Intérêts et indications de l'imagerie systématique dans la prise en charge de l'endocardite infectieuse

Xavier Duval

Hôpital Bichat Claude Bernard, Paris

Infective endocarditis

- Rare disease : 30 cas / 10^6 inhabitants : 1500 cases
- Difficult diagnosis
- Poor prognosis
  - Mortality 20% in-hospital; 40% at 5 years
- High Morbidity : surgery 50 %
  50% unemployed

- **Improvement of prognosis ?**
- **Role of IMAGING ?**

Systematic imaging ?

- No randomised clinical trial
- What sort of imaging ?
- Which region to explore ?

- What is the impact ?
- What could be the indications ?

European Heart Journal (2009) **30**, 2369–2413
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453 consecutive definite IE patients; 2 French referral centers; January 1990 to March 2005

Systematic Cerebral CT

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Systematic Cerebral CT

Cerebrovascular Complications

n=109 24%

Thuny F et al. Eur Heart J. 2007

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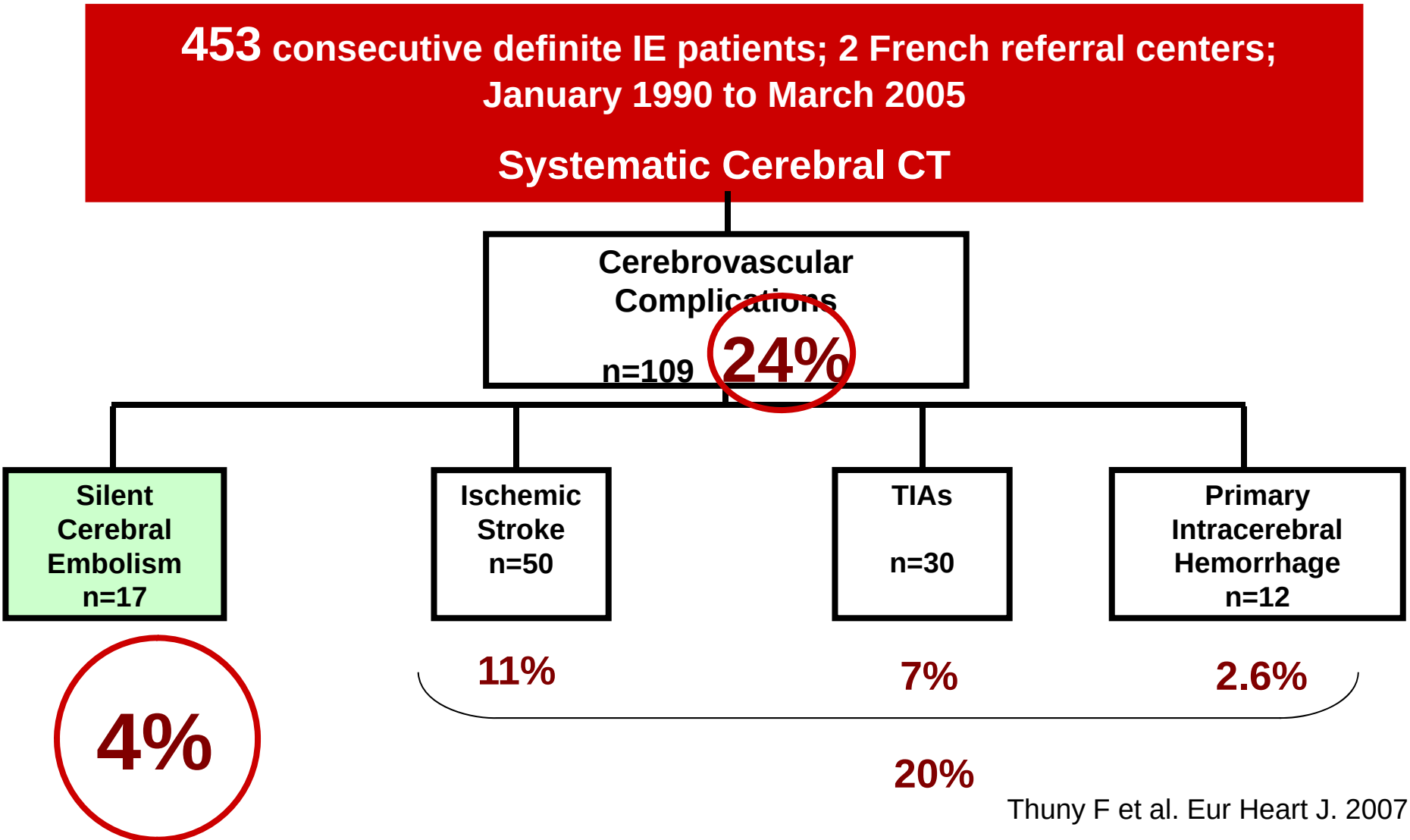

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(June 2005-Sept 2008)

with systematic cerebral MRI with MRangiography

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Neurological Complications
n=106
82%

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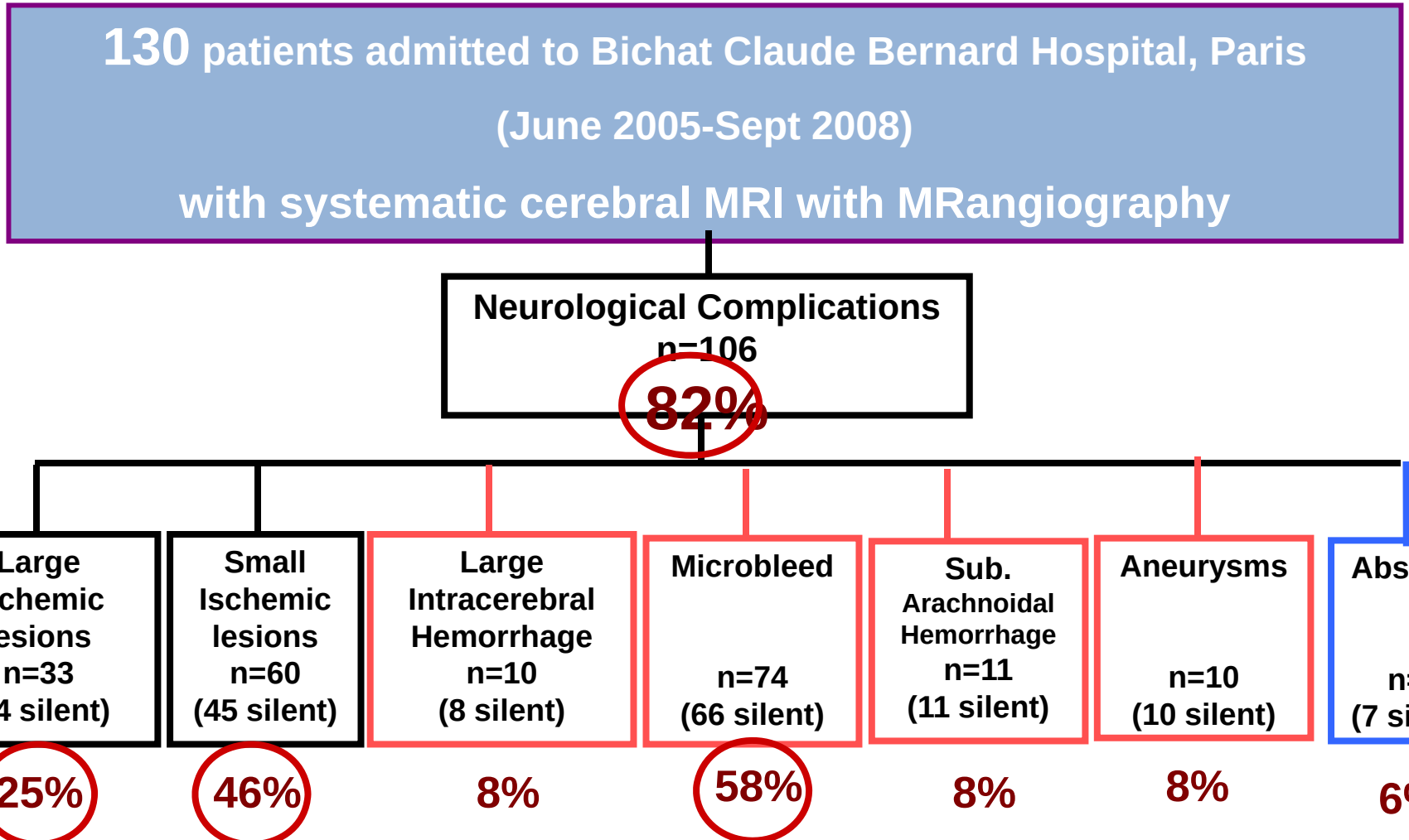

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IMAGE diagnosis impact

	EI Diagnosis BEFORE MRI		
	Definite n=77	Possible n=50	Exclude n=3
Diagnosis AFTER MRI			
Definite n=91	77		
Possible n=39		39	
Exclude n=0			3

Diagnosis modification in 17 / 53 non definite IE(25%)

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Definite n=91	77	14 ↑	
Possible n=39		36	3 ↑
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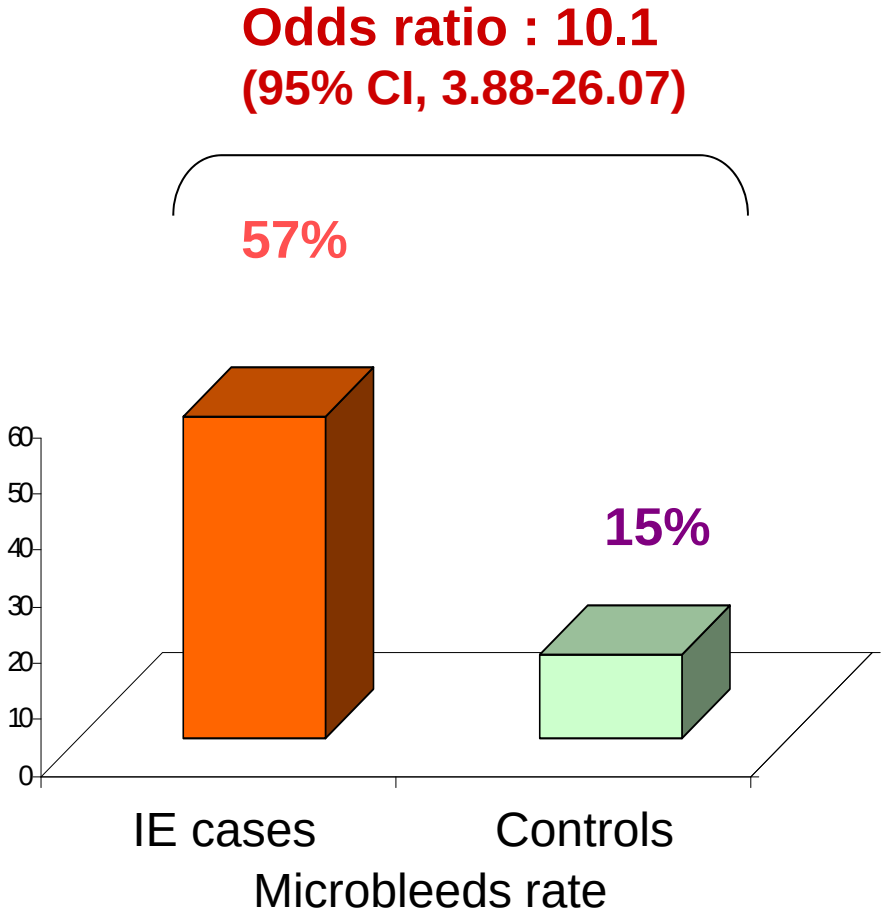
Microbleeds/IE IMAGE ancillary study

Case control study

- First 60 IE cases
- 120 sex- and age-matched controls without IE

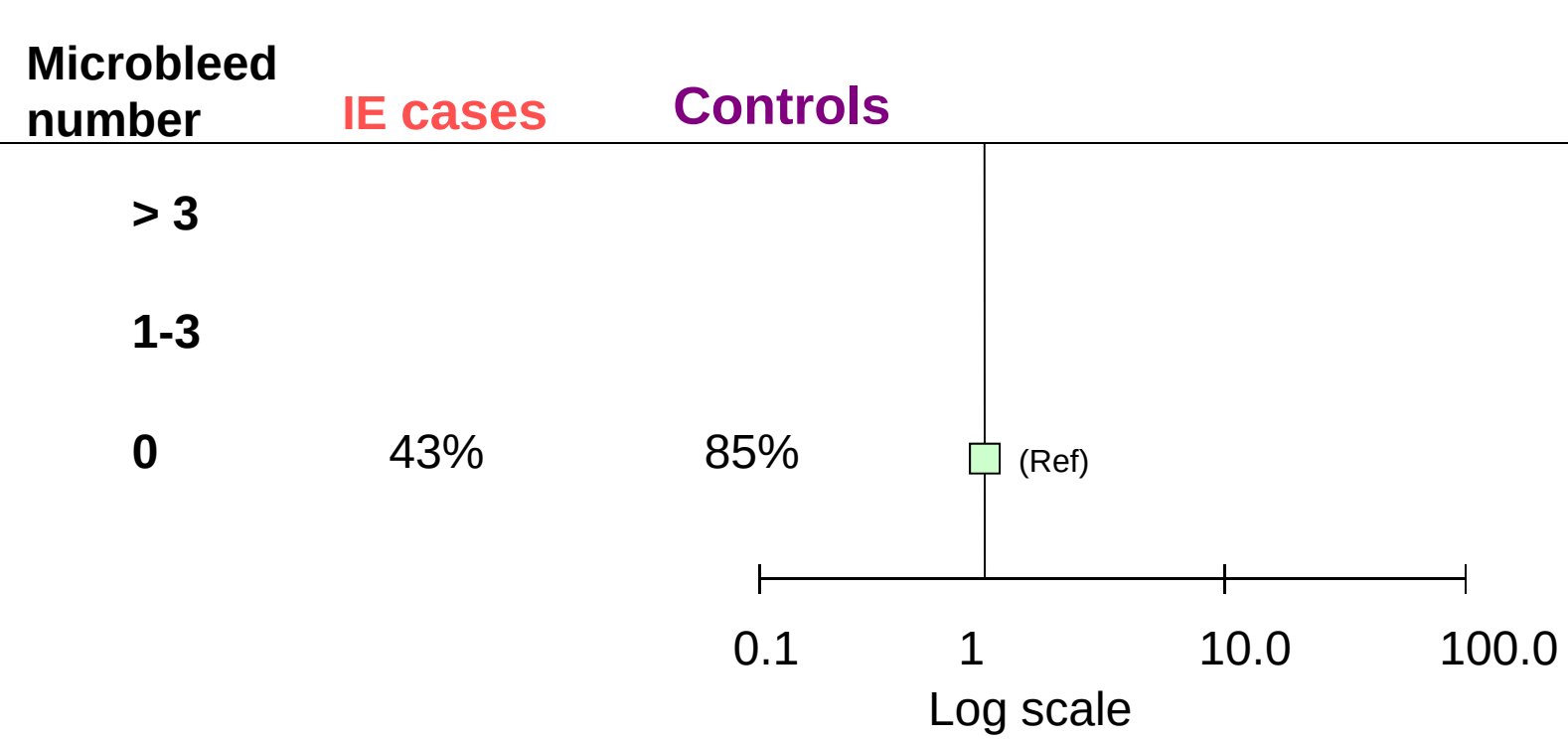
  (MRI performed for clinical reasons)
- 180 MRIs were read independently by two blinded neuroradiologists

  (kappa 0.933)



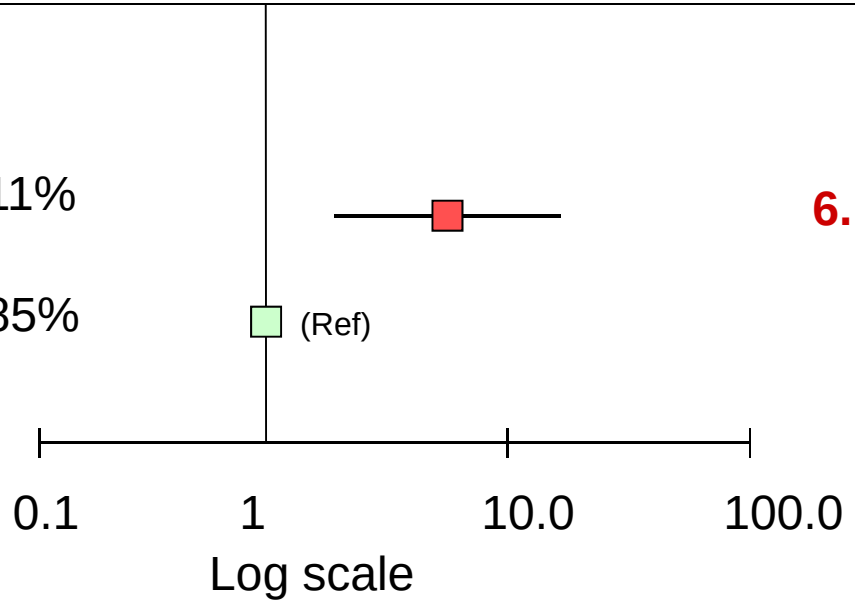
In IE pts, Microbleeds associated with *non-Streptococci* IE (67% vs. 38% p=0.033)

Microbleeds/IE IMAGE ancillary study



Microbleeds/IE IMAGE ancillary study

Microbleed number	IE cases	Controls	OR 95% CI
> 3			
1-3	25%	11%	6. 1 (2.1 – 18)
0	43%	85%	(Ref)



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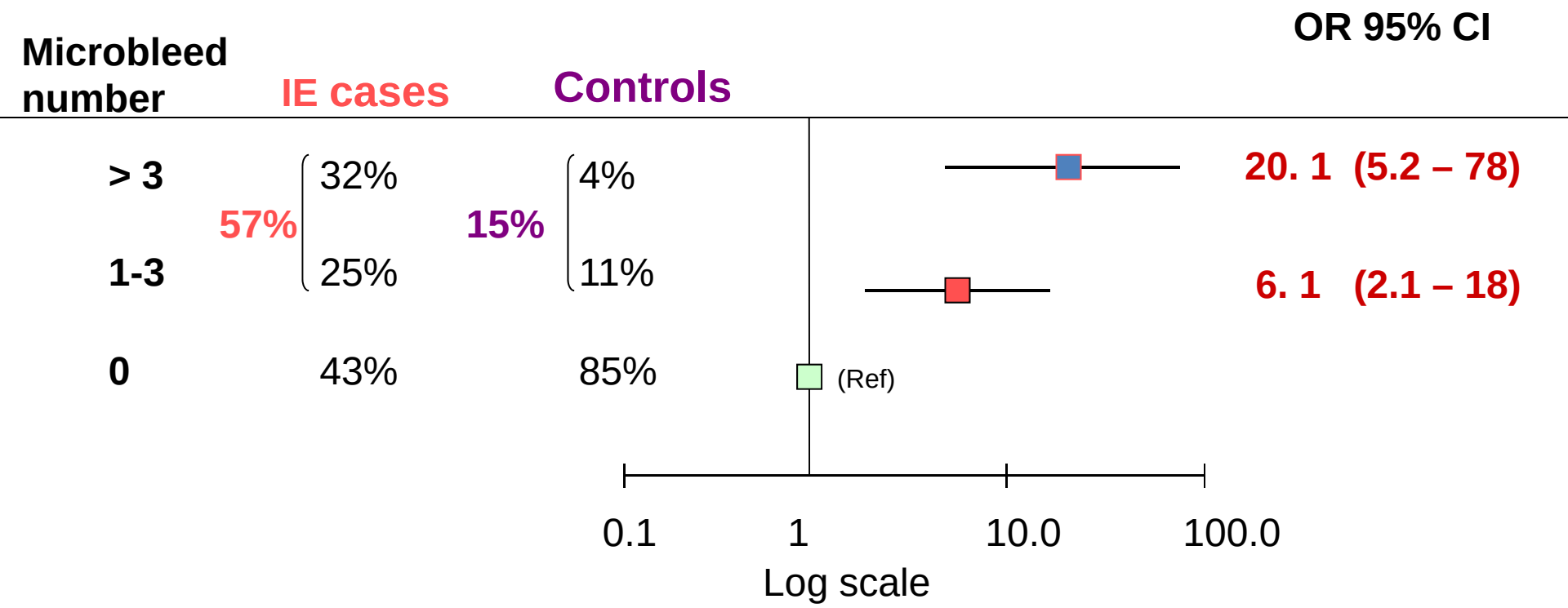

OR increase with the increase in the number of microbleeds suggesting a causal relationship

Abdominal MRI / cerebral MRI

- 58 pts; definite n = 29, possible n=27, excluded n=2

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- **cerebral MRI** : cerebral lesions in **47** patients **(81%)** (95% CI: 71-91)
  - ischemic lesions in 25
  - microbleeds in 32
  - silent aneurysms in 6

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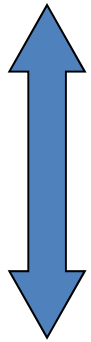
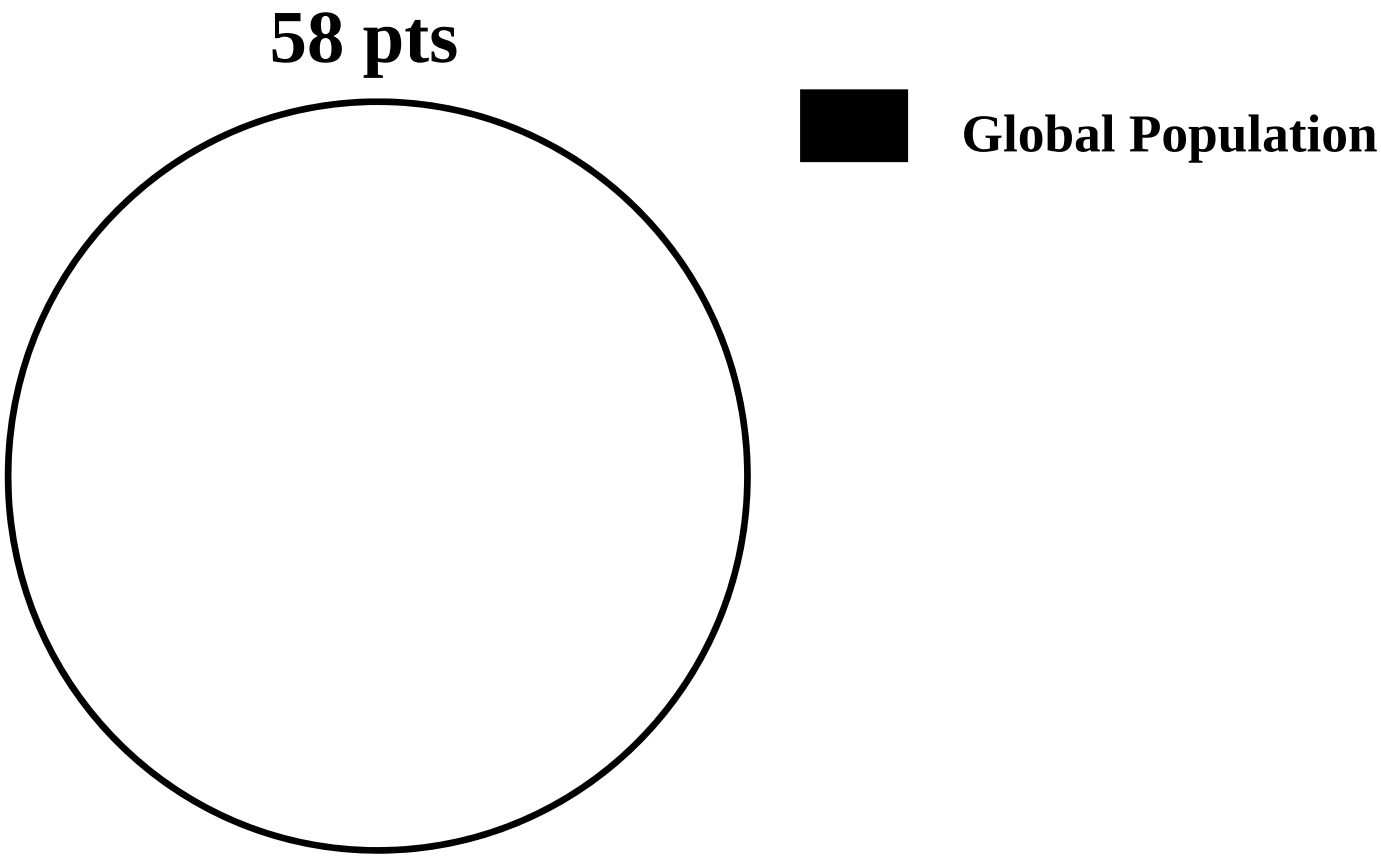


- **abdominal MRI :** abdominal lesions in **20** pts **(34%)** (95% CI: 22-46).

Abdominal MRI / cerebral MRI



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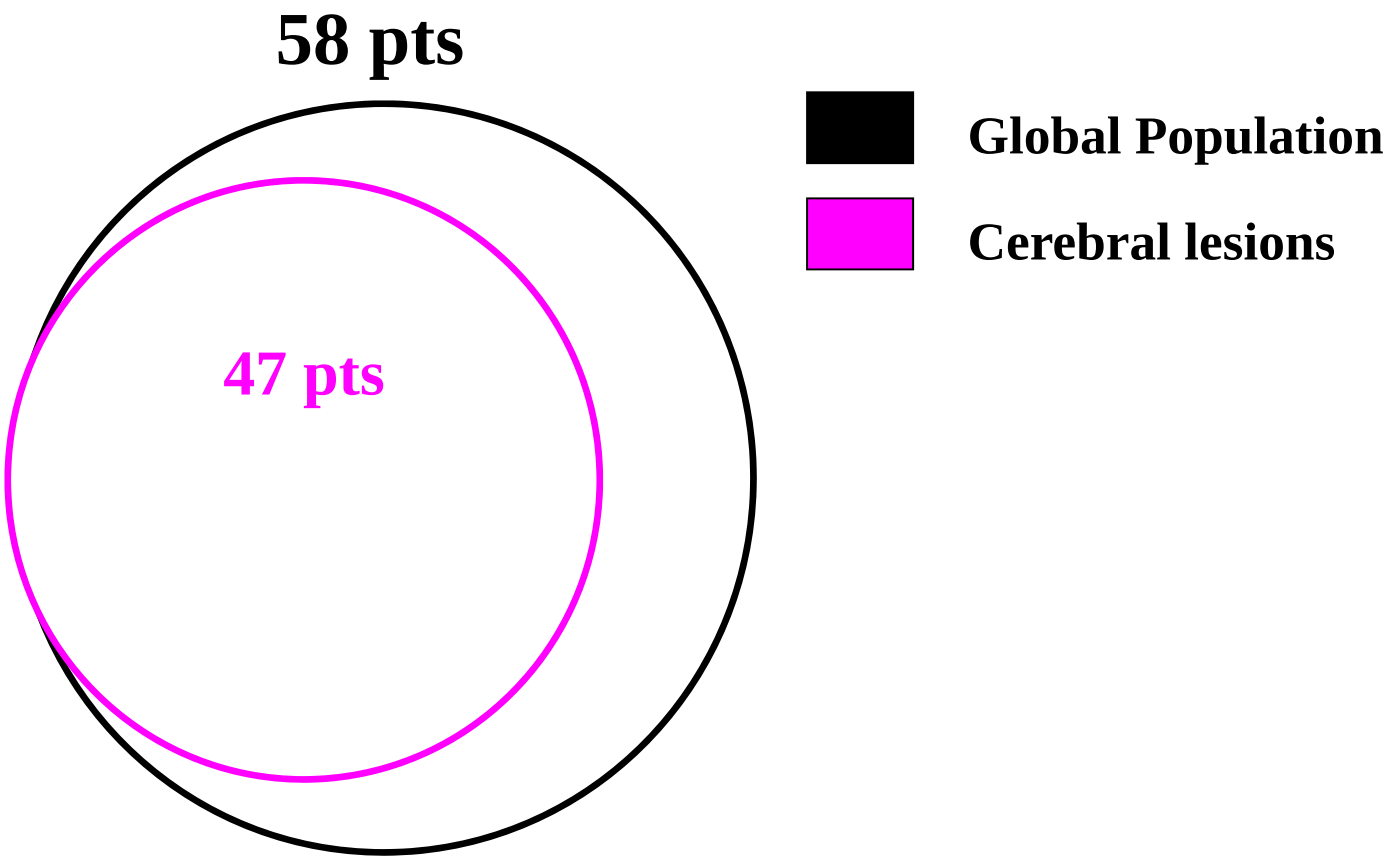

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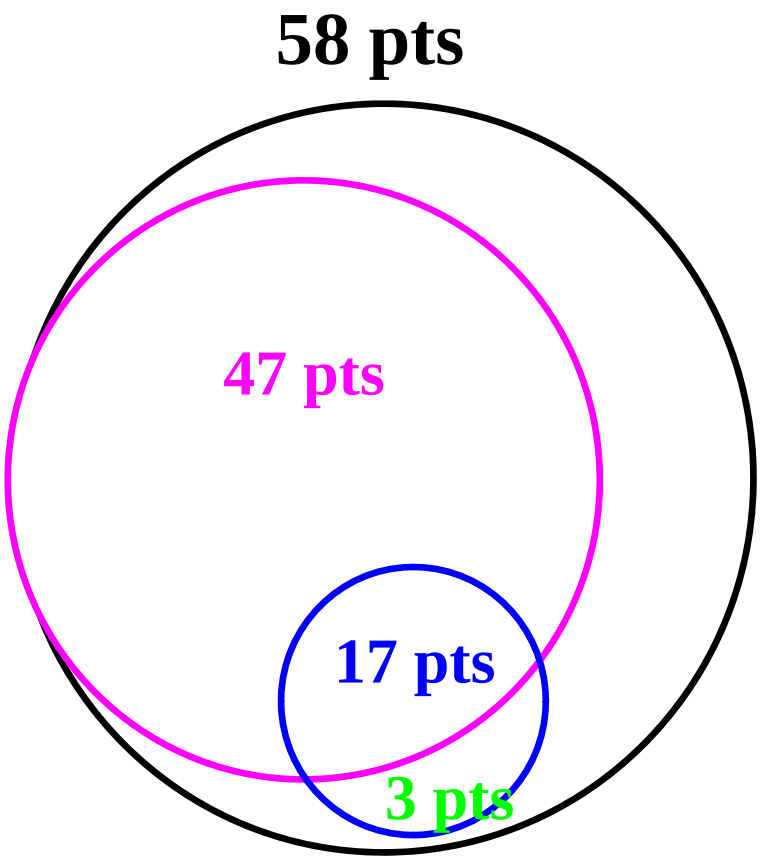


Global Population

Cerebral lesions

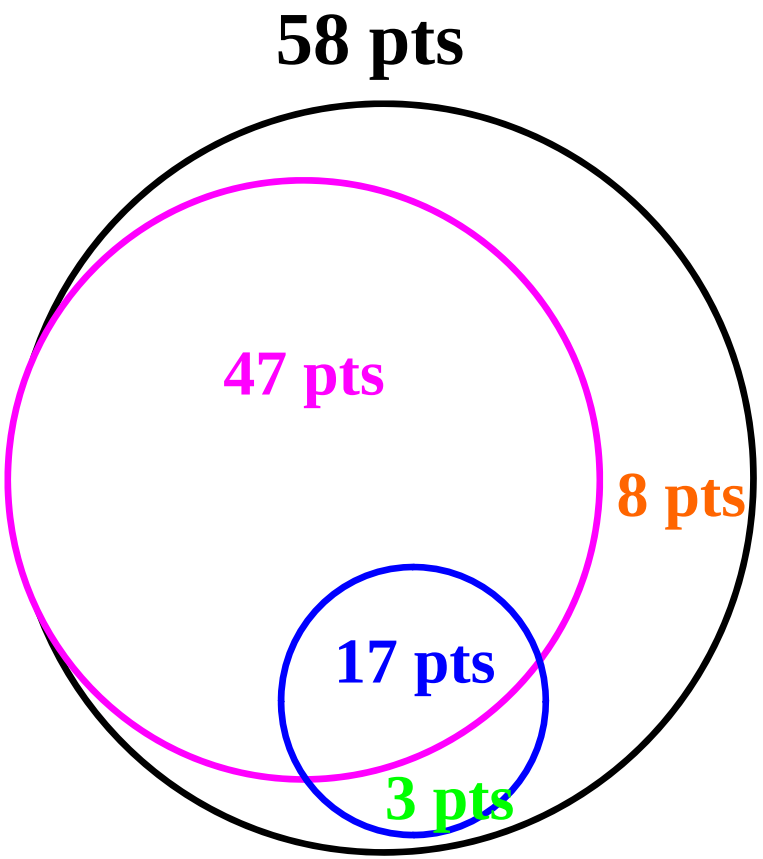
Cerebral and abdominal lesions

Isolated abdominal lesions

No lesion

86% of pts with cerebral and or abdominal lesions

Abdominal MRI / cerebral MRI



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Abdominal MRI / cerebral MRI diagnostic Impact

Duke Classification post MRI:

- Duke Classification Upgraded in 14 / 29 (48%) with non definite IE

Abdominal MRI / cerebral MRI diagnostic Impact

Duke Classification post MRI:

- Duke Classification Upgraded in **14 / 29 (48%)** with non definite IE

- **exclusively** due to **cerebral MRI** **in 10**
- Due to **cerebral MRI** or **abdominal** **in 4**
- **NEVER** exclusively due to abdominal MRI

IE with symptomatic cerebral complications: contribution of systematic cerebral MRI to disease staging and medical decision

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- **Additional impact of cerebral MRI ?**

IE with symptomatic cerebral complications: contribution of systematic cerebral MRI to disease staging and medical decision

- **30 patients with IE and NC**
- Explored by cerebral CT scan
- **Additional impact of cerebral MRI ?**
- Neurological symptoms:
  - Stroke n=18
  - Meningitis n= 5
  - Seizures: n=1
  - Confusion n=12

IE with symptomatic cerebral complications: contribution of systematic cerebral MRI to disease staging and medical decision

- MRI more sensible than TDM for the diagnosis of **symptomatic** lesions: **100%** vs **81%**

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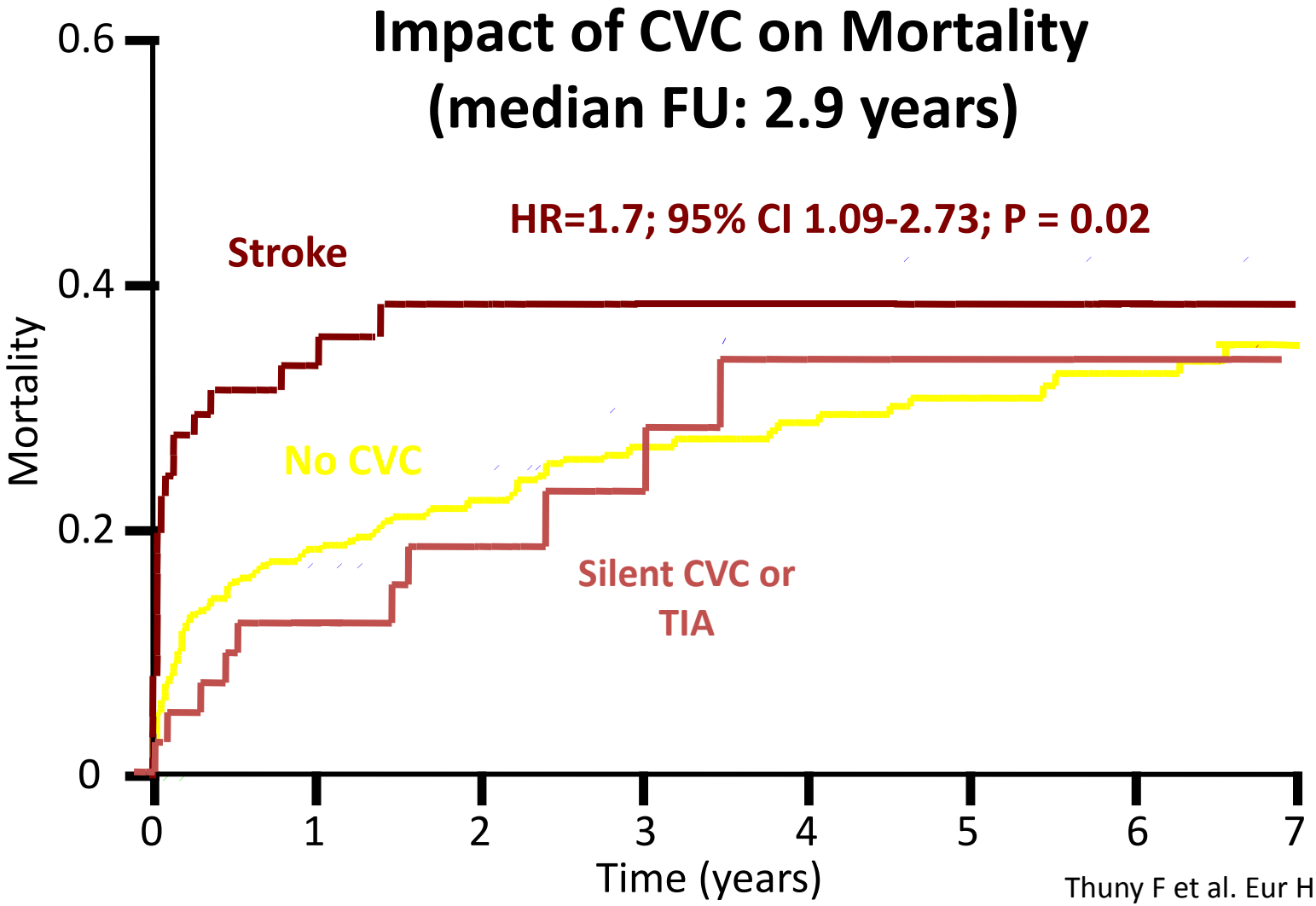

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Impact of silent complications detection on therapeutic plans?

Could have an impact in several ways:

- Silent ischemic stroke: consider surgery in case of large vegetation?
- Abscess: use of AB with high CNS diffusion?
- Hemorrhagic events:
  - Modify anticoagulation level ?
  - Modify surgery timing ?
  - Cancel surgery ?

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IMAGE therapeutic impact

- In 29/130 pts (**22%**): experts modified IE treatment plans based on MRI results

– Modification of anticoagulation level	n= 6
– Modification of antibiotics	n= 5
– Modification of surgery plan	n=18
– Embolisation of aneurysm	n = 4

Abdo MRI / Cerebral MRI therapeutic impact

- Modification of endocarditis therapeutic plans in **14 (28%)** of the 58 patients
- Including modification of surgical plans in **6** (10%)
- Based **solely on cerebral MRI**

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Overall

- Modification of classification and/or therapeutic plans in 27 (**47%;** 95% CI: 34-60) patients

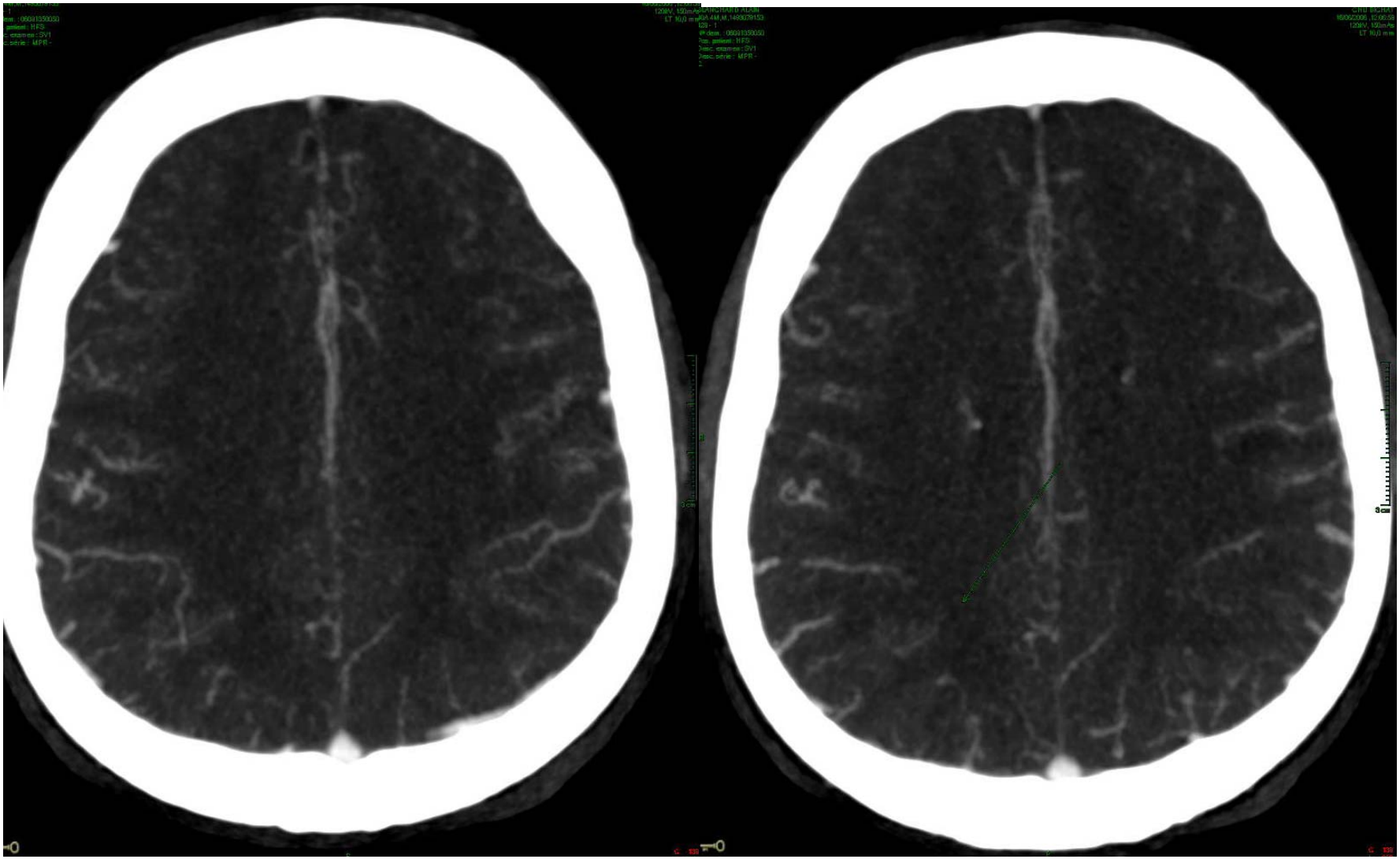
IE with symptomatic cerebral complications: contribution of systematic cerebral MRI to disease staging and medical decision

- MRI more sensible than TDM for the diagnosis of symptomatic lesions: **100%** vs **81%**
- MRI more sensible than TDM for the diagnosis of additional Asymptomatic lesions: **50%** vs **23%**
- Modification of cardiac surgical decision in **20%** of patients due to MRI
- **None of the 51% of the operated on pts died.**

Conclusions

- Systematic cerebral imaging: No recommendation
- Diagnosis impact (IE diagnosis and extension)
- Leads to
  - Find asymptomatic lesions
  - Modify therapeutic plan
  - Better evaluation of neurological risk
  - Increase cost, perfom unnecessary procedures?
- Pronostic impact unknown: RCT?

Angio-scanner Cérébral



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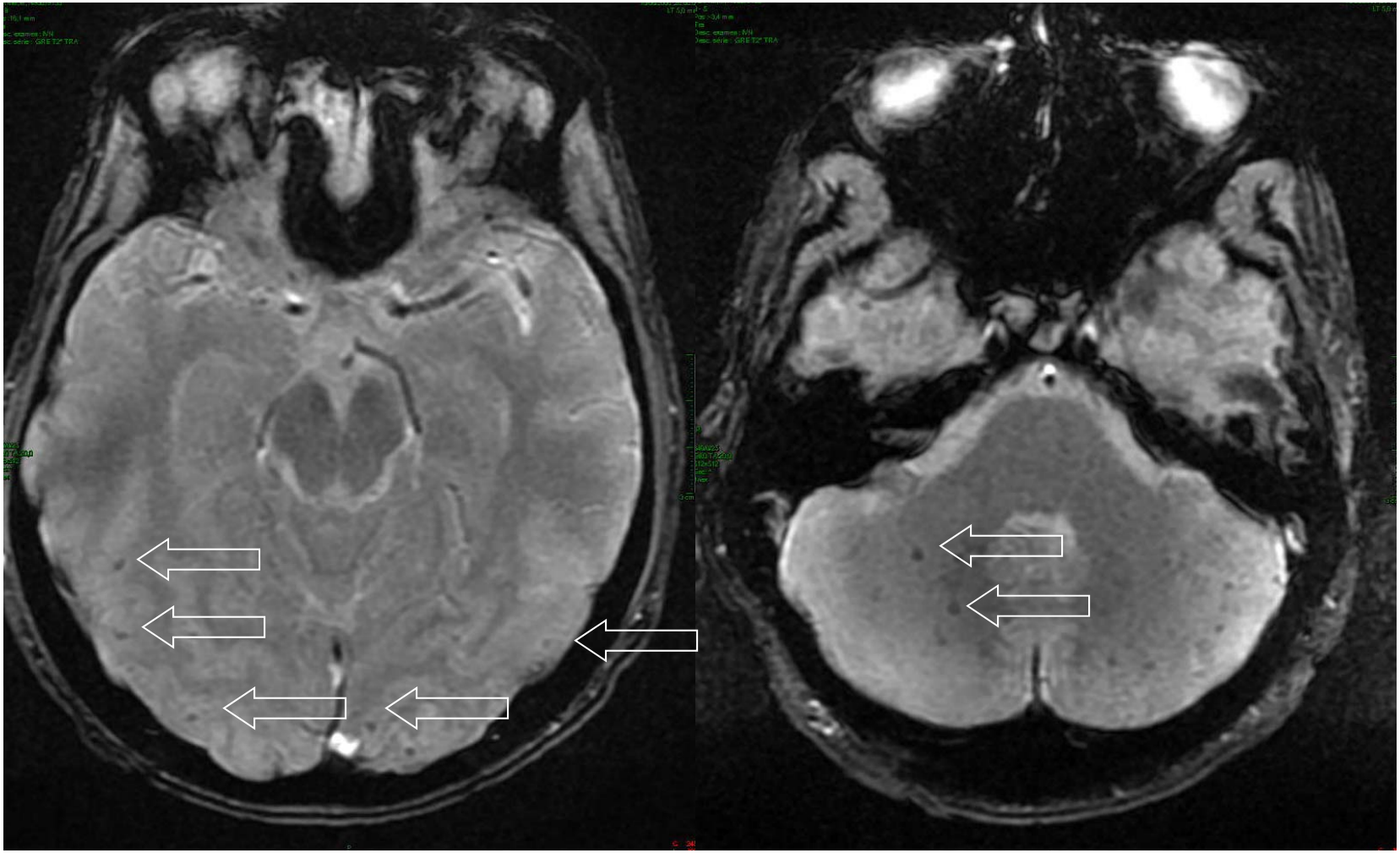

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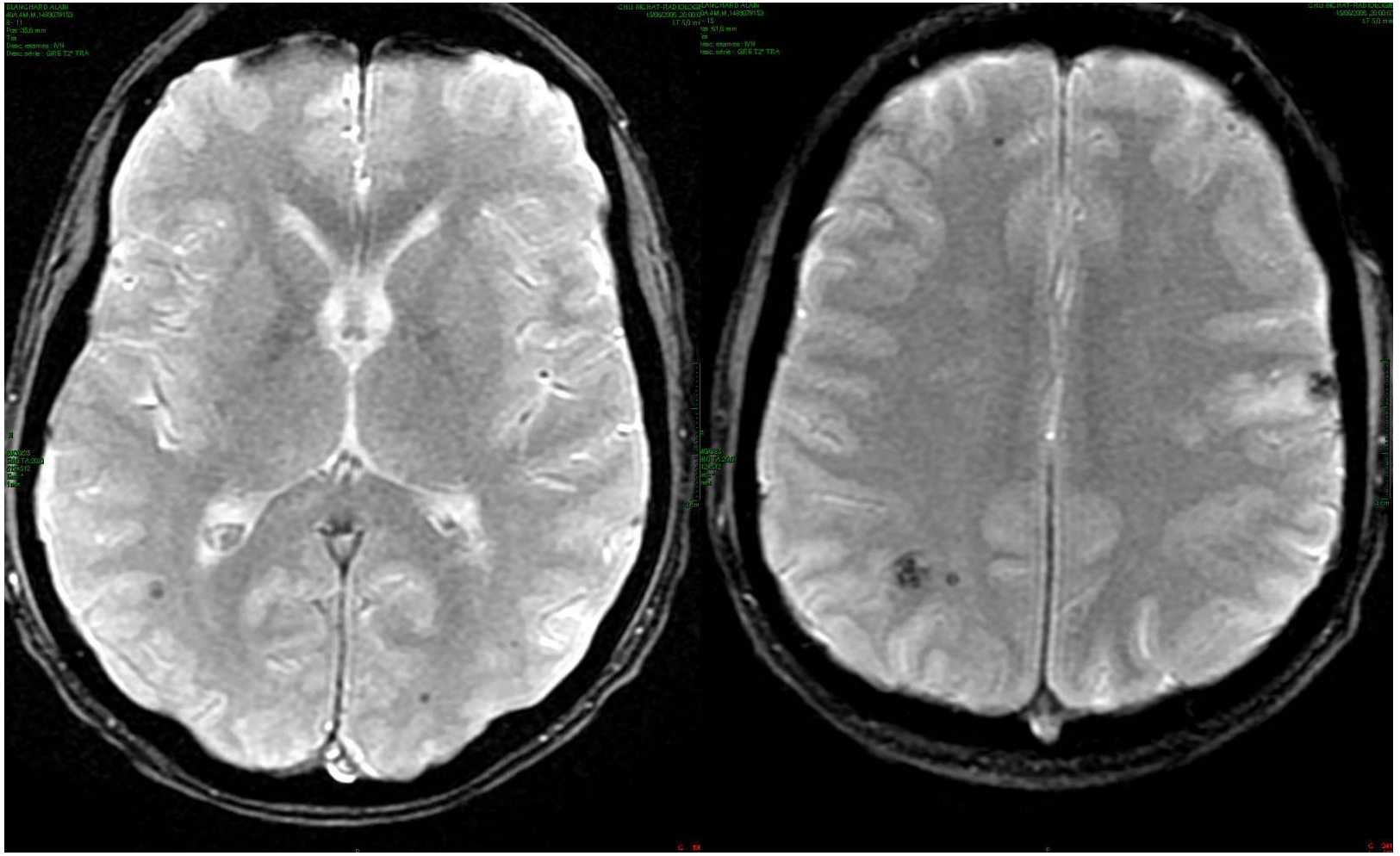

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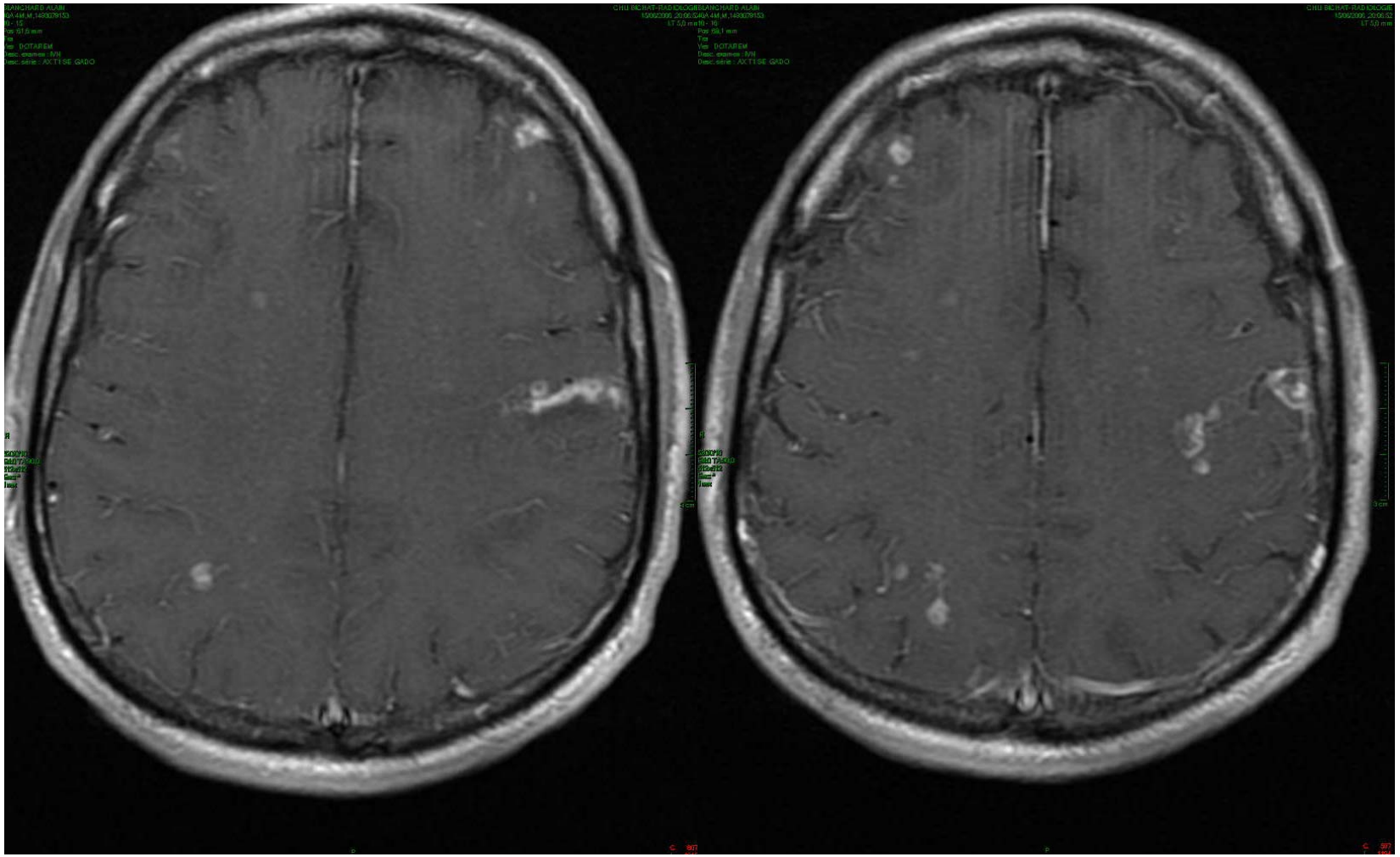

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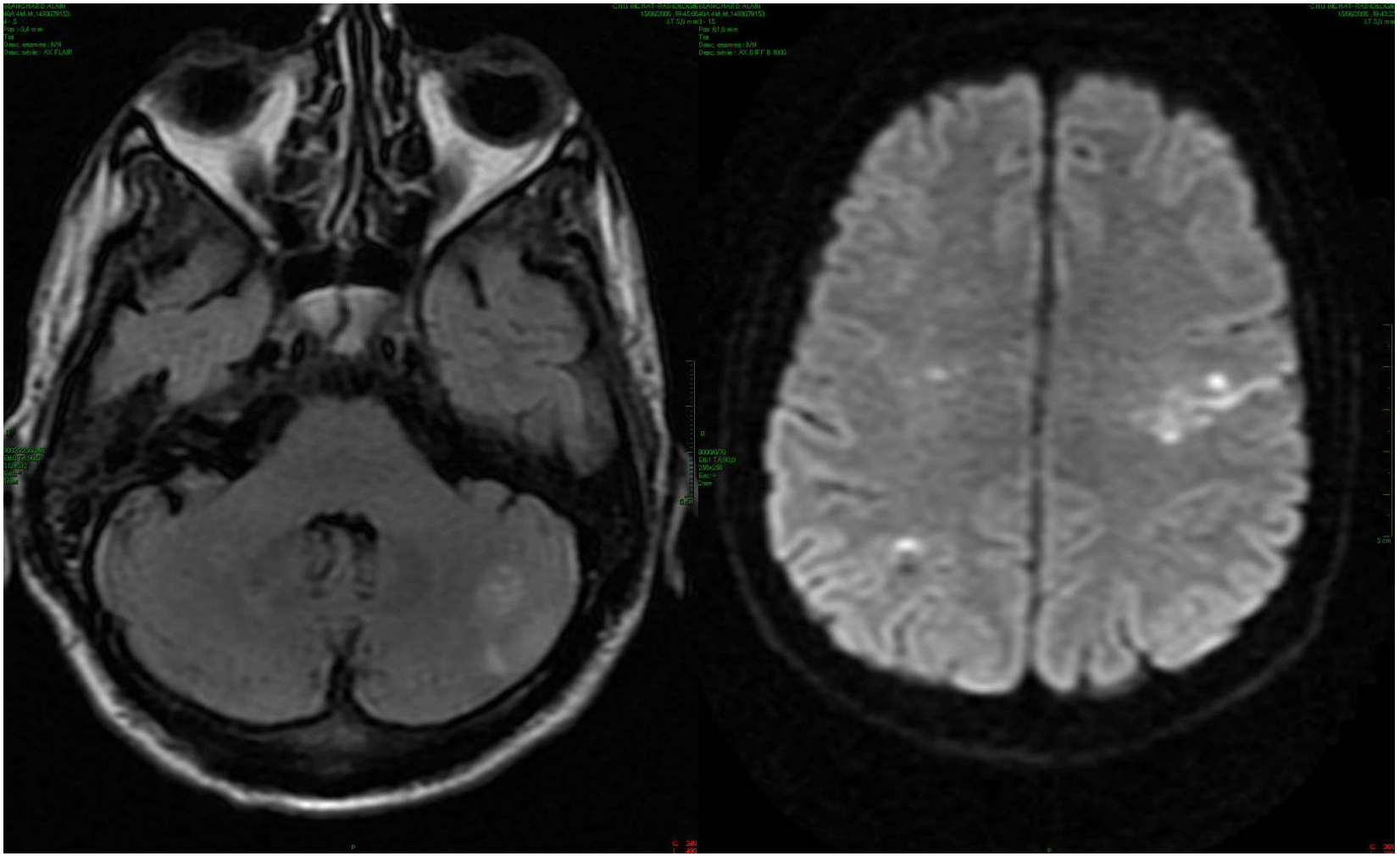

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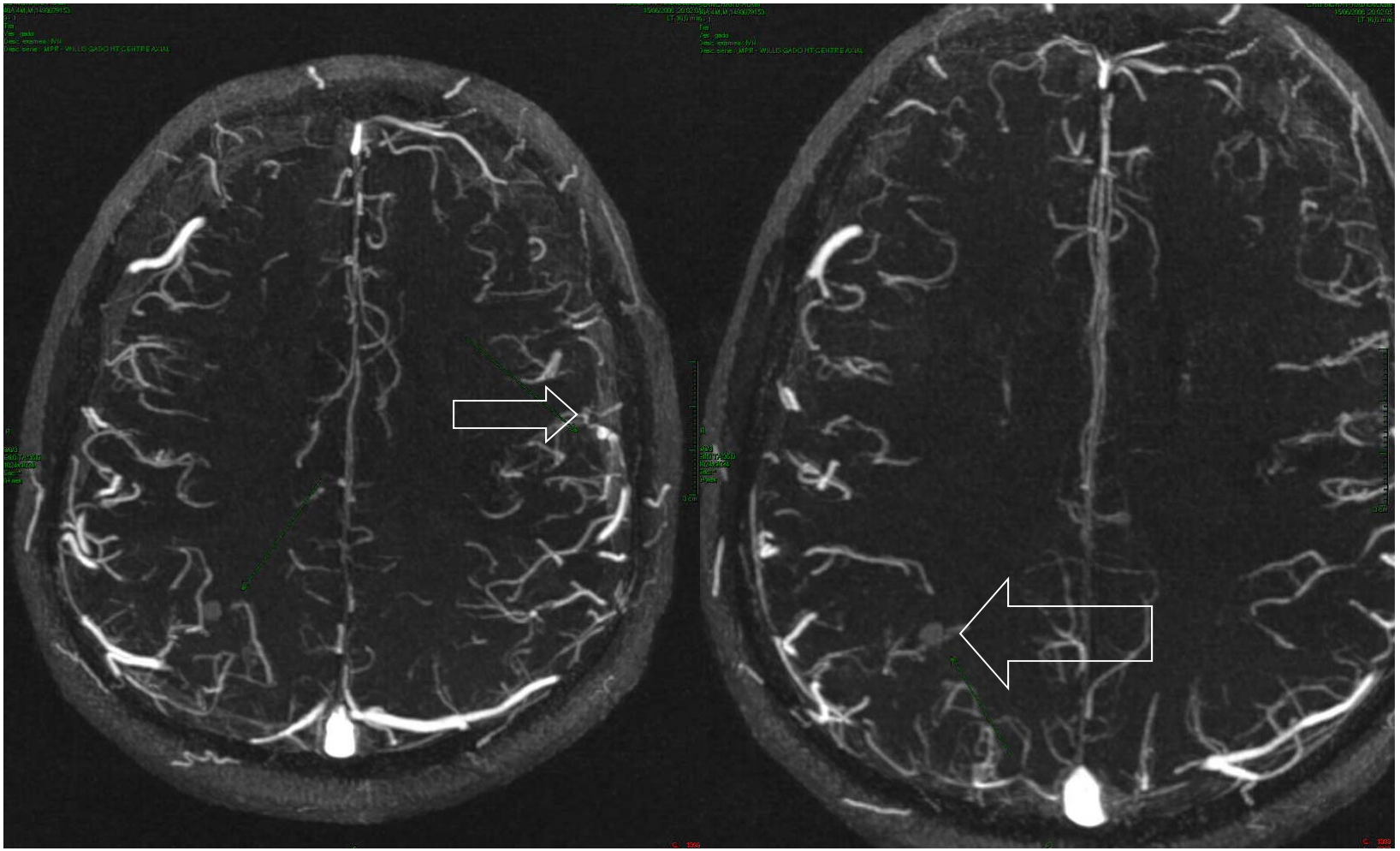

Diagnosis criteria

MAJOR CRITERIA

Blood cultures positive for IE:

- Typical microorganisms consistent with IE from two separate blood cultures:
  Viridans streptococci, *Streptococcus bovis*, HACEK group, *Staphylococcus aureus*; or
  Community-acquired enterococci, in the absence of a primary focus;

  or
- Microorganisms consistent with IE from persistently positive blood cultures:
  At least two positive blood cultures of blood samples drawn > 12 h apart; or
  All of three or a majority of ≥ 4 separate cultures of blood (with first and last sample drawn at least 1 h apart)

80-85 % hémocultures positives

60% critère majeur de Duke

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Evidence of endocardial involvement

- Echocardiography positive for IE
  Vegetation - Abscess - New partial dehiscence of prosthetic valve
- New valvular regurgitation

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MINOR CRITERIA

- Predisposition: predisposing heart condition, injection drug use
- Fever: temperature > 38°C
- Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhages, conjunctival haemorrhages, Janeway lesions
- Immunologic phenomena: glomerulonephritis, Osler's nodes, Roth's spots, rheumatoid factor
- Microbiological evidence: positive blood culture but does not meet a major criterion or serological evidence of active infection with organism consistent with IE

30-40% des cas

Diagnosis of IE is definite in the presence of	Diagnosis of IE is possible in the presence of
2 major criteria, or *1 major and 3 minor criteria, or* *5 minor criteria*	*1 major and 1 minor criteria, or* *3 minor criteria*

Vascular phenomena (emboli, aneurysm, infarcts)