



EuroValve

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IE with cerebral hemorrhage

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DE MARSEILLE



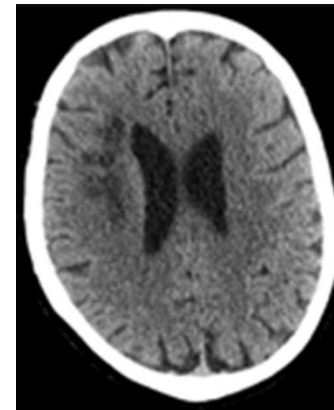
Case report: aortic bioprosthetic IE

History of the disease

- 75 year-old man
- surgical aortic valve replacement 2-year ago (Hancock 25 + coronary artery bypass)
- referred to hospital for an ischemic stroke and paravalvular regurgitation on TTE

Clinical examination

- no fever
- aortic systolic murmur 2/6
- transient left hemiparesia
- no heart failure



Cerebral CT showed ischaemic lesion of the right semioval centre.

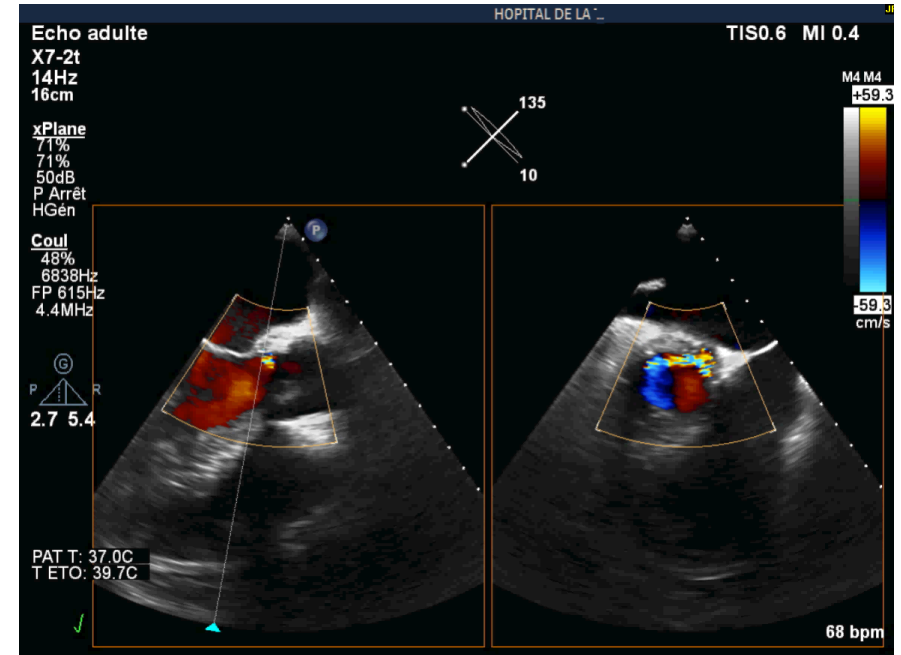
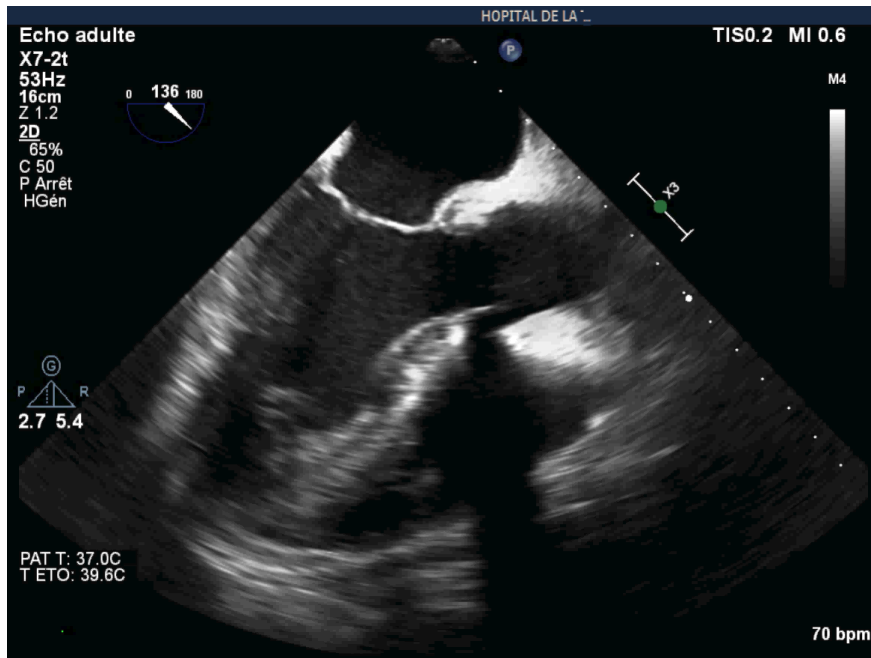
Case report: aortic bioprosthetic IE

Laboratory data

- ✦ white blood cell count : 8,700/mm³
- ✦ CRP : 26 mg/l
- ✦ serum creatinin : 119 µmol/l
- ✦ haemoglobin : 14 g/dl

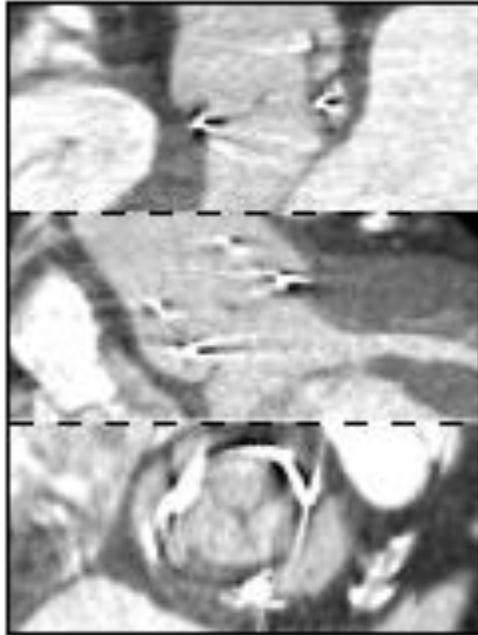
Blood cultures: negative

First TEE



- posterior aortic pseudoaneurysm with moderate paravalvular regurgitation
- no vegetation or leaflet thickening

Cardiac CT-scan



- Cardiac CT confirmed the presence of the pseudoaneurysm (arrows) without vegetation or leaflet thickening.

Q1: is this endocarditis?

1. Yes it is, no doubt
2. We need additional investigations before therapy
3. I treat and perform additional investigations

Q1: is this endocarditis?

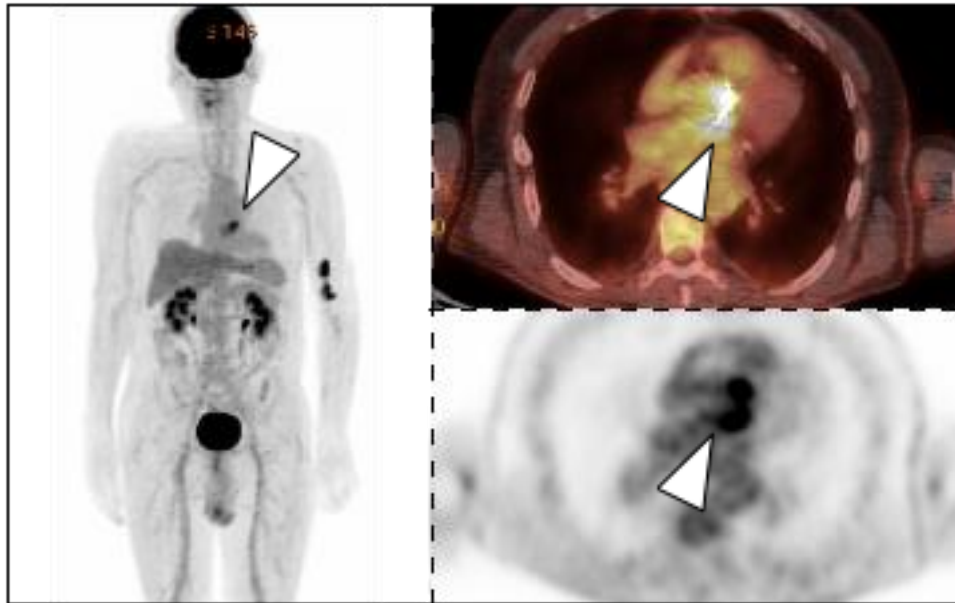
Major criteria
1. Blood cultures positive for IE a. Typical microorganisms consistent with IE from 2 separate blood cultures: • <i>Viridans streptococci</i>, <i>Streptococcus gallolyticus</i> (<i>Streptococcus bovis</i>), <i>HACEK</i> group, <i>Staphylococcus aureus</i>; or • Community-acquired enterococci, in the absence of a primary focus; or b. Microorganisms consistent with IE from persistently positive blood cultures: • ≥ 2 positive blood cultures of blood samples drawn >12 h apart; or • All of 3 or a majority of ≥ 4 separate cultures of blood (with first and last samples drawn ≥ 1 h apart); or c. Single positive blood culture for <i>Coxiella burnetii</i> or phase I IgG antibody titre $>1:800$
2. Imaging positive for IE a. <u>Echocardiogram positive for IE:</u> • Vegetation; • Abscess, pseudoaneurysm, intracardiac fistula; • Valvular perforation or aneurysm; • New partial dehiscence of prosthetic valve. b. Abnormal activity around the site of prosthetic valve implantation detected by ^{18}F -FDG PET/CT (only if the prosthesis was implanted for >3 months) or radiolabelled leukocytes SPECT/CT. c. <u>Definite paravalvular lesions by cardiac CT.</u>
Minor criteria
1. Predisposition such as <u>predisposing heart condition</u> , or injection drug use. 2. Fever defined as temperature $>38^\circ\text{C}$. 3. Vascular phenomena (including those detected by imaging only): <u>major arterial emboli, septic pulmonary infarcts, infectious (mycotic) aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway's lesions.</u> 4. Immunological phenomena: glomerulonephritis, Osler's nodes, Roth's spots, and rheumatoid factor. 5. Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE.

Definite IE
Pathological criteria • Microorganisms demonstrated by culture or on histological examination of a vegetation, a vegetation that has embolized, or an intracardiac abscess specimen; or • Pathological lesions; vegetation or intracardiac abscess confirmed by histological examination showing active endocarditis Clinical criteria • 2 major criteria; or • 1 major criterion and 3 minor criteria; or • 5 minor criteria
Possible IE
• 1 major criterion and 1 minor criterion; or • 3 minor criteria
Rejected IE
• Firm alternate diagnosis; or • Resolution of symptoms suggesting IE with antibiotic therapy for ≤ 4 days; or • No pathological evidence of IE at surgery or autopsy, with antibiotic therapy for ≤ 4 days; or • Does not meet criteria for possible IE, as above

Q1: is this endocarditis?

1. Yes it is, no doubt
2. We need additional investigations before therapy
3. ***I treat and perform additional investigations***

PET CT



- PET/CT showed an intense prosthetic [18F]FDG uptake (arrowhead).

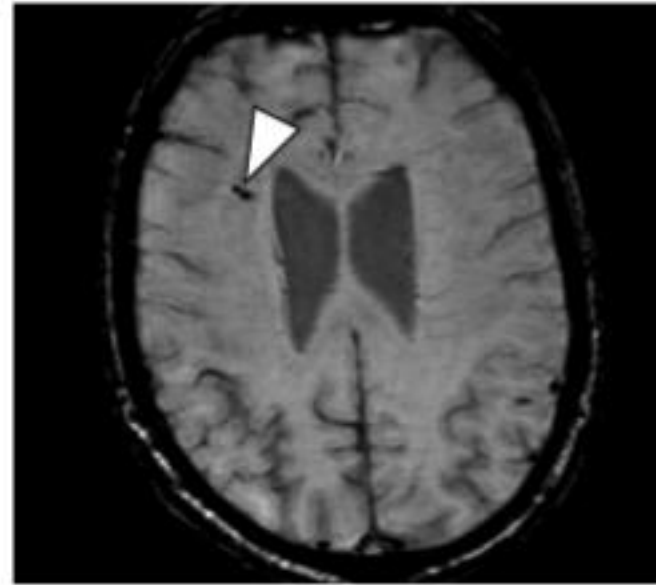
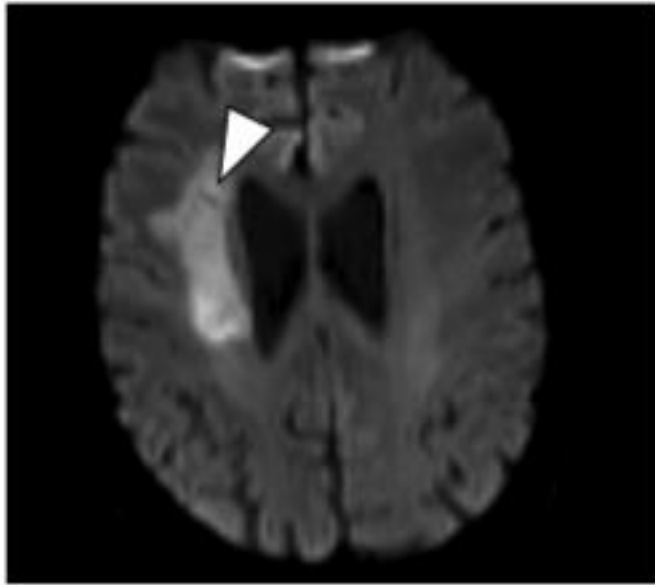
Q2: what is the best therapeutic option?

1. Immediate surgery
2. Antibiotic therapy
3. Additional investigations are needed

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1. Immediate surgery
2. Antibiotic therapy
3. ***Additional investigations are needed***

Cerebral MRI Day 4



MRI showed haemorrhagic conversion in the ischemic area (open arrows).

Q3: what is the best therapeutic option?

1. Immediate surgery
2. Delayed surgery
3. Definite contra-indication to surgery

Q3: what is the best therapeutic option?

1. Immediate surgery
2. ***Delayed surgery***
3. Definite contra-indication to surgery

Indications and timing of surgery

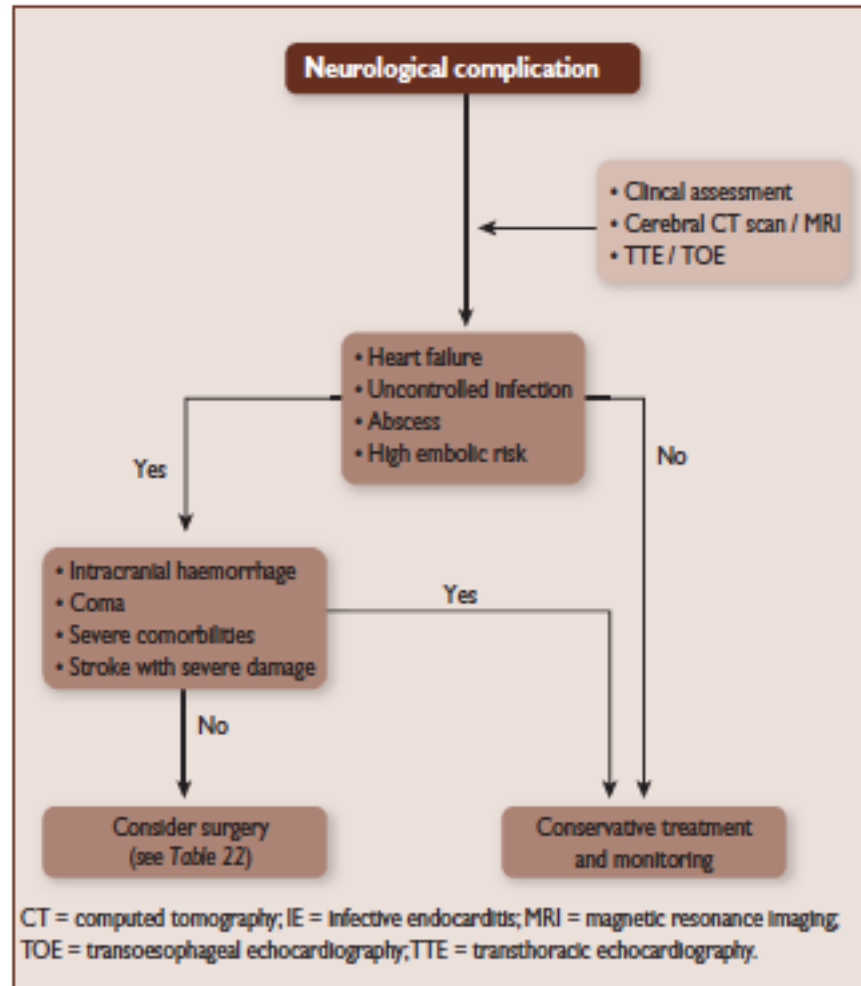
Indications for surgery	Timing	Class	Level
1. Heart Failure			
Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock.	Emergency	I	B
Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance.	Urgent	I	B
2. Uncontrolled infection			
Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation).	Urgent	I	B
Infection caused by fungi or multiresistant organisms.	Urgent/elective	I	C
Persisting positive blood cultures despite appropriate antibiotic therapy and adequate control of septic metastatic foci.	Urgent	IIa	B
PVE caused by staphylococci or non-HACEK Gram negative bacteria.	Urgent/elective	IIa	C
3. Prevention of embolism			
Aortic or mitral NVE or PVE with persistent vegetations >10 mm after one or more embolic episode despite appropriate antibiotic therapy.	Urgent	I	B
Aortic or mitral NVE with vegetations >10 mm, associated with severe valve stenosis or regurgitation, and low operative risk.	Urgent	IIa	B
Aortic or mitral NVE or PVE with isolated very large vegetations (>30 mm).	Urgent	IIa	B
Aortic or mitral NVE or PVE with isolated large vegetations (>15 mm) and no other indication for surgery.	Urgent	IIb	C

Management of neurological complications

Recommendations	Class	Level
After a silent embolism or transient ischaemic attack, cardiac surgery, if indicated, is recommended without delay.	I	B
Neurosurgery or endovascular therapy is indicated for very large, enlarging or ruptured intracranial infectious aneurysms.	I	C
Following intracranial haemorrhage, surgery should generally be postponed for ≥ 1 month.	IIa	B
After a stroke, surgery indicated for HF, uncontrolled infection, abscess, or persistent high embolic risk should be considered without any delay as long as coma is absent and the presence of cerebral haemorrhage has been excluded by cranial CT or MRI.	IIa	B
Intracranial infectious aneurysms should be looked for in patients with IE and neurological symptoms. CT or MR angiography should be considered for diagnosis. If non-invasive techniques are negative and the suspicion of intracranial aneurysm remains, conventional angiography should be considered.	IIa	B

Management of neurological complications

ESC guidelines



Cerebral MRI findings in IE

- 109 IEE
- MR and MRA with 7 days
- 71 MR abnormalities

Duval X - Ann Intern Med. 2010;152:497-504
Hess A - AJNR Am J Neuroradiol. 2013 May 2
Iung B - Eur Heart J CVI . 2012; 13:703-10

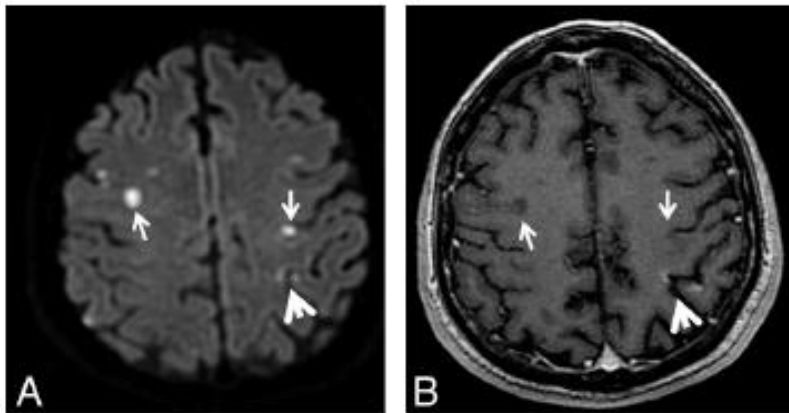


FIG 2. DWI (A) and postcontrast T1 (B) sequences show recent ischemic lesions of different ages in the same patient: acute ischemia (small white arrows) and subacute ischemia (large white arrows).

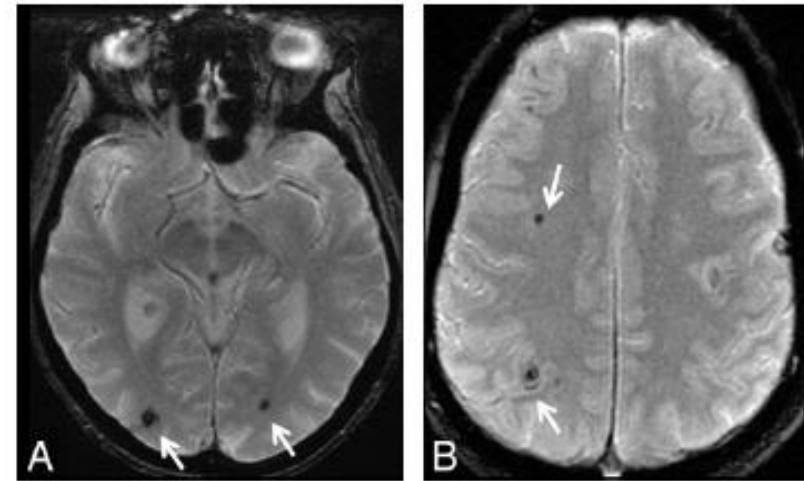


FIG 3. Multiple cortical and subcortical microbleeds on a T2* sequence.

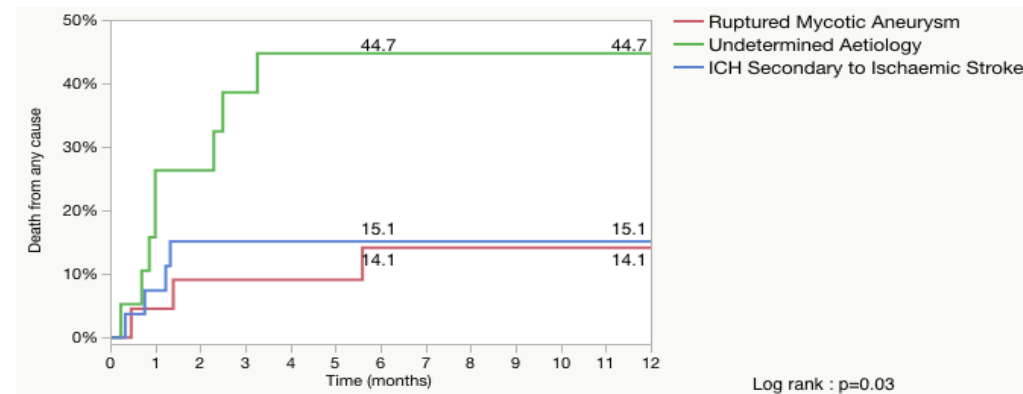
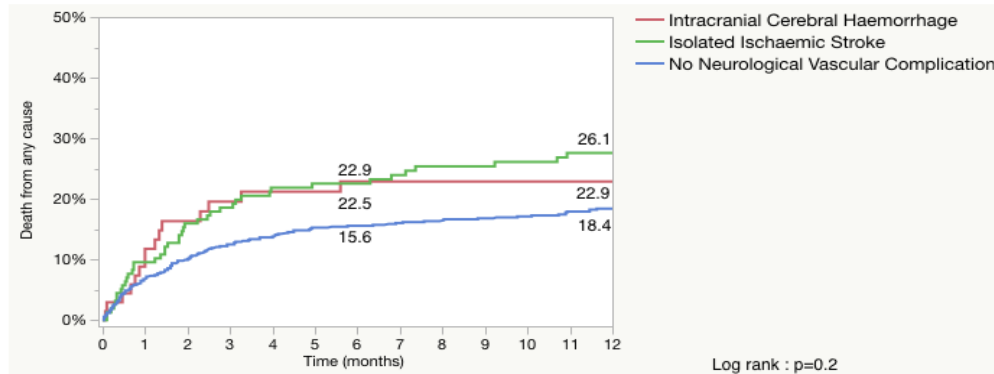
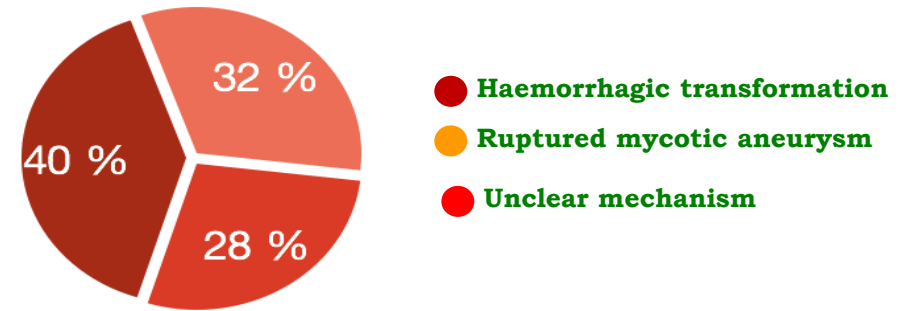
La Timone Experience

Salaun E, Touil A, Habib G Arch Cardiovasc Diseases 2018 under press

From 2000-2015 => 963 left sided IE

Cerebral hemorrhage: n=68 (7%), age:57±13 years, 75% men

	Multivariable Odd ratio (95%-CI)	p Value
Age, per one increase	-	0.35
Intravenous drug abuse	-	0.71
Presence of vegetation	-	0.82
Presence of severe regurgitation	3.2 (1.3-7.6)	0.008
Platelet count <150x10 ⁹ /L	2.3 (1.01-5.4)	0.049
Staphylococci	-	0.31
Streptococci	-	0.43
Ischaemic stroke	4.2 (1.9-9.4)	<0.001
Mycotic aneurysm	100.2 (29.2-343.7)	<0.001
Other symptomatic systemic embolism	14.1 (5.1-38.9)	<0.001



The multidisciplinary endocarditis team



Endocarditis with Embolic Stroke

- Clinical assessment
- Immediate Cerebral CT scan / MRI
- TTE / TEE

- Refer the patient to a reference center

**Immediate discussion
within the endocarditis team***

No theoretical indication for surgery**

Theoretical indication for surgery**

**Conservative treatment and monitoring
Delayed (> 4 weeks) surgery when indicated**

Yes

- Intracranial haemorrhage
- Coma
- Severe comorbidities
- Stroke with severe damage

No

Urgent surgery

* Includes cardiac surgeon, cardiologist, specialist of infectious diseases, neurologist, neuro-surgeons, and interventional neuroradiologists

** Heart failure, Uncontrolled infection, Abscess, High embolic risk

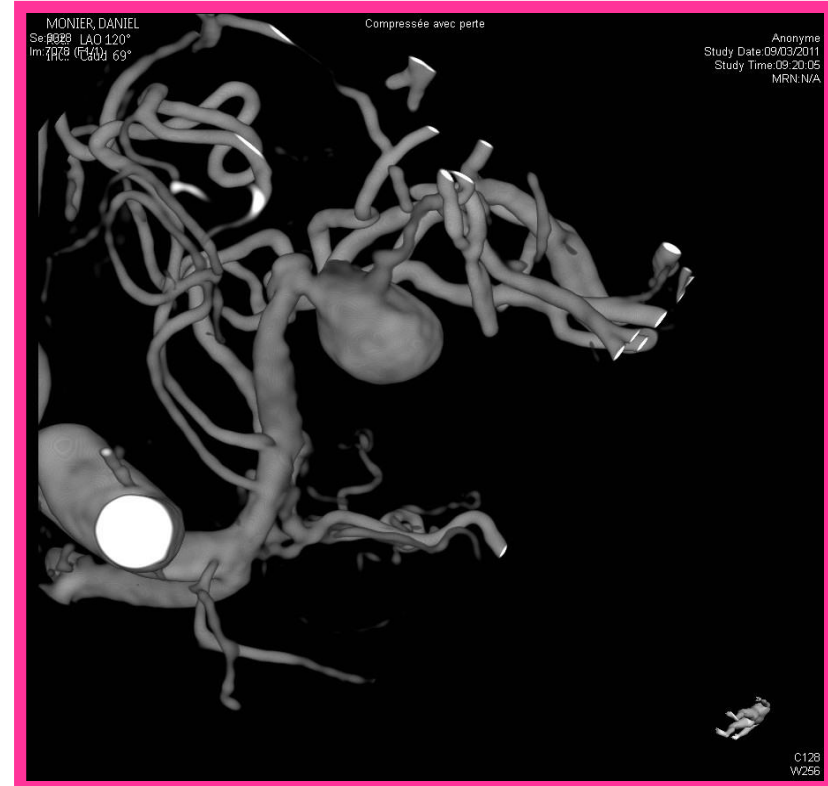
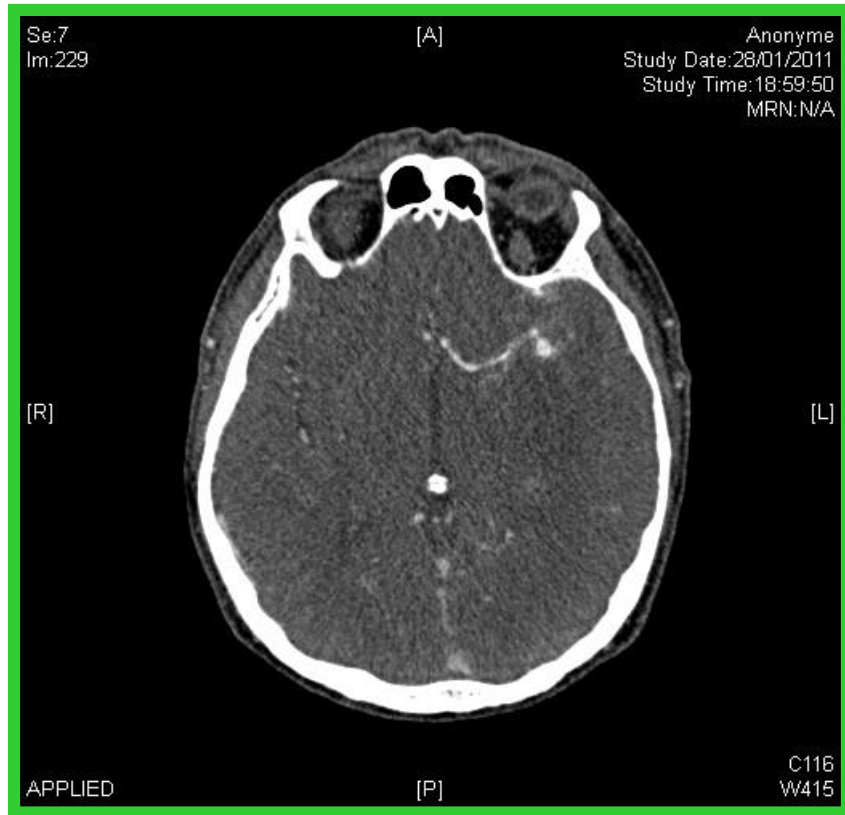
Diagnosis Algorithm of Neurological Complications in Patients with Left-Sided Valve Infective Endocarditis

Yanagawa B, GB, Pettersson GB, Habib G, Ruel M, Saposnik G, Latter DA, Verma S – Circulation 2017

Table 3. Current Endocarditis Management Guidelines

Guideline	Year	Timing of Surgery		
		Silent Embolism/TIA	Ischemic Stroke	Hemorrhagic Stroke
AHA	2015	No delay (class IIb; LOE B)	No delay if neurological damage is not severe (class IIb; LOE B) At least 4 wk for major ischemic stroke (class IIa; LOE B)	At least 4 wk (class IIa; LOE B)
ESC	2015	No delay (class I; LOE B)	No delay for heart failure, uncontrolled infection, abscess, persistent high embolic risk in absence of coma (class IIa; LOE B)	>1 mo (class IIa; LOE B)
STS	2011	-	Delay of <4 wk for cardiac dysfunction, recurrent stroke or systemic embolism or uncontrolled infection despite adequate antibiotic therapy (class IIb; LOE C) At least 4 wk from the stroke, if possible, for major ischemic stroke (class IIa, LOE C)	At least 4 wk from the stroke, if possible (class IIa, LOE C)

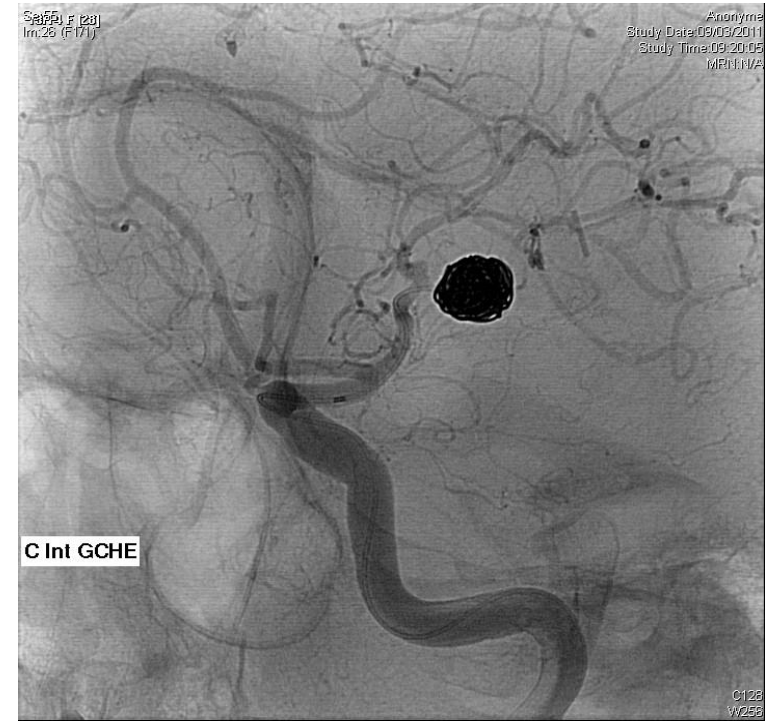
Mycotic aneurysm



Mycotic aneurysm



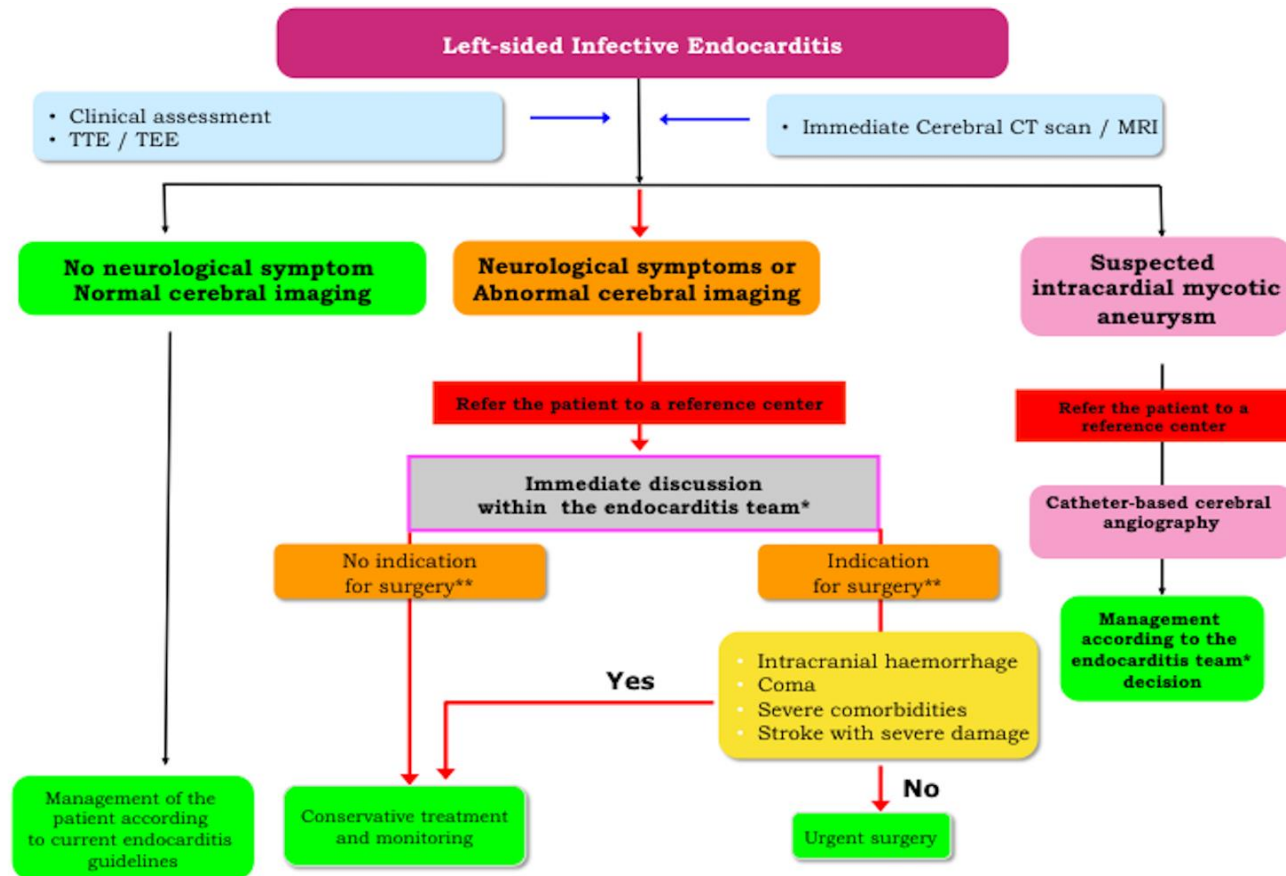
Basal



After coil exclusion

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Salaun E, Pizzi M, Erba P, Tornos P, Lancellotti P, Habib G - Submitted to Circulation



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** Heart failure, Uncontrolled infection, Abscess, High embolic risk

Case report: aortic bioprosthetic IE

Follow-up

- ✦ no clinical deterioration
- ✦ partial regression of haemorrhage on contre MRI

Cardiac Surgery on day 30

- ✦ small vegetation, no typical abscess
- ✦ aortic valve replacement by a bioprosthesis
- ✦ uneventfull outcome