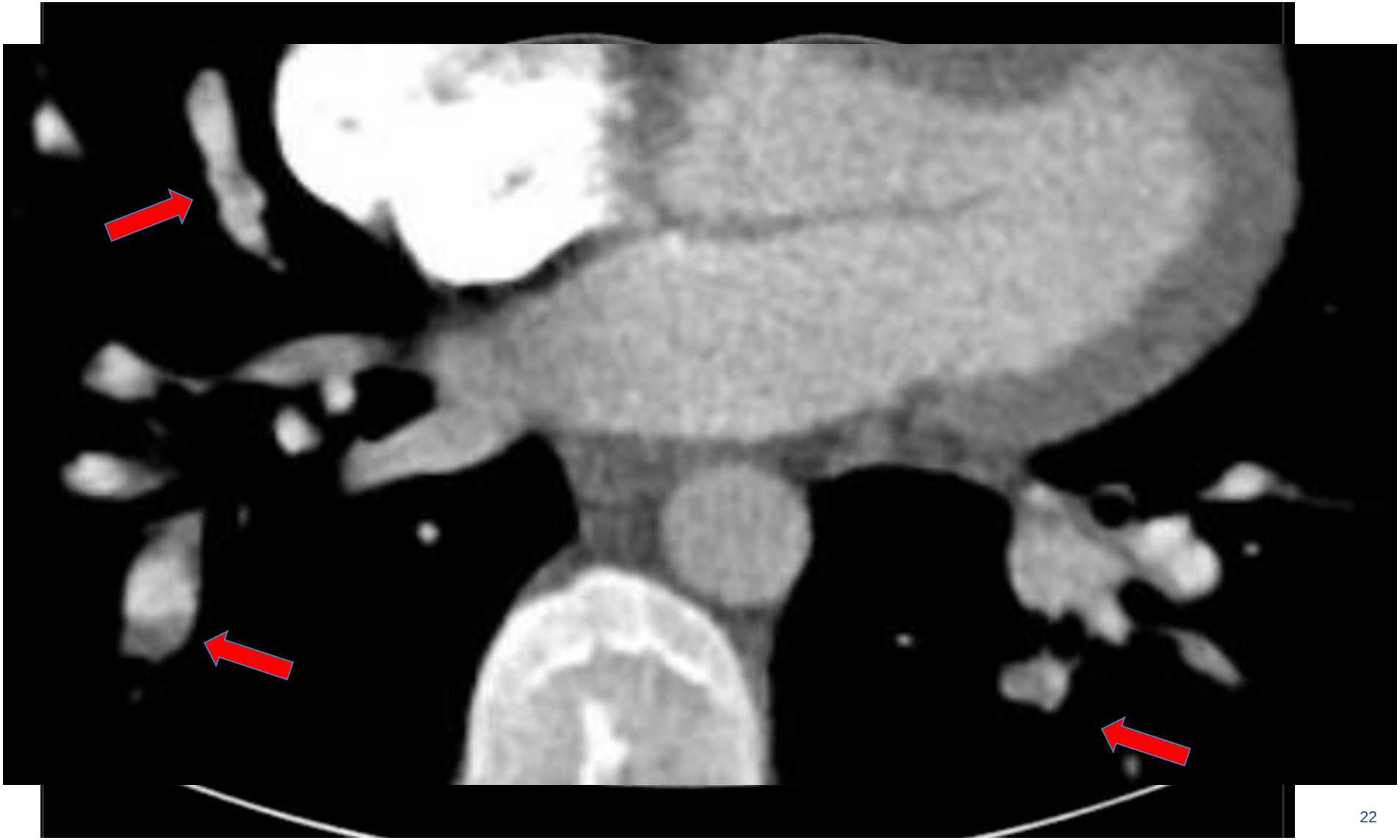
## 1/2017: CT pulmonary angiography



# ML, m, 26 y., FC IV, PVR 882, Riociguat

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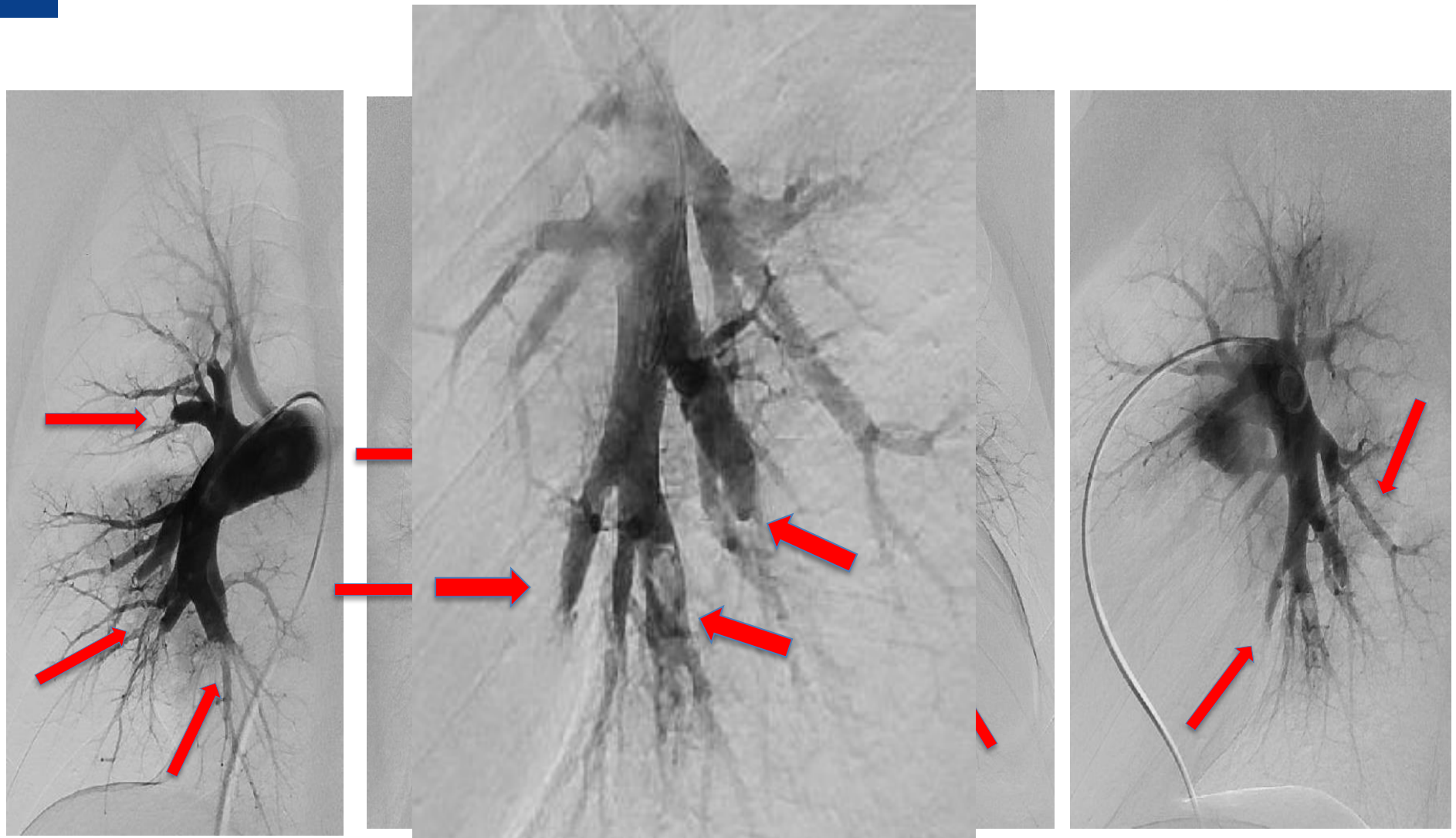
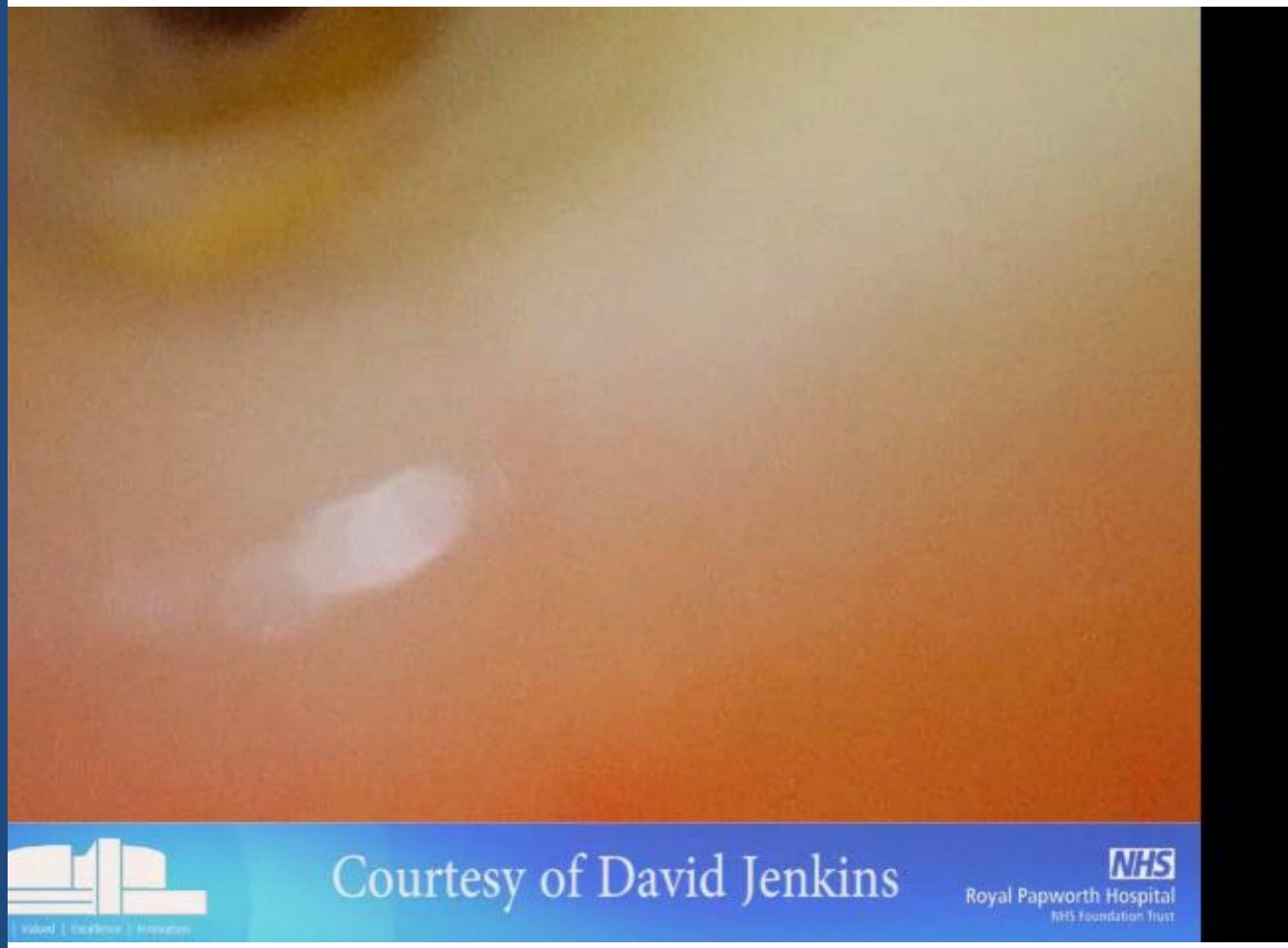


LAO 30

left 90

Subsegmental artery (4 mm) left upper lobe:

Remove the fibrous material (PEA) or dilate it (BPA)?

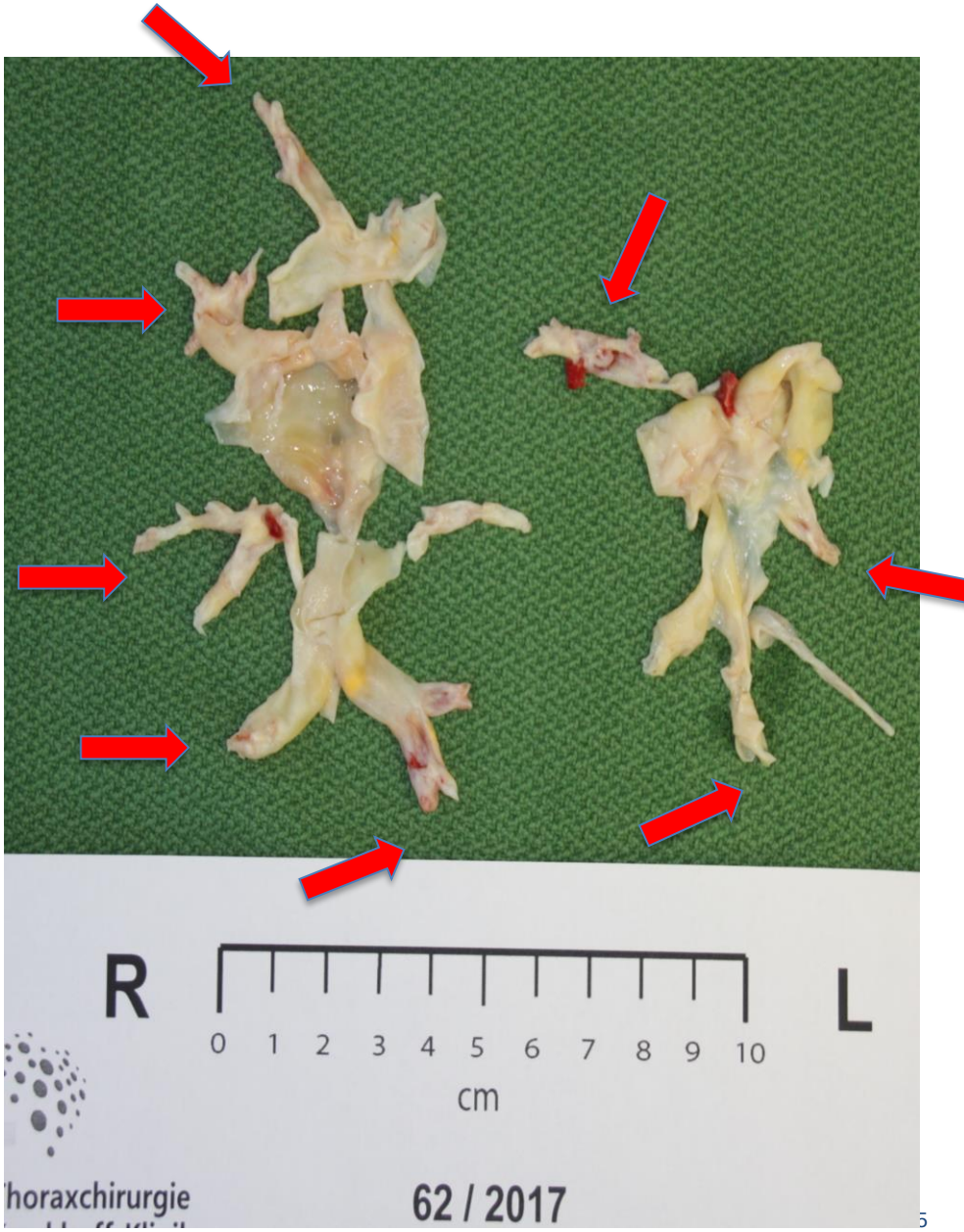


# Treatment discussion and decision for surgery

29.5.2017
pulmonary endarterectomy (preop. systemic PAP, right heart failure, RV-EF < 20 %)

(18 oC,
DHCA 48 min)

5/2018: FC I, no PH



6th WSPH Nice 2018

**CTEPH Diagnosis**
**Continue Lifelong Anticoagulation**

**Treatment Assessment by an Expert CTEPH Team** [1,2]

**Operable**

**Non-operable**

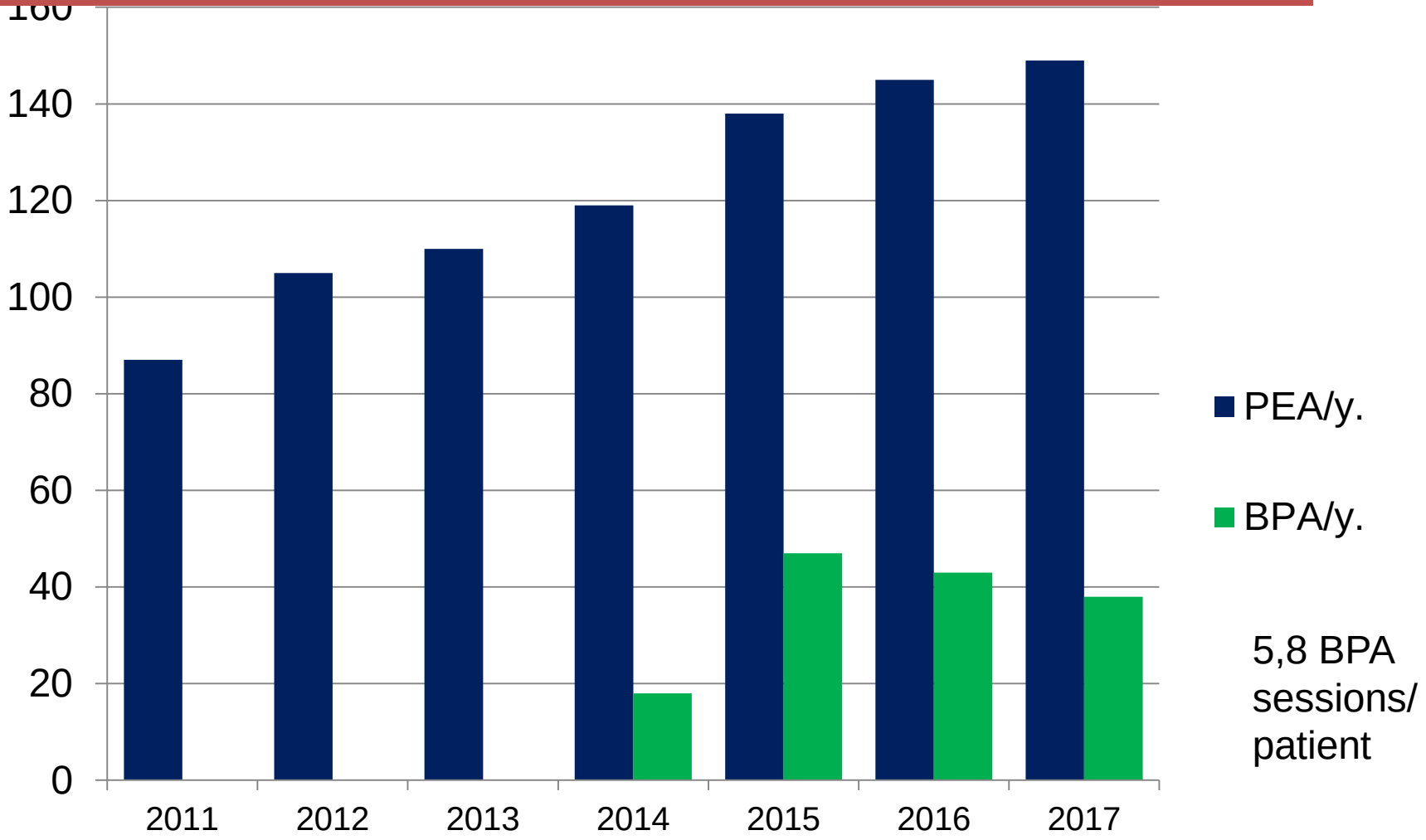
**Pulmonary Endarterectomy**
**(Treatment of Choice)**

**Targeted medical therapy with or without BPA** [2,3]

**Persistent/recurrent symptomatic pulmonary hypertension**

[1] Multidisciplinary: PEA/PTE surgeon, PH expert, BPA interventionalist, and radiologist
[2] Expert center defined: > 50 PEA/PTE, > 100 BPA sessions per year
[3] BPA without medical therapy can be considered in selected cases

# BPA is not an alternative to PEA surgery, but a promising option for inoperable CTEPH patients



# Conclusions CTEPH / PEA 2018

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A multidisciplinary expert team is mandatory for evaluation and treatment of CTEPH patients (I C)

PEA is and will remain the standard treatment for CTEPH patients (I C)

For inoperable CTEPH-patients targeted medication therapy is recommended and BPA is an emerging and promising interventional treatment option

Based on an interdisciplinary approach, the combination of treatment modalities (surgery, intervention, drugs) will be the future concept for many CTEPH patients.

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