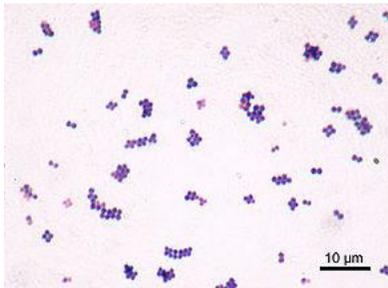


Endocardite infectieuse grave à *Staphylococcus aureus*

David Lebeaux, Matthieu Revest



DES Maladies Infectieuses et Tropicales

3 octobre 2022



Cas clinique 2

- Patient de 42 ans, ATCD de bicuspidie
- Adressé pour fièvre (39°C) et AEG brutales depuis 48 heures
- A l'examen:
 - FC: 115/min, TA 130/50
 - FR 22/MIN, SpO2: 97% en AA
 - Souffle systolique diastolique
 - Auscultation pulmonaire normale
 - Douleur poignet droit depuis la veille
 - Eruption cutanée stable depuis la veille au soir, pas de syndrome méningé

Question 1

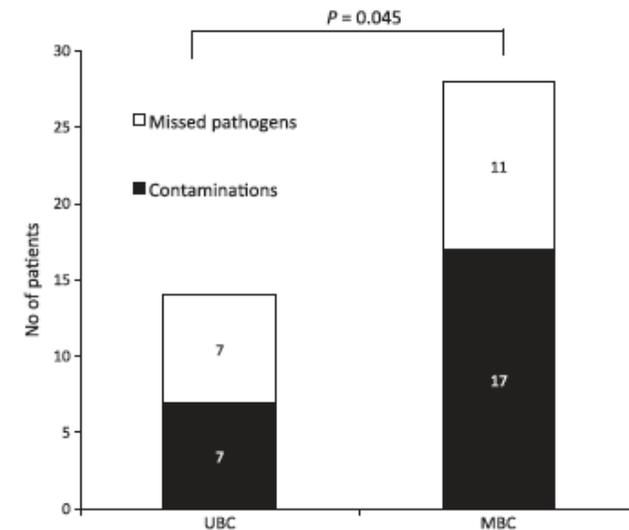
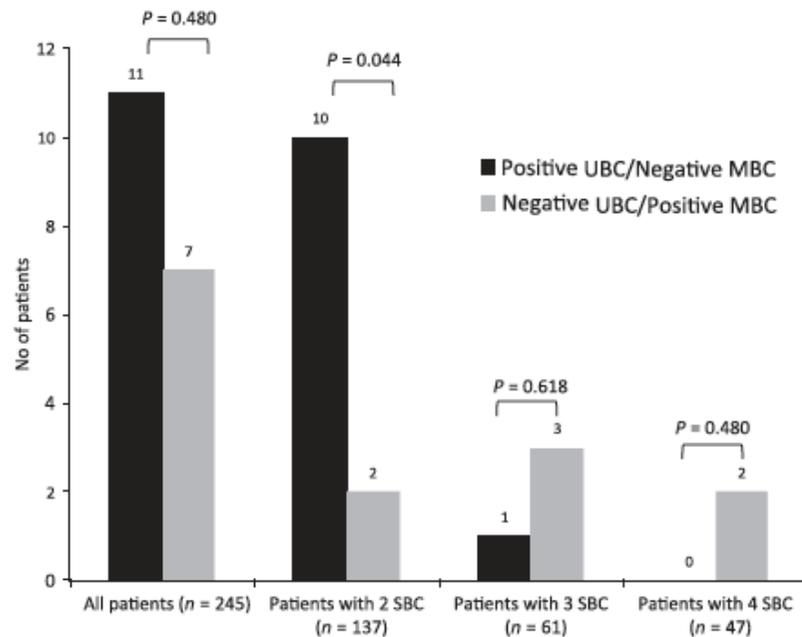
- **Quel bilan prescrivez-vous ?**

Hémocultures: comment optimiser le diagnostic ?

Unique blood culture for diagnosis of bloodstream infections in emergency departments: a prospective multicentre study

Clin Microbiol Infect 2014; 20: O920–O927

S. Dargère¹, J.-J. Parienti^{2,3}, E. Roupie⁴, P.-E. Gancel⁴, E. Wiel⁵, N. Smaiti⁵, C. Loiez⁶, L.-M. Joly⁷, L. Lemée⁸, M. Pestel-Caron⁸, D. du Cheyron⁹, R. Verdon¹, R. Leclercq^{3,10}, V. Cattoir^{3,10} and UBC study group^a



Protocole Uniendo en cours

Microbiologie des EI en France

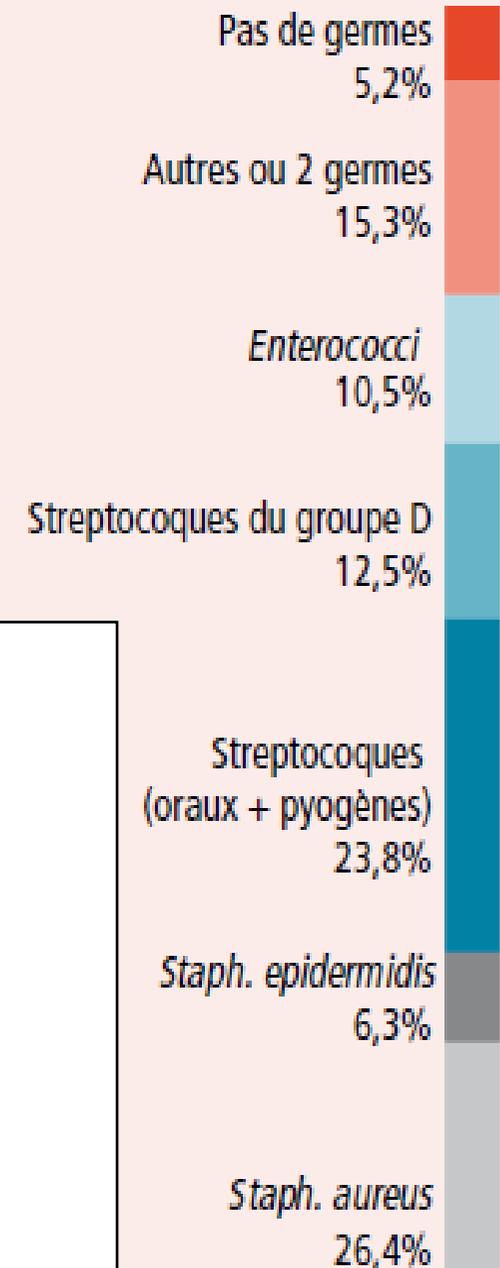
35% de staphylocoques

35% de streptocoques

10% d'entérocoques

15% 'autres' ou polymicrobiens

5% non documentées



Question 2

- **Vous suspectez une endocardite infectieuse**
 - **Débutez-vous une antibiothérapie ?**
1. **Oui**
 2. **Non**

Question 2

- Vous suspectez une endocardite infectieuse
- Débutez-vous une antibiothérapie ?
 1. Oui
 2. Non
- L'heure du débat !!!!

Question 3

- **Vous débutez un traitement antibiotique.**
 - **Lequel ?**
- 1. Amoxicilline + cloxacilline**
 - 2. Amoxicilline + cefazoline**
 - 3. Amoxicilline + cloxacilline + gentamicine**
 - 4. Amoxicilline + cefazoline + gentamicine**
 - 5. Vancomycine + gentamicine**

Question 3

- Vous débutez un traitement antibiotique.
- Lequel ?
 1. Amoxicilline + cloxacilline
 2. Amoxicilline + cefazoline
 - 3. Amoxicilline + cloxacilline + gentamicine selon reco ESC 2015**
 4. Amoxicilline + cefazoline + gentamicine
 5. Vancomycine + gentamicine

Question 3

- Vous débutez un traitement antibiotique.
- Lequel ?
 1. **Amoxicilline + cloxacilline**
 2. **Amoxicilline + cefazoline**
 3. Amoxicilline + cloxacilline + gentamicine
 4. Amoxicilline + cefazoline + gentamicine
 5. Vancomycine + gentamicine



European Heart Journal (2015) **36**, 3075–3123
doi:10.1093/eurheartj/ehv319

ESC GUIDELINES



2015 ESC Guidelines for the management of infective endocarditis

The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC)

Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM)

Comment optimiser le traitement antibiotique ?

Traitement empirique ?

ORIGINAL ARTICLE	INFECTIOUS DISEASES
Are all beta-lactams similarly effective in the treatment of methicillin-sensitive <i>Staphylococcus aureus</i> bacteraemia?	
M. Paul ^{1,2} , N. Zemer-Wassercug ¹ , O. Talker ¹ , Y. Lishtzinsky ¹ , B. Lev ³ , Z. Samra ^{3,2} , L. Leibovici ^{4,2} and J. Bishara ^{1,2}	

TABLE 2. Multivariable logistic regression analysis for 30-day mortality: empirical antibiotic treatment^a

Variable ^b	OR, 95% CI n = 541 patients, deaths = 202	p-value
Empirical antibiotic treatment		
Oxacillin/cefazolin	Reference	
Cefuroxime	1.98 (0.98–4.01)	0.058
Ceftriaxone/cefotaxime	2.24 (1.23–4.08)	0.008
Beta-lactam-beta-lactamase	2.68 (1.23–5.85)	0.013

Comparative Effectiveness of Beta-Lactams Versus Vancomycin for Treatment of Methicillin-Susceptible *Staphylococcus aureus* Bloodstream Infections Among 122 Hospitals

Clinical Infectious Diseases[®] 2015;61(3):361–7

Jennifer S. McDanel,^{1,2,3} Eli N. Perencevich,^{1,2,3} Daniel J. Diekema,^{2,4,5} Loreen A. Herwaldt,^{1,2,5} Tara C. Smith,^{1,4} Elizabeth A. Chrischilles,¹ Jeffrey D. Dawson,⁶ Lan Jiang,³ Michihiko Goto,^{2,3} and Marin L. Schweizer^{1,2,3}

Table 1. Characteristics of Patients With Methicillin-Susceptible *Staphylococcus aureus* Bloodstream Infections Who Received Empiric Therapy With a Beta-Lactam Alone or Vancomycin Alone (N = 5784)

Characteristic	Patients Who Received Beta-Lactams ^a (N = 2659)	Patients Who Received Vancomycin ^a (N = 3125)	P Value
30-day mortality ^a	361 (14)	437 (14)	.654

En multivarié, mortalité si bétalactamines vs vanco en définitif:
HR: 0,65 (95% CI: 0,52-0,80)

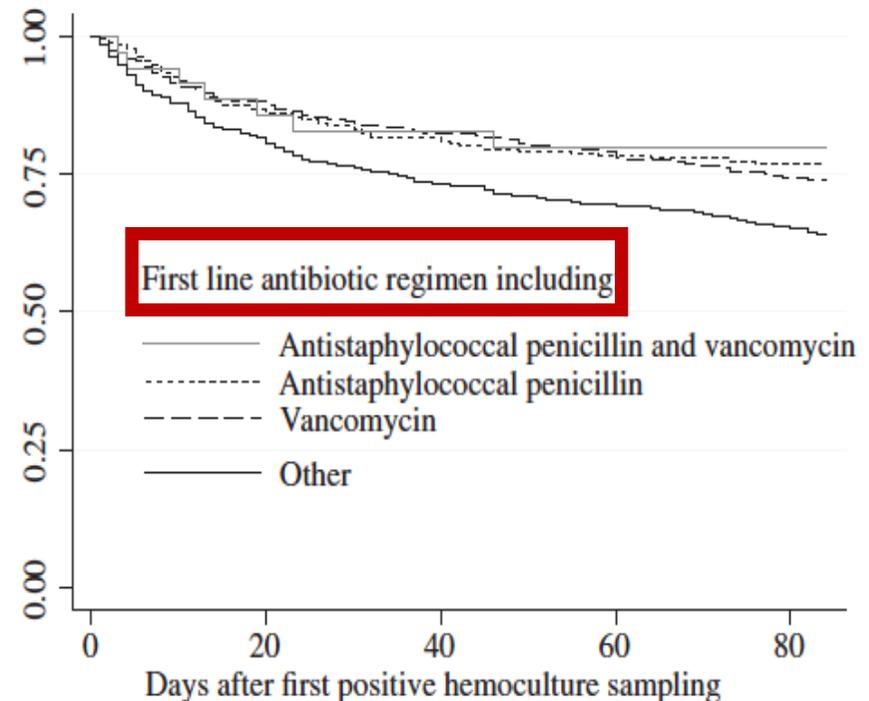
Factors associated with 12 week case-fatality in *Staphylococcus aureus* bacteraemia: a prospective cohort study

P. Braquet^{1,2,*}, F. Alla^{3,4,5}, C. Cornu^{6,7,8}, F. Goehringer⁹, L. Piroth¹⁰, C. Chirouze¹¹, M. Revest¹², C. Lechiche¹³, X. Duval^{14,15,16}, V. Le Moing^{1,2,*},
on behalf of the VIRSTA-AEPEI study group

■ Cohorte VIRSTA



- Prospective, observationnelle
- France, 2009-2011
- 2091 bactériémies *S. aureus*
- Létalité**
 - 23% à S4
 - 34% à S12



Comment optimiser le traitement antibiotique ?

2015 ESC Guidelines for the management of infective endocarditis

European Heart Journal (2015) 36, 3075–3123

Table 20 Proposed antibiotic regimens for initial empirical treatment of infective endocarditis in acute severely ill patients (before pathogen identification)^a

Antibiotic	Dosage and route	Class ^b	Level ^c	Comments
Community-acquired native valves or late prosthetic valves (≥ 12 months post surgery) endocarditis				
Ampicillin with (Flu)cloxacillin or oxacillin with Gentamicin ^d	12 g/day i.v. in 4–6 doses 12 g/day i.v. in 4–6 doses 3 mg/kg/day i.v. or i.m. in 1 dose	IIa	C	Patients with BCNIE should be treated in consultation with an ID specialist.
Vancomycin ^d with Gentamicin ^d	30–60 mg/kg/day i.v. in 2–3 doses 3 mg/kg/day i.v. or i.m. in 1 dose	IIb	C	For penicillin-allergic patients

Endocardites infectieuses: les aminosides ?

- **Cf diaporama de David**
- **Cf traitement définitif (un peu plus loin)**

Question 4

- L'ETO montre une IA 4/4 avec doute sur abcès. Hémocs: SAMS
- Fièvre persistante, TA 130/45 et crépitants à l'auscultation pulmonaire
- Que faites-vous ?

Question 4

- L'ETO montre une IA 4/4 avec doute sur abcès. Hémocs: SAMS
 - Fièvre persistante, TA 130/45 et crépitants à l'auscultation pulmonaire
 - Que faites-vous ?
-
- Réponses attendues:
 - Cloxacilline ou cefazoline monothérapie
 - Chirurgie

2015 ESC Guidelines for the management of infective endocarditis

European Heart Journal (2015) 36, 3075–3123

Table 17 Antibiotic treatment of infective endocarditis due to *Staphylococcus* spp.

Antibiotic	Dosage and route	Duration (weeks)	Class ⁱ	Level ^j	Ref. ^k	Comments
Native valves						
Methicillin-susceptible staphylococci						
(Flu)cloxacillin or oxacillin	12 g/day i.v. in 4–6 doses	4–6	I	B	6,8, 128, 135, 136, 158	Gentamicin addition is not recommended because clinical benefit has not been demonstrated and there is increased renal toxicity
	Paediatric doses: ^g 200–300 mg/kg/day i.v. in 4–6 equally divided doses					

Traitement chirurgical des EI



Cf topo Pr Flecher

Chirurgie des EI du cœur gauche en France

- **397 patients avec EI cœur gauche (+/- droit)**
 - **181 (46%) opérés à la phase aiguë - Indications:**
 - insuf cardiaque, n=128 (71%) / seule indication, n=47 (26%)
 - risque embolie, n=97 (54%) / seule indication, n=22 (12%)
 - infectieuse, n=73 (40%) / seule indication, n=9 (5%)
 - **Délais moyens**
 - admission => chirurgie = 15 j \pm 13 (médiane 12 [5-22])

Cf topo Pr Flecher



**AEPEI: Association pour l'Etude et la
Prévention des Endocardites Infectieuses**



Traitement Chirurgical

Table 22 Indications and timing of surgery in left-sided valve infective endocarditis (native valve endocarditis and prosthetic valve endocarditis)

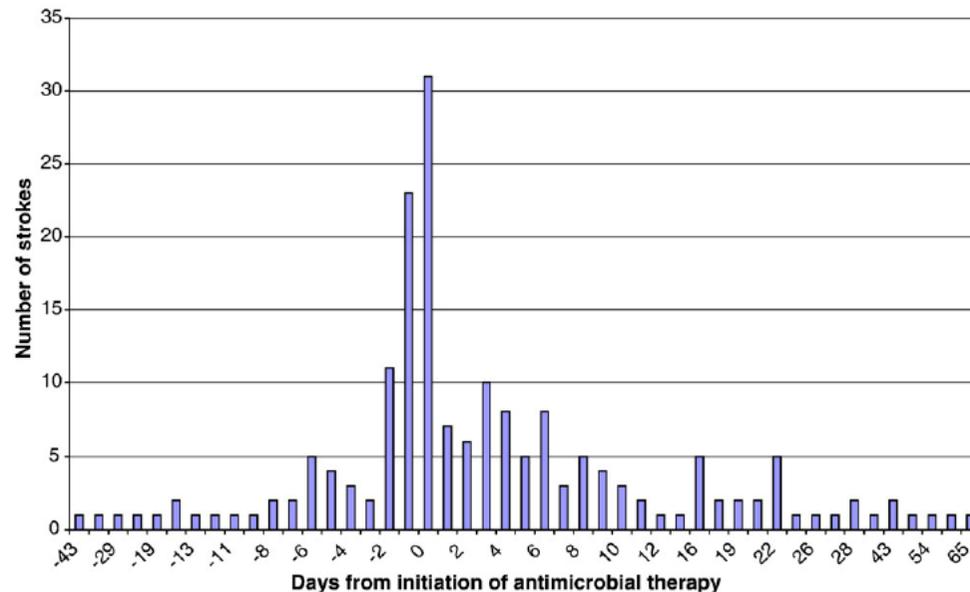
Indications for surgery	Timing ^a	Class ^b	Level ^c	Ref. ^d
1. Heart failure				
Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock	Emergency	I	B	111,115, 213,216
Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance	Urgent	I	B	37,115, 209,216, 220,221
2. Uncontrolled infection				
Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation)	Urgent	I	B	37,209, 216
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	123
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	9,58,72, 113,222
Aortic or mitral NVE with vegetations >10 mm, associated with severe valve stenosis or regurgitation, and low operative risk	Urgent	IIa	B	9
Aortic or mitral NVE or PVE with isolated very large vegetations (>30 mm)	Urgent	IIa	B	113
Aortic or mitral NVE or PVE with isolated large vegetations (>15 mm) and no other indication for surgery ^e	Urgent	IIb	C	

Comment optimiser la chirurgie ?

The relationship between the initiation of antimicrobial therapy and the incidence of stroke in infective endocarditis: An analysis from the ICE Prospective Cohort Study (ICE-PCS)

Am Heart J 2007;154:1086-94

Stuart A. Dickerman, MD, FACC,^a Elias Abrutyn, MD,^b Bruno Barsic, MD, PhD,^c Emilio Bouza, MD, PhD,^d



Daily incidence of stroke in ICE cohort.

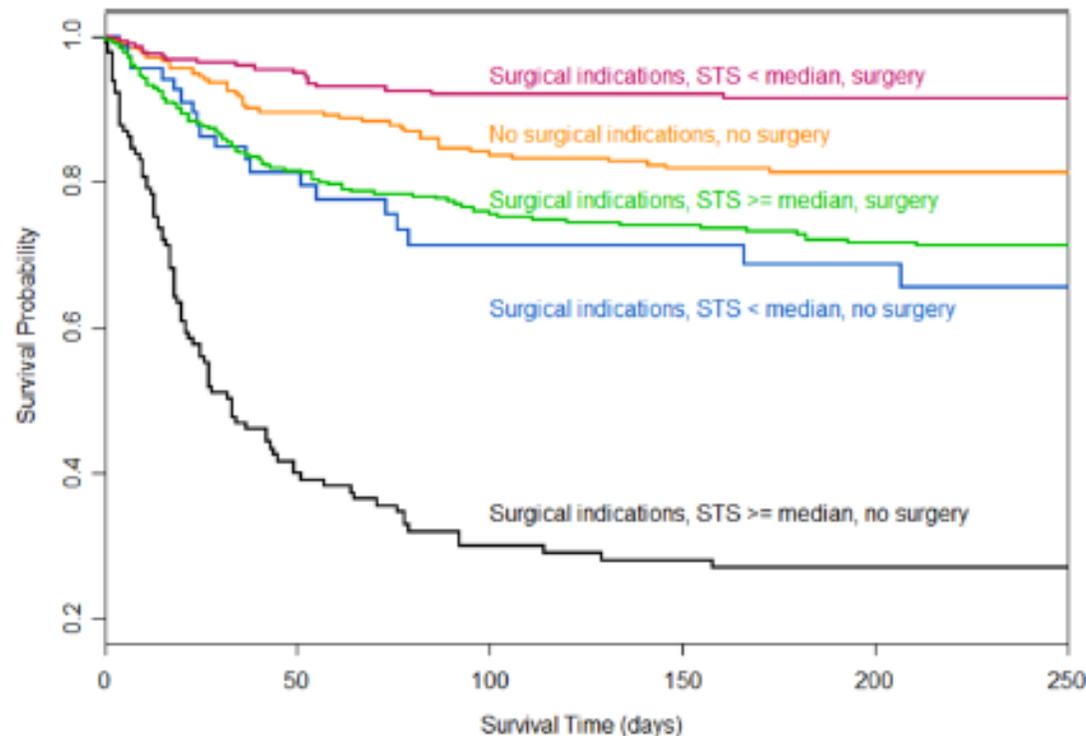
Cf topo Pr Flecher

Association Between Surgical Indications, Operative Risk, and Clinical Outcome in Infective Endocarditis

A Prospective Study From the International Collaboration on Endocarditis

Vivian H. Chu, MD, MHS; Lawrence P. Park, PhD; Eugene Athan, MD;

Circulation January 13, 2015



Determinants and consequences of positive valve culture when cardiac surgery is performed during the acute phase of infective endocarditis

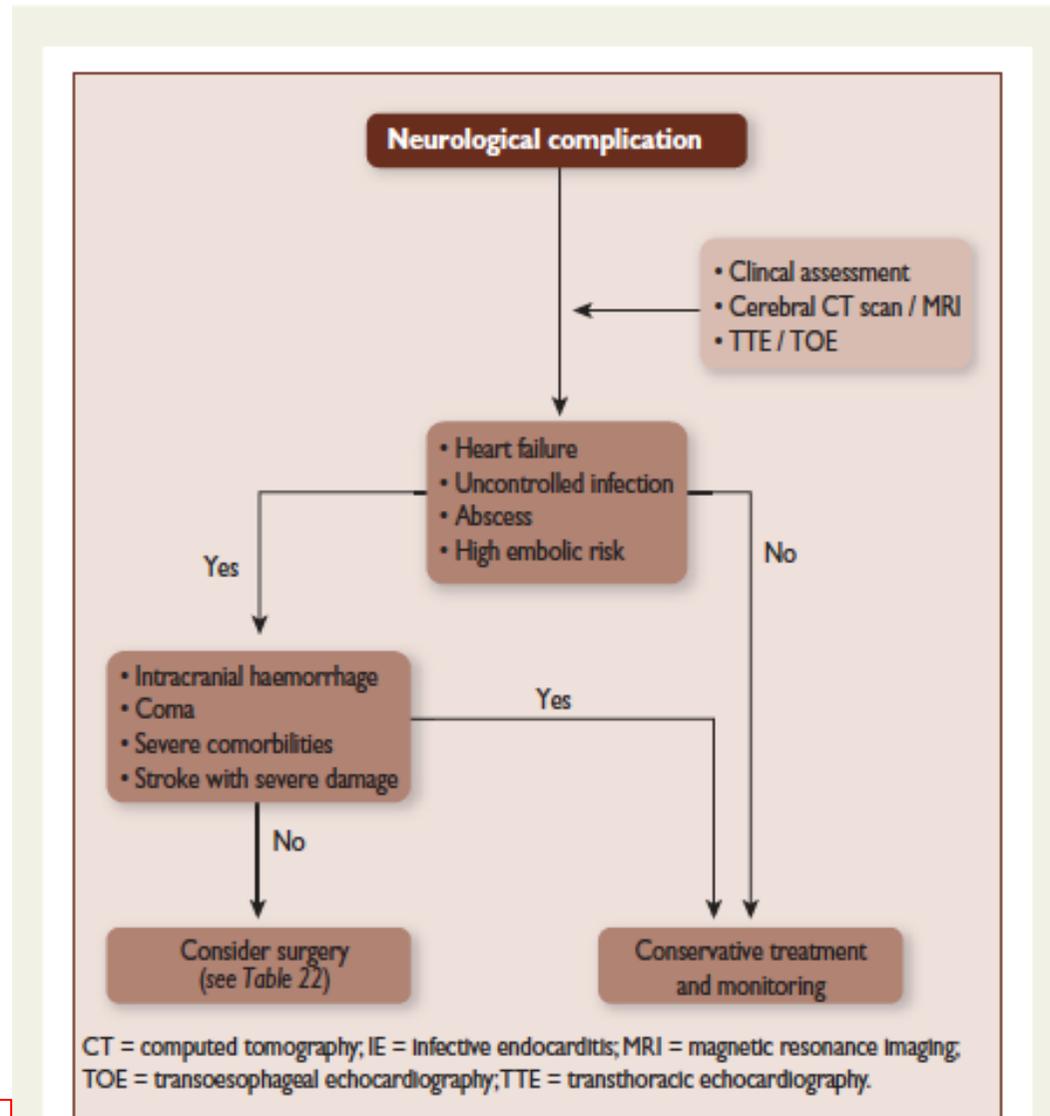
European Journal of Clinical Microbiology & Infectious Diseases 6 November 2019

P. Fillâtre¹ · A. Gacouin¹ · M. Revest¹ · A. Maamar¹ · S. Patrat-Delon¹ · E. Flécher² · O. Fouquet³ · N. Lerolle⁴ · J.-P. Verhoye² · Y. Le Tulzo¹ · Pierre Tattevin¹  · J.-M. Tadié¹

Table 3 Postoperative events in patients with positive and negative valve cultures

	Positive valve culture (<i>n</i> = 46)	Negative valve culture (<i>n</i> = 102)	<i>P</i>
Acute renal failure	32 (69.6%)	67 (65.7%)	0.783
Haemodialysis	16 (34.8%)	25 (24.5%)	0.274
Acute respiratory distress syndrome	17 (37.0%)	16 (15.7%)	0.008
Mechanical ventilation duration (days)	9 [1–20]	10 [1–24]	0.767
Inotropes/vasopressor duration (days)	1 [1–2]	1 [1–1]	0.249
Nosocomial infection	12 (26.1%)	28 (27.5%)	0.326
New cardiac surgery (all causes)	11 (23.9%)	24 (23.5%)	1.0
Intensive care unit length of stay (days)	6 [3–12]	7 [4–18]	0.439
In-hospital length of stay (days)	33 [18–46]	36 [22–52]	0.175
In-hospital mortality	14 (30.4%)	20 (19.6%)	0.278

Complications neurologiques / chirurgie



Question 5

- **Une chirurgie va être réalisée dans les 24 heures. Quel bilan préop ?**
 1. **Coronarographie**
 2. **IRM cérébrale**
 3. **Scanner cérébral**
 4. **Scanner thoracoabdominopelvien**
 5. **Tep scanner**

Question 5

- Une chirurgie va être réalisée dans les 24 heures. Quel bilan préop ?

1. **Coronarographie**
2. IRM cérébrale
3. **Scanner cérébral**
4. Scanner thoracoabdominopelvien
5. Tep scanner

2015 ESC Guidelines for the management of infective endocarditis

10.2.1 Coronary angiography

Coronary angiography is recommended according to the ESC Guidelines on the management of valvular heart disease⁵⁵ in men >40 years, in post-menopausal women and in patients with at least one cardiovascular risk factor or a history of coronary artery disease. Exceptions arise when there are aortic vegetations that may be dislodged during catheterization or when emergency surgery is necessary. In these situations, high-resolution CT may be used to rule out significant coronary artery disease in haemodynamically stable patients.⁵⁵

Risk-benefit Assessment of Systematic Thoracoabdominal-pelvic Computed Tomography in Infective Endocarditis

Raphaël Lecomte,^{1,2} Nahéma Issa,³ Benjamin Gaborit,^{1,2} Paul Le Turnier,^{1,2} Colin Deschanvres,^{1,2} Nathalie Asseray,^{1,2} Thierry Le Tourneau,⁴ Magali Michel,⁴ Ousama Al Habash,⁵ Philippe Bizouarn,⁶ Fabrice Camou,³ and David Boutoille^{1,2}

¹Department of Infectious Disease, Centre Hospitalier Universitaire (CHU) Hôtel-Dieu, and ²Centre d'Investigation Clinique Unité d'Investigation Clinique 1413 Institut national de la santé et de la recherche médicale, CHU Nantes, ³Intensive Care and Infectious Disease Unit, Groupe Saint-André, CHU Bordeaux, and Departments of ⁴Cardiology, and ⁵Thoracic and Cardiovascular Surgery, Institut du Thorax, and ⁶Anaesthesiology, University Hospital, Nantes, France

Clinical Infectious Diseases[®] 2019;69(9):1605-12

Table 2. Impact of the Discovery of Secondary Lesions on Thoracoabdominal-pelvic Computed Tomography According to the Type of Lesion

Lesion	Lesion on TAP-CT	Lesion With Modification of Treatment	Asymptomatic Lesion With Modification of the Treatment
Spondylodiscitis	25	23	5
Abscess ^a	254	10	0
Vascular	11	3	2
Pulmonary	39	6	2
Total	325	42	9

Abbreviation: TAP-CT, thoracoabdominal-pelvic computed tomography.

^aSpleen, kidney, liver, or muscle location.

522 patients

Insuffisance rénale dans les suites du scanner: 14,9%

1,9%

Cf topo Raphael Lepeule

Effect of Early Cerebral Magnetic Resonance Imaging on Clinical Decisions in Infective Endocarditis

A Prospective Study

Ann Intern Med. 2010;152:497-504.

Xavier Duval, MD, PhD; Bernard Jung, MD; Isabelle Klein, MD, PhD; Eric Brochet, MD; Gabriel Thabut, MD, PhD; Florence Arnoult, MD; Laurent Lepage, MD; Jean-Pierre Laisny, MD, PhD; Michel Wolff, MD; and Catherine Leport, MD, PhD, for the IMAGE (Resonance Magnetic Imaging at the Acute Phase of Endocarditis) Study Group*

Table 2. Cerebral Lesions Observed on Early Systematic Cerebral Magnetic Resonance Imaging in Patients With Infective Endocarditis

Lesion Characteristic	All Patients (n = 130), n (%)	Patients With Neurologic Symptoms (n = 16), n (%)	Patients Without Neurologic Symptoms (n = 114), n (%)
≥1 lesion	106 (82)	16 (100)	90 (79)
>1 lesion	86 (66)	13 (81)	73 (64)
Ischemic lesion	68 (52)	14 (88)	54 (47)
Large systematized ischemic lesion*	33 (25)	9 (56)	24 (21)
Small ischemic lesion	60 (46)	14 (88)	46 (40)
Hemorrhagic lesion	79 (61)	10 (63)	69 (61)
Intraparenchymal hemorrhagic lesion	10 (8)	3 (19)	7 (6)
Microhemorrhage	74 (58)	7 (44)	67 (59)
Subarachnoidal hemorrhage	11 (8)	2 (13)	9 (8)
Unruptured aneurysm	10 (8)	1 (6)	9 (8)
Cerebral abscess	8 (6)	1 (6)	7 (6)

* Refers to infarction of a large arterial cortical or subcortical territory secondary to a proximal cerebral artery occlusion.

Endocardites infectieuses: des maladies différentes !

- **Endocardite subaiguë d'Osler**
 - Streptocoques, enterocoques, Staph coag neg, HACEK
 - Maladie peu bruyante sur le plan infectieux
 - Souvent opérée: retard diagnostic (> 3 mois)
 - Suivi post-opératoire

- **Endocardite aiguë: faut aller vite !**
 - *Staphylococcus aureus*, pneumocoque (entérobactéries)
 - Confirmer rapidement le diagnostic
 - Optimisation de l'antibiothérapie
 - Chirurgie rapide ?