The prosthetic valvular thrombosis (PVT)

The less worst treatment

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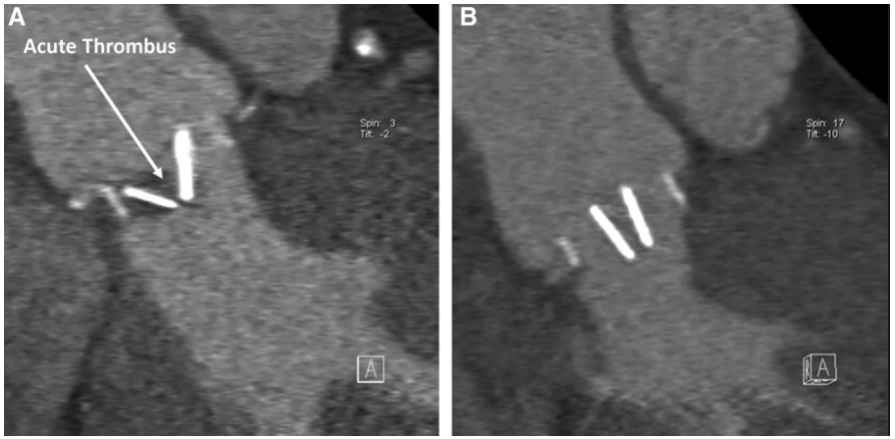
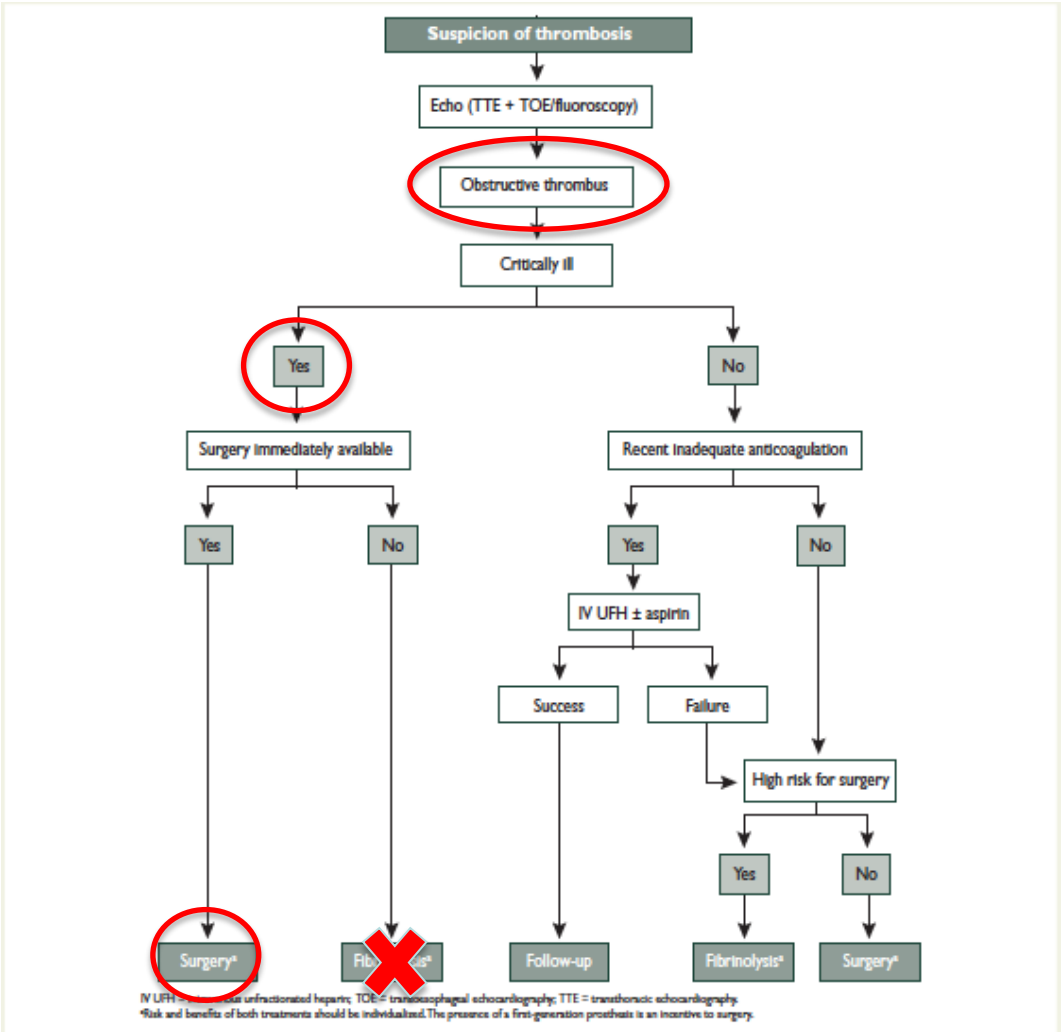
The less worst treatment

Clinical case 1

- 74 year old man
- St Jude prosthesis in aortic position 6 years ago for severe AS
- 3 weeks before, admission for digestive haemorragic diathesis
- Required transfusion and AVK+ Aspirin to be stopped
- Relay with LMWH –therapeutic doses
- Admitted for acute SOB grade III
- Echocardiography showing obstructive thrombus at the level of of the prosthesis confirmed by CT



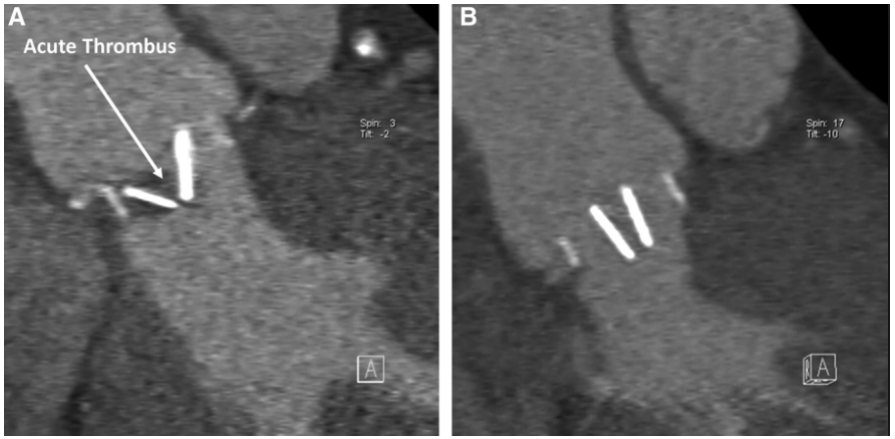
Which treatment ?



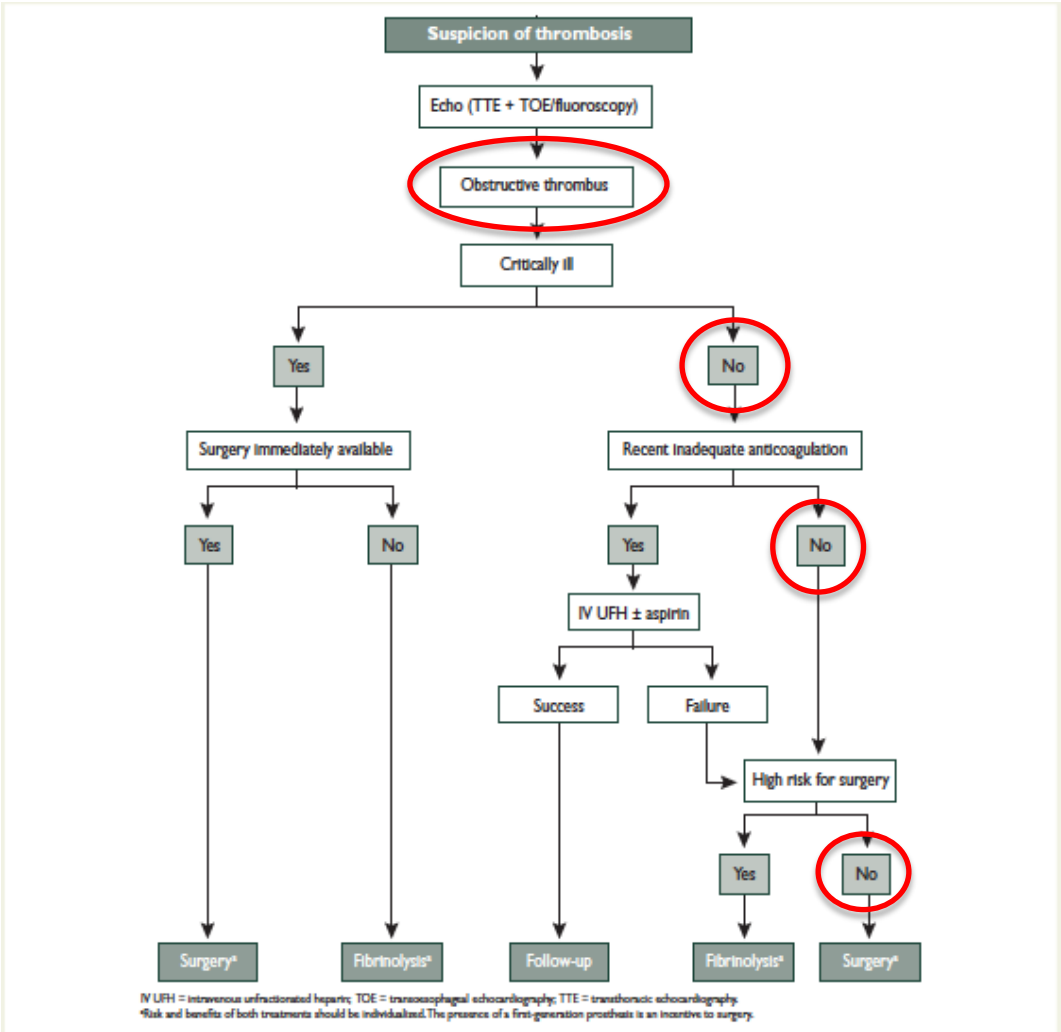
IV UFH = intravenous unfractionated heparin; TOE = transesophageal echocardiography; TTE = transthoracic echocardiography.
[a]Risk and benefits of both treatments should be individualized. The presence of a first-generation prosthesis is an incentive to surgery.

Clinical case 2

- 74 year old man, no RF
- St Jude prosthesis in aortic position 6 years ago for severe AS
- Last INR 2.5
- Admitted for SOB grade IIa
- Echocardiography showing obstructive thrombus at the level of of the prosthesis confirmed by CT



Which treatment ?



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[a]Risk and benefits of both treatments should be individualized. The presence of a first-generation prosthesis is an incentive to surgery.

Quality of anticoagulation

Table 19 Indications for antithrombotic therapy after valvular surgery

	Class[a]	Level[b]	Ref[c]
Oral anticoagulation is recommended lifelong for all patients with a mechanical prosthesis.	I	B	213
Oral anticoagulation is recommended lifelong for patients with bioprostheses who have other indications for anticoagulation.[d]	I	C	
The addition of low-dose aspirin should be considered in patients with a mechanical prosthesis and concomitant atherosclerotic disease.	IIa	C	
The addition of low-dose aspirin should be considered in patients with a mechanical prosthesis after thromboembolism despite adequate INR.	IIa	C	
Oral anticoagulation should be considered for the first three months after implantation of a mitral- or tricuspid bioprosthesis.	IIa	C	
Oral anticoagulation should be considered for the first three months after mitral valve repair.	IIa	C	
Low-dose aspirin should be considered for the first three months after implantation of an aortic bioprosthesis.	IIa	C	
Oral anticoagulation may be considered for the first three months after implantation of an aortic bioprosthesis.	IIb	C	

[a]Prosthesis thrombogenicity: Low = Carbomedics, Medtronic Hall, St Jude Medical, ON-X; Medium = other bileaflet valves; High = Lillehei-Kaster, Omniscience, Starr-Edwards, Bjork-Shiley and other tilting-disc valves.
[b]Patient-related risk factors: mitral or tricuspid valve replacement; previous thromboembolism; atrial fibrillation; mitral stenosis of any degree; left ventricular ejection fraction <35%.

Table 20 Target international normalized ratio (INR) for mechanical prostheses

Prosthesis thrombogenicity[a]	Patient-related risk factors[b]	
	No risk factor	Risk factor ≥1
Low	2.5	3.0
Medium	3.0	3.5
High	3.5	4.0

Quality of anticoagulation(2)

Anticoagulation with a VKA and INR monitoring is recommended in pts with a mechanical prosthetic valve	CLASS I	A
Anticoagulation with VKA to achieve INR 2.5 is recommended in mechanical AVR ,no risk factors for thromboembolism	CLASS I	B
VKA ,INR -3.0 in pts with mechanical AVR ,additional risk factors for thromboembolism,-older generation mechanical AVR	CLASS I	B
VKA,INR -3.0 in mitral mechanical valve pts	CLASS I	B
Aspirin 75-100 mg in addition to VKA in mechanical prosthesis pts	CLASS I	A
Aspirin 75-100 mg in all pts with bioprosthetic aortic or mitral valve	CLASS II a	B
Anticoagulation with VKA– INR 2.5 reasonable in bioprosthetic MVR or repair ,first 3 months	CLASS II a	C
Anticoagulation with VKA– INR 2.5 reasonable after bioprosthetic AVR	CLASS II b	B
Clopidogrel 75 mg daily may be reasonable for first 6 months after TAVR in addition to life long aspirin 75-100mg daily	CLASS II b	C
Anticoagulation with oral direct thrombin inhibitors or anti Xa agents should not be used in mechanical prosthesis patients	CLASS III HARM	B

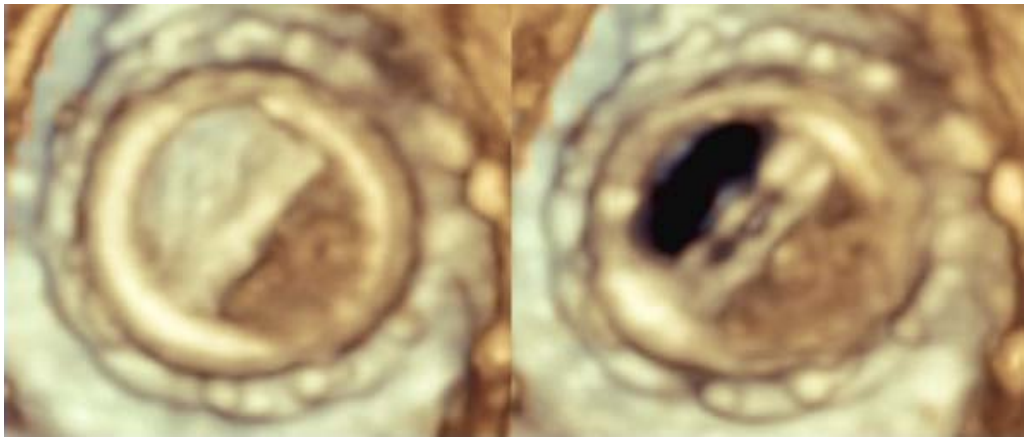
Bridging

- Most minor surgical procedures : no interrution (class I, level of evidence C). Appropriate techniques of haemostasis should be used and the INR should be measured on the day of the procedure

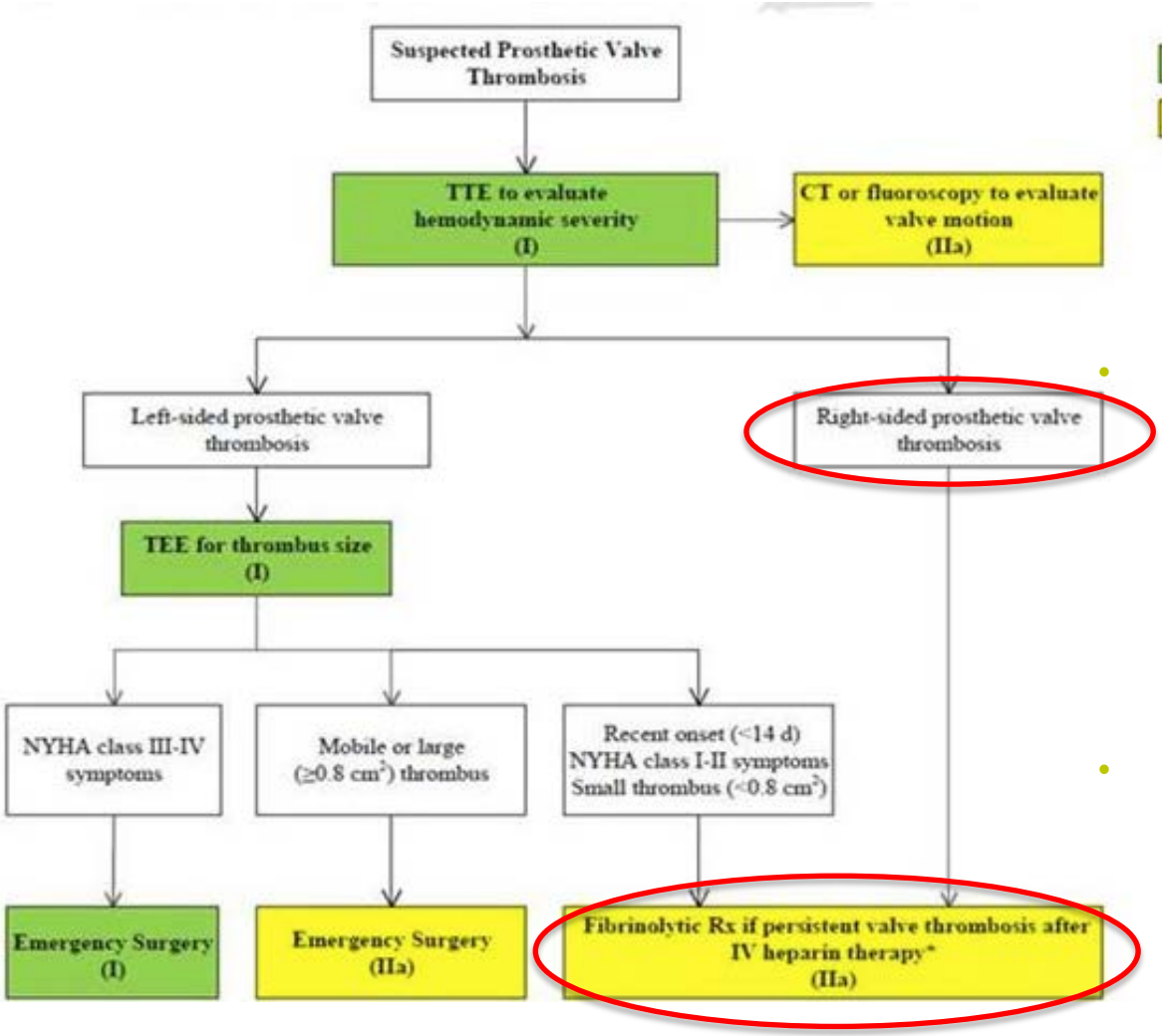
- Major surgical procedures requiring an INR ,1.5. In patients with a mechanical prosthesis, oral anticoagulant therapy should be stopped before surgery and bridging, using heparin, is recommended (recommendation class I, level of evidence C)
  - UFH remains the only approved heparin treatment in patients with mechanical prostheses; intravenous administration should be favoured over the subcutaneous route (recommendation class IIa, level of evidence C). To stop 4hours before intervention
  - LMWH although often used, no evidence (if used twice a day – stop 12 hours before intervention). CI if severe renal failure

Clinical case 3

- 65 years old woman
- St Jude mechanical prosthesis tricuspid valve replaced for endocarditis 4 years ago
- INR at the last follow-up is 2.0
- PVT 1 year before admission – fibrinolysis
- Admitted for SOB III
- Diagnosis of PVT at echo – embolic amputations at pulmonary angio CT



Which treatment ?

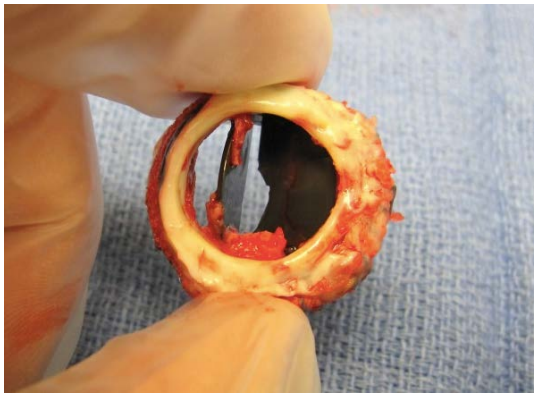


- In case of haemodynamic instability a short protocol is recommended, using either intravenous recombinant tissue plasminogen activator 10 mg bolus + 90 mg in 90 minutes with UFH, or streptokinase 1 500 000 U in 60 minutes without UFH
- Longer durations of infusions can be used in stable patients

Surgery vs Fibrinolysis

- Poor compliance to anticoagulation
- Reoccurence
- Age

→ bioprosthesis

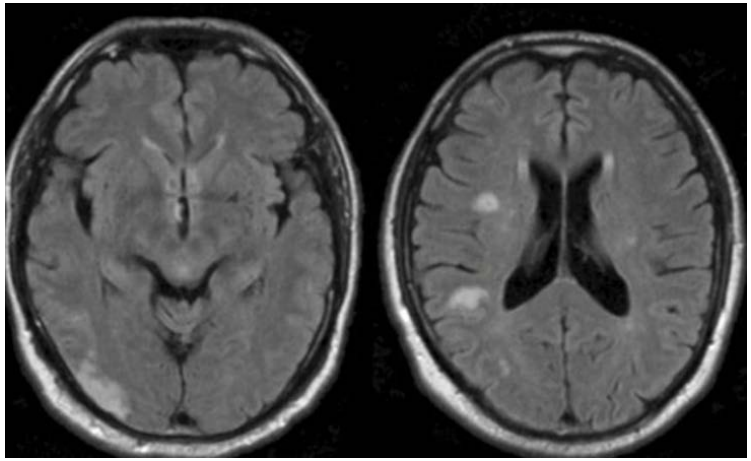


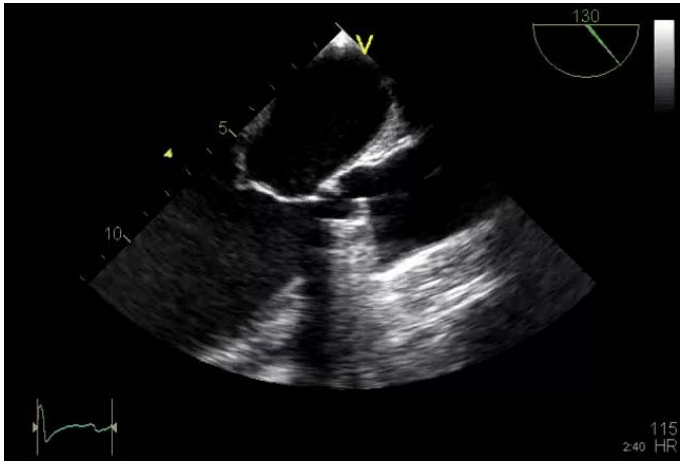
	SURGERY	FIBRINOLYTIC THERAPY
THROMBOEMBOLISM	1.6%	16%
MAJOR BLEEDING	1.4%	5%
RECURRENT PVT	7.1%	25.4%
RESTORING NORMAL VALVE FUNCTION	90%	70%

Karthikeyan G et al Eur Heart J. 2013 Jun;34(21):1557-66

Clinical case 4

- 73 years old woman
- Smoker
- Aortic valve replacement 3 years ago by a bioprosthesis
- Sinus rhythm 67 bpm BP 160 / 90 mm Hg
- Aspirine 100 mg/d
- Admission for repetitive stroke





Type of prosthesis BP vs MVP ?

Table 17 Choice of the aortic/mitral prosthesis. In favour of a mechanical prosthesis.

	Class [a]	Level [b]
A mechanical prosthesis is recommended according to the desire of the informed patient and if there are no contraindications for long-term anticoagulation.[c]	I	C
A mechanical prosthesis is recommended in patients at risk of accelerated structural valve deterioration.[d]	I	C
A mechanical prosthesis is recommended in patients already on anticoagulation as a result of having a mechanical prosthesis in another valve position.	I	C
A mechanical prosthesis should be considered in patients aged <60 years for prostheses in the aortic position and <65 years for prostheses in the mitral position.[e]	IIa	C
A mechanical prosthesis should be considered in patients with a reasonable life expectancy,[f] for whom future redo valve surgery would be at high risk.	IIa	C
A mechanical prosthesis may be considered in patients already on long-term anticoagulation due to high risk of thromboembolism.[g]	IIb	C

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Aortic Valve Replacement

A Prospective Randomized Evaluation of Mechanical Versus Biological Valves in Patients Ages 55 to 70 Years

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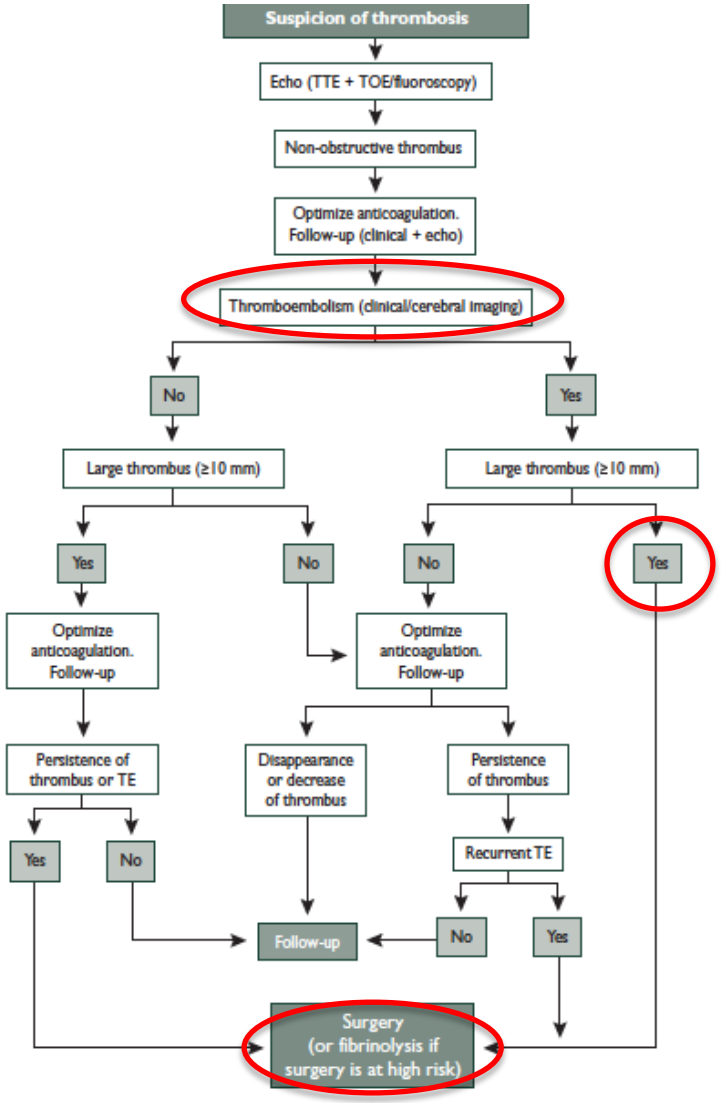
Variables	MP (n = 149) %/pt-yr (95% CI)	BP (n = 147) %/pt-yr (95% CI)	p Value
Thromboembolism	0.54 (0.14–0.94)	0.24 (0.03–0.51)	0.3
Bleeding	1.47 (0.81–2.13)	0.72 (0.25–0.19)	0.08
Endocarditis	0.38 (0.04–0.72)	0.24 (0.03–0.51)	0.7
Valve failure	0	2.17 (1.35–2.98)	0.0001
Valve thrombosis	0.23 (0.03–0.49)	0	0.2
Nonstructural dysfunction	0.23 (0.03–0.49)	0.24 (0.03–0.51)	0.6
Reoperation	0.62 (0.19–1.05)	2.32 (1.48–3.18)	0.0003

Which treatment ?



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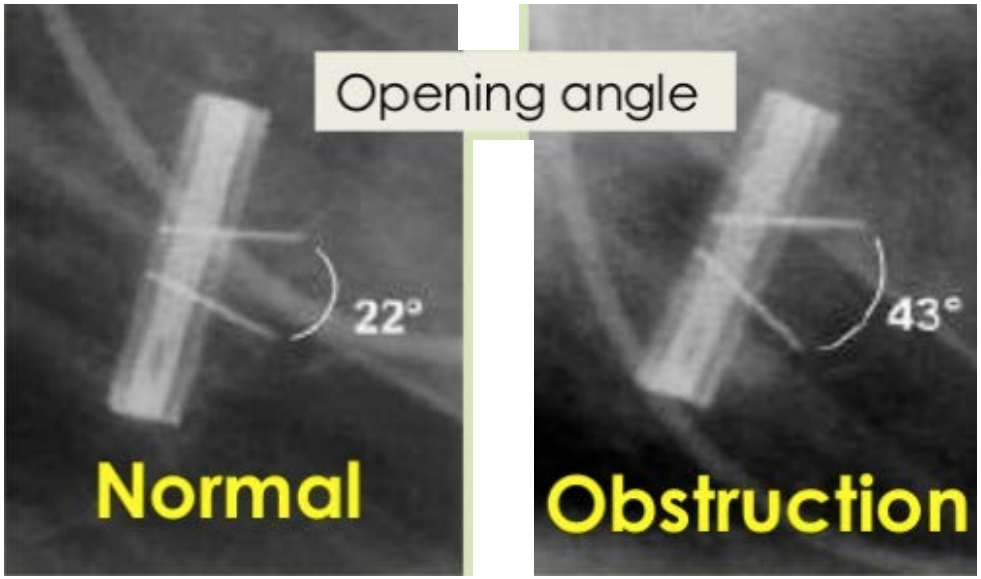
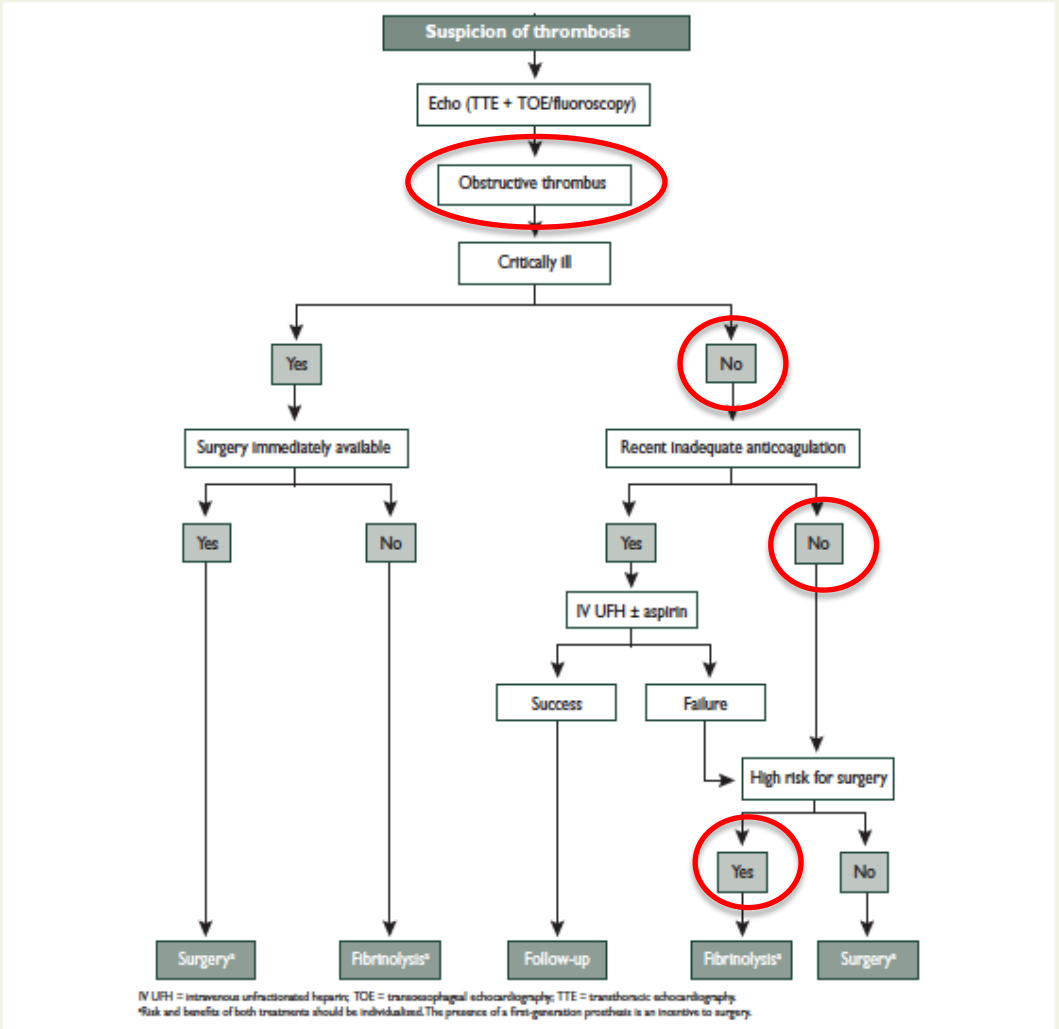
Clinical case 5

- 76 years old woman , GFR 30 ml/min, previous AMI, diabetes (no retinopathy)
- Mechanical mitral valve prosthesis type Carbomedics, implanted 6 years ago
- Sinus rhythm 98 bpm BP 134/80 mm hg
- SOB grade II since 3 weeks ago. INR 3.5 last fup



Which treatment ?



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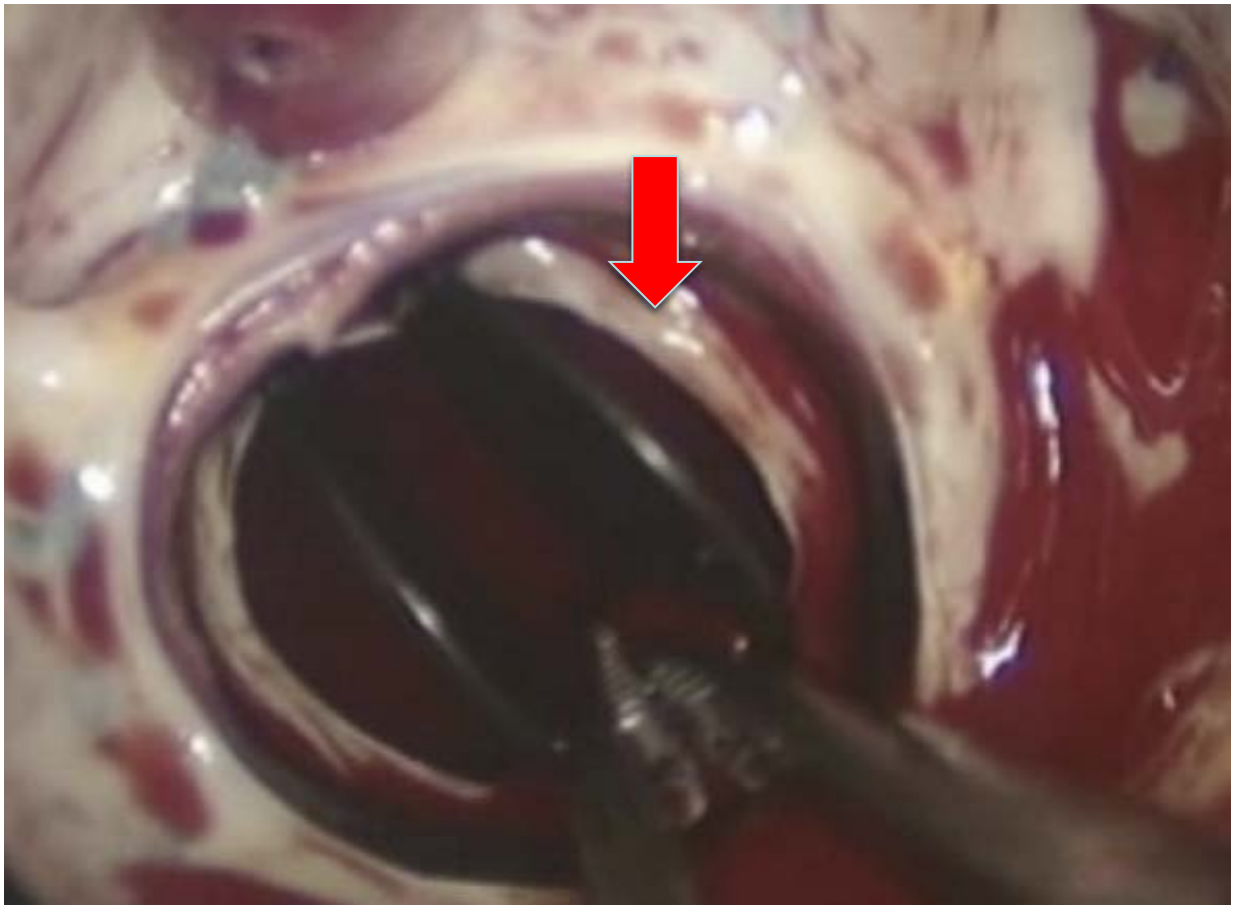
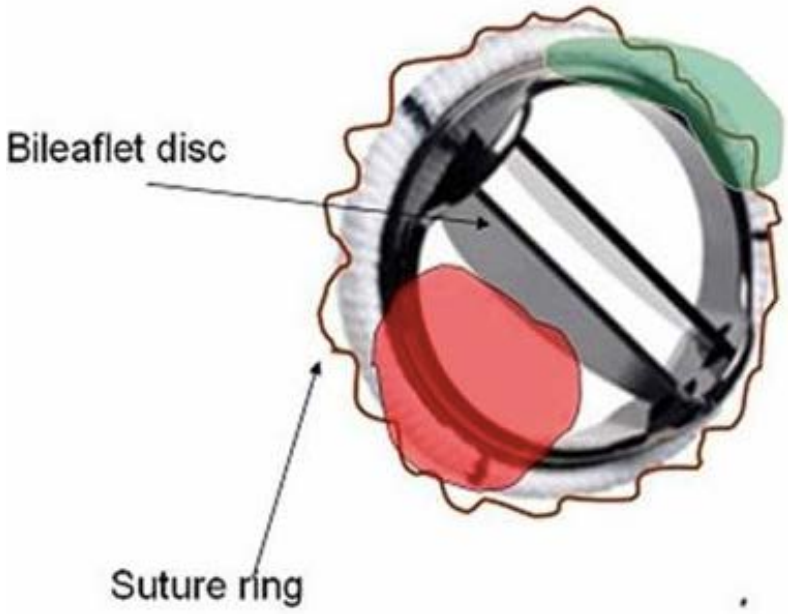
Fibrinolytic therapy inefficient



Thrombus vs pannus



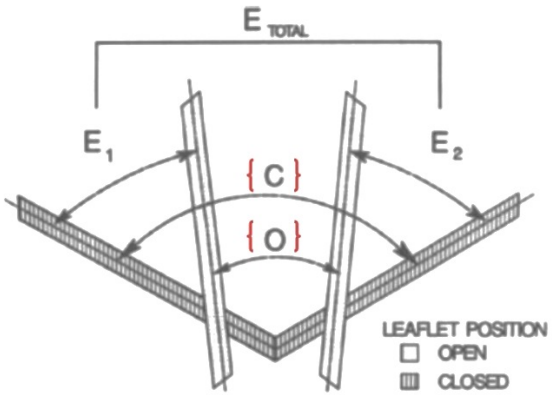
Pannus

- Small, less dense mass, growing from
- Within suture line
- Along the plane of valve

Thrombus

- Large
- Less dense
- Mass project away from valve disc

Follow-up of PVT : TOE/cinefluoroscopy

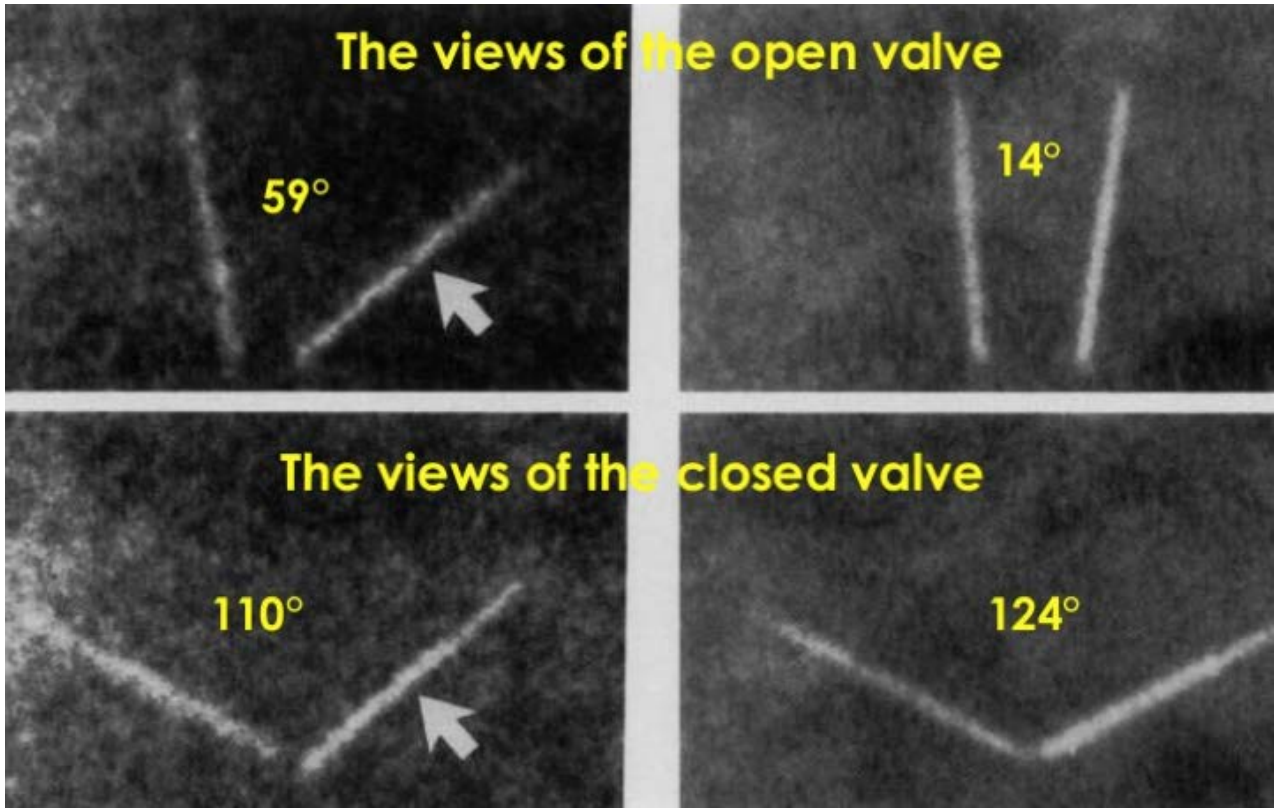


Bileaflet Mechanical Prosthetic Heart Valves	Opening angle (OA)	Closing angle (CA)
Carbomedics	<24°	>130°
Edwards Duromedics	<29°	>148°
Sorin Bicarbon	<24°	>135°
St.Jude Medical Standard	<13°	>120°

Example before and after thrombolysis

Before

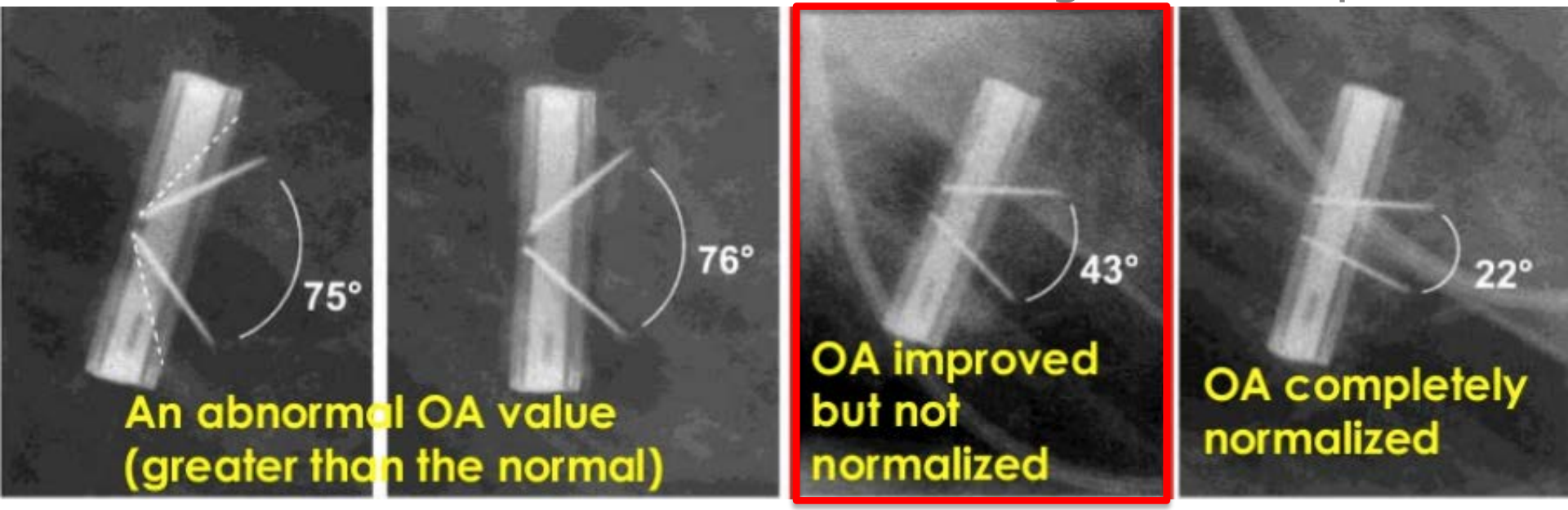
After



Implications for follow-up

3h of rtpa
100 mg

+ 24 h
heparin



Mean grad
10 mmHg

Mean grad
6 mmHg

Mean grad
5 mmHg

The silent Doppler PVT

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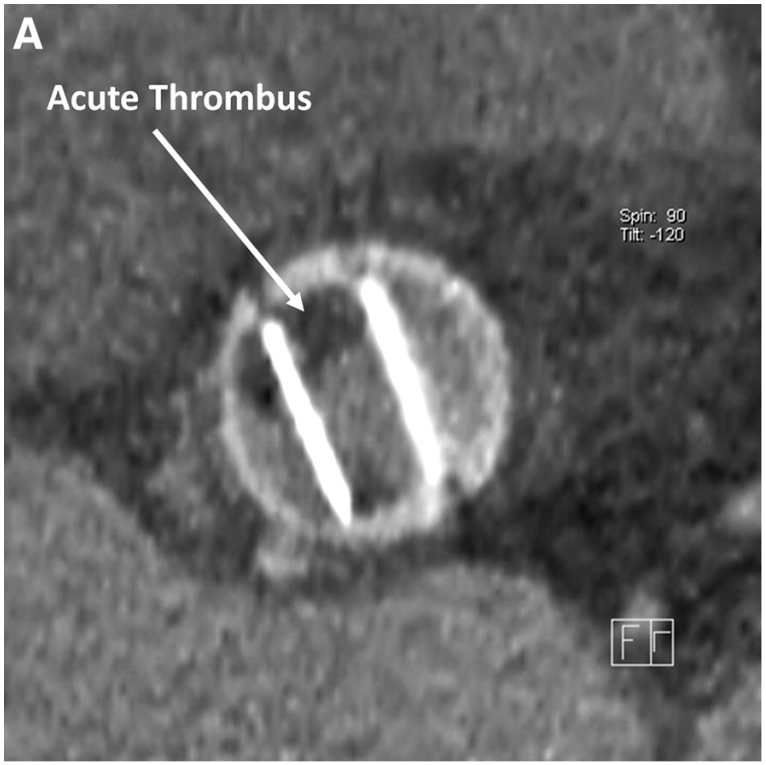
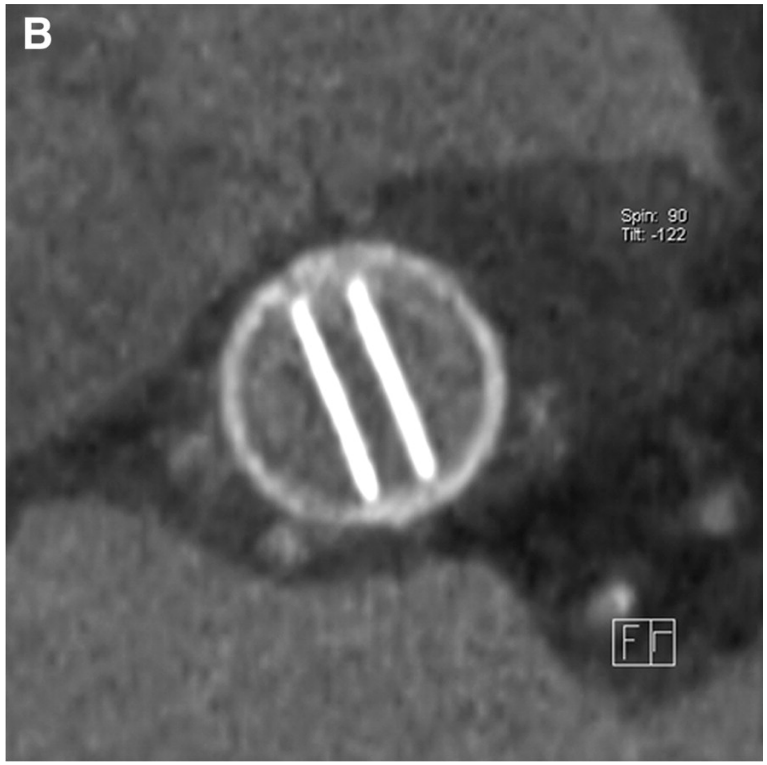
Courtesy of Montorsi

CT follow-up after thrombolysis





PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

IIA Level C

Take home messages

- **Prevention of PVT is key:**
  - Good valve type
  - Adequate antithrombotic treatment (chronic-bridging)

- **PVT management is always at high risk**
  - Surgery in emergency
  - Fibrinolysis and risk of bleeding, recurrence, embolism

- **Fibrinolysis (if not contraindicated) should be reserved to:**
  - Unoperable patients
  - Waiting for the operation if impossible to perform early
  - Right-sided PVT

- **Thromboembolism**
  - Often multifactorial origin – treat other CV RF

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Integration of multiple parameters

- Contraindications to anticoagulation
- Quality of anticoagulation
- Contraindication to thrombolysis
- Age
- Size of thrombus
- Severity of symtoms
- Type of prosthesis