

General management of infective endocarditis

Team approach in infective endocarditis

Gilbert Habib
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Eurovalves Barcelona 2017



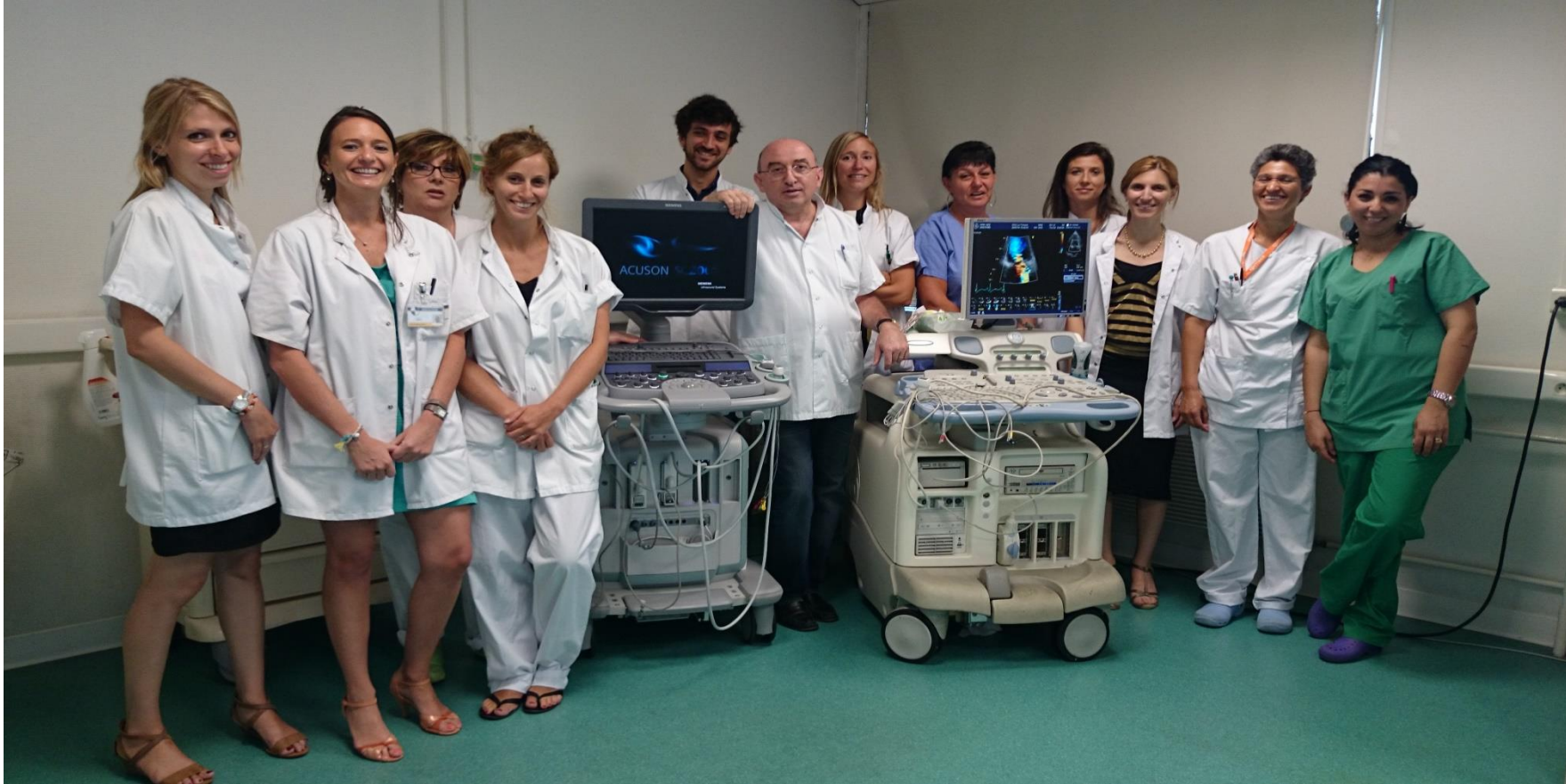
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The echolab



« Heart Team"»

Infective Endocarditis

Gilbert Habib
La Timone Hospital
Marseille - France

JESFC , January, 13th, 2017



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« Endocarditis Team »

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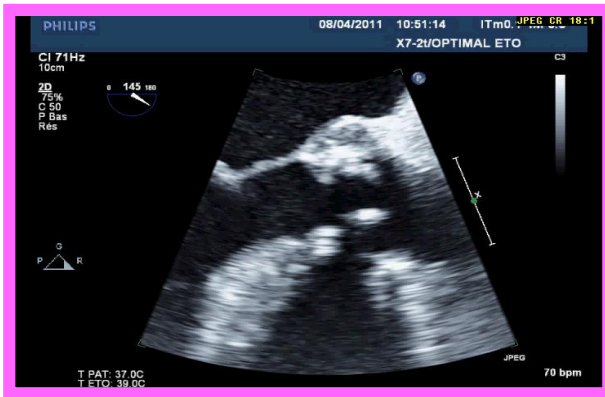
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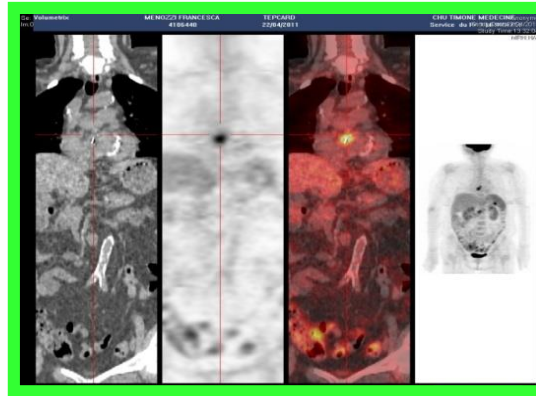
The multidisciplinary endocarditis team



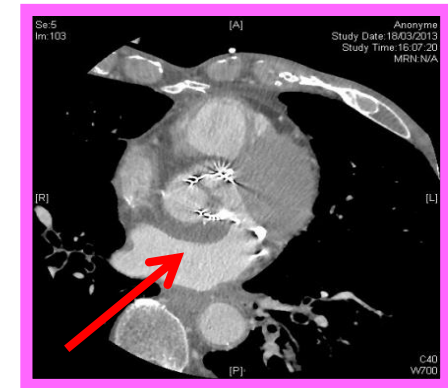
Multimodality imaging in IE



TOE
Morphology



PET CT
**Inflammation /
infection**



Cardiac CT
Perivalvular lesions

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)

Team approach in endocarditis

1. The “Endocarditis Team”
2. Team approach for diagnosis
3. Team approach for treatment
4. Specific situations

Team approach in endocarditis

1. *The “Endocarditis Team”*

2. Team approach for diagnosis
3. Team approach for treatment
4. Specific situations

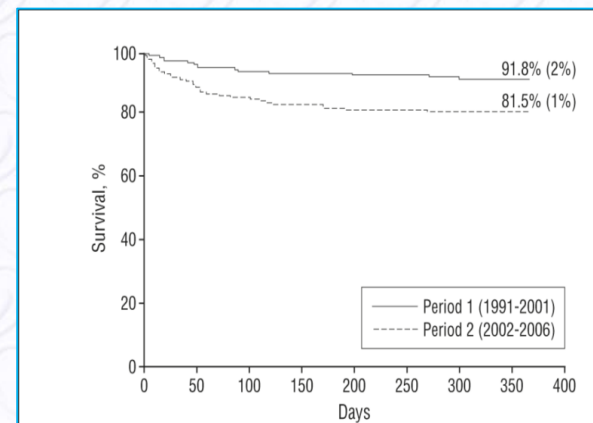
The multidisciplinary endocarditis team

Dramatic Reduction in Infective Endocarditis–Related Mortality With a Management-Based Approach

Elisabeth Botelho-Nevers, MD; Franck Thuny, MD; Jean Paul Casalta, MD; Hervé Richet, MD, PhD; Frédérique Gouriet, MD, PhD; Frédéric Collart, MD; Alberto Riberi, MD; Gilbert Habib, MD; Didier Raoult, MD, PhD



The management of IE by a multidisciplinary medical-surgical team using a standardized protocol to treat IE was associated with a significant decrease in mortality



The « Endocarditis team »

- **Characteristics of the reference centre**

1. Immediate access to diagnostic procedures should be possible, including TTE, TOE, multislice CT, MRI, and nuclear imaging.
2. Immediate access to cardiac surgery should be possible during the early stage of the disease, particularly in case of complicated IE
3. Several specialists should be present on site (the “Endocarditis Team”), including at least cardiac surgeons, cardiologists, anaesthesiologists, ID specialists, microbiologists and, when available, specialists in valve diseases, CHD, pacemaker extraction, echocardiography and other cardiac imaging techniques, neurologists, and facilities for neurosurgery and interventional neuroradiology.

Role of the « Endocarditis team »

1. The “Endocarditis Team” should have meetings on a regular basis in order to discuss cases, take surgical decisions, and define the type of follow-up.
2. The “Endocarditis Team” chooses the type, duration, and mode of follow-up of antibiotic therapy, according to a standardized protocol, following the current guidelines.
3. The “Endocarditis Team” should participate in national or international registries, publicly report the mortality and morbidity of their centre, and be involved in a quality improvement programme, as well as in a patient education programme.
4. The follow-up should be organized on an outpatient visit basis at a frequency depending on the patient’s clinical status (ideally at 1, 3, 6, and 12 months after hospital discharge, since the majority of events occur during this period).

The « Endocarditis team »

Recommendations	Class	Level
Patients with complicated IE should be evaluated and managed at an early stage in a reference centre, with immediate surgical facilities and the presence of a multidisciplinary “Endocarditis Team”, including an ID specialist, a microbiologist, a cardiologist, imaging specialists, a cardiac surgeon, and if needed a specialist in CHD.	Ila	B
For patients with non-complicated IE managed in a non-reference centre, early and regular communication with the reference centre and, when needed, with visit to the reference centre, should be made.	Ila	B

Team approach in endocarditis

1. The “Endocarditis Team”
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The Duke echographic criteria

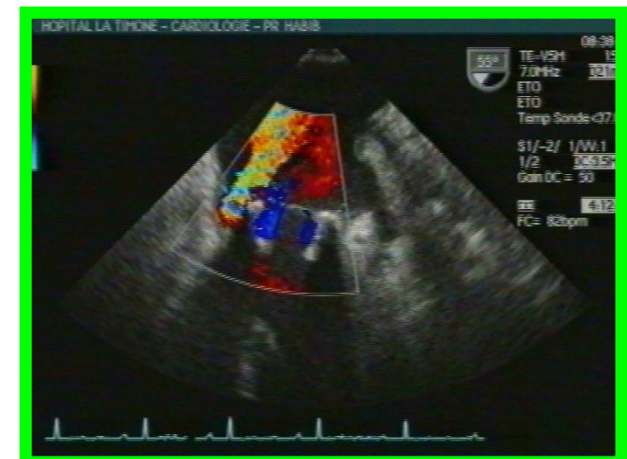
Durack DT Am J Med 1994 ; 96 : 200-9



vegetation



abscess

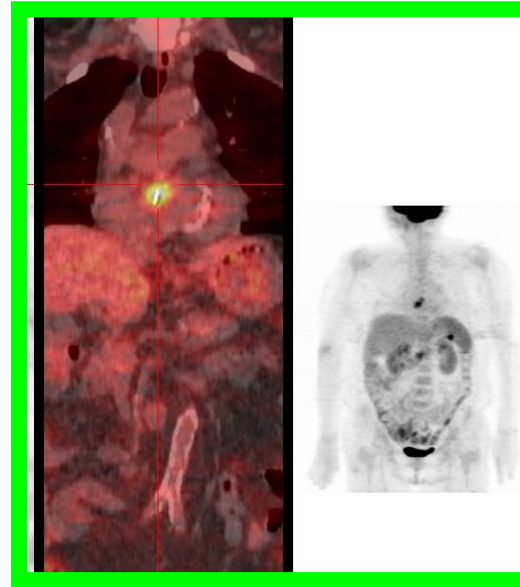


*new dehiscence
of prosthetic valve*

^{18}F FDG-PET-CT in endocarditis



First TOE

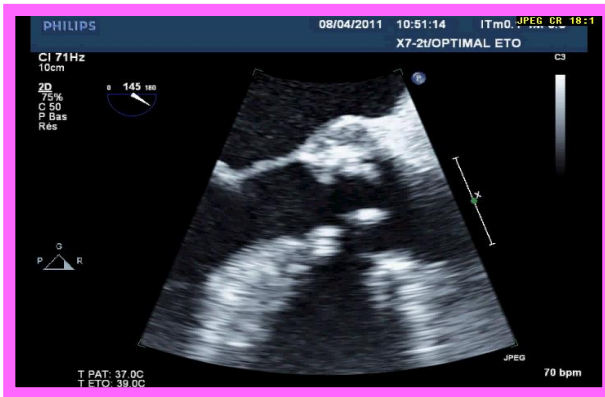


^{18}F FDG-PET-CT

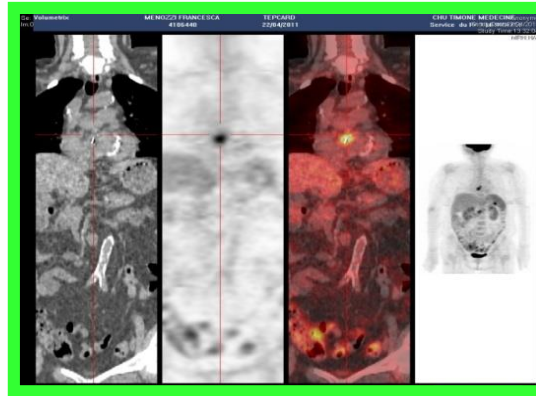


Follow-up TOE

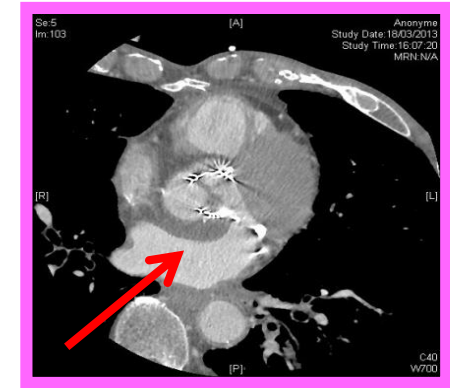
Multimodality imaging in IE



TOE
Morphology

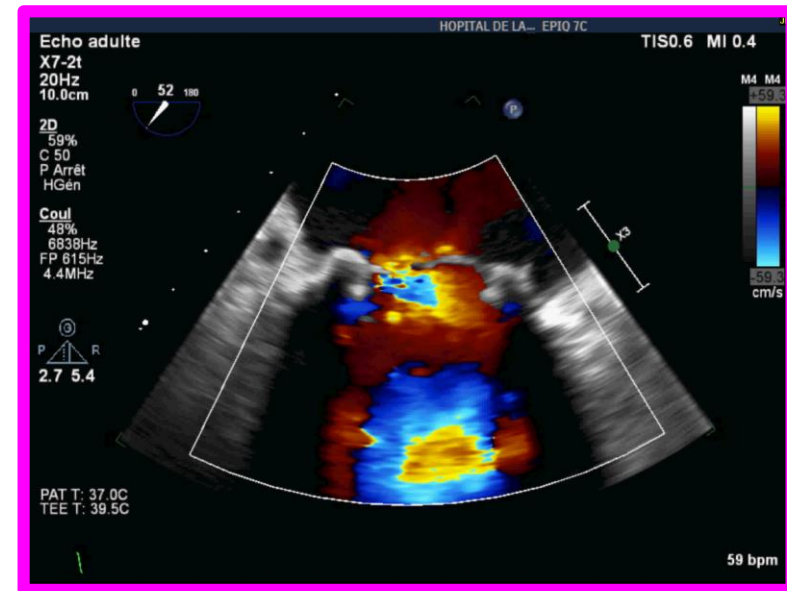
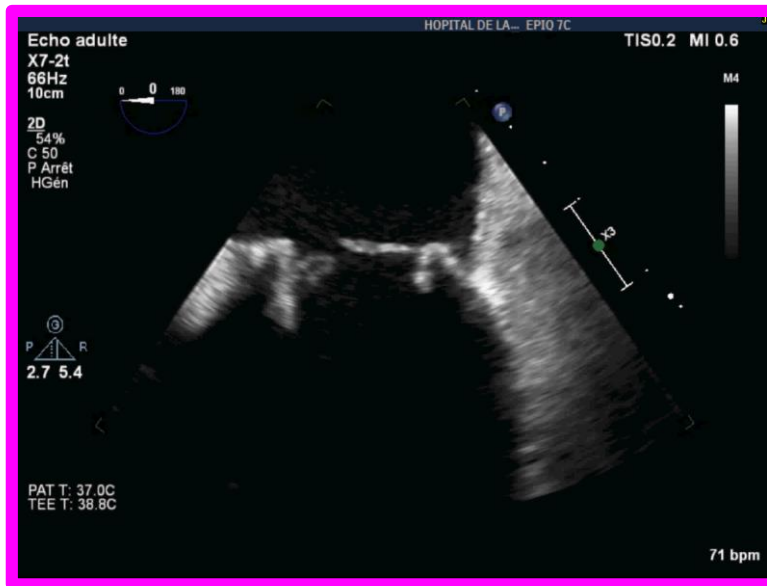


PET CT
Inflammation /
infection

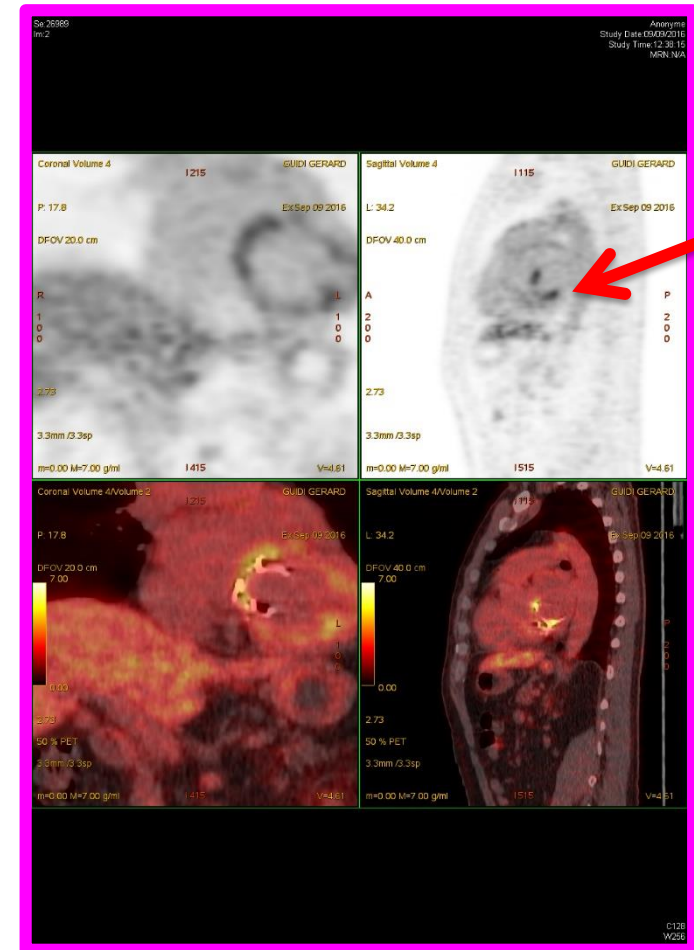
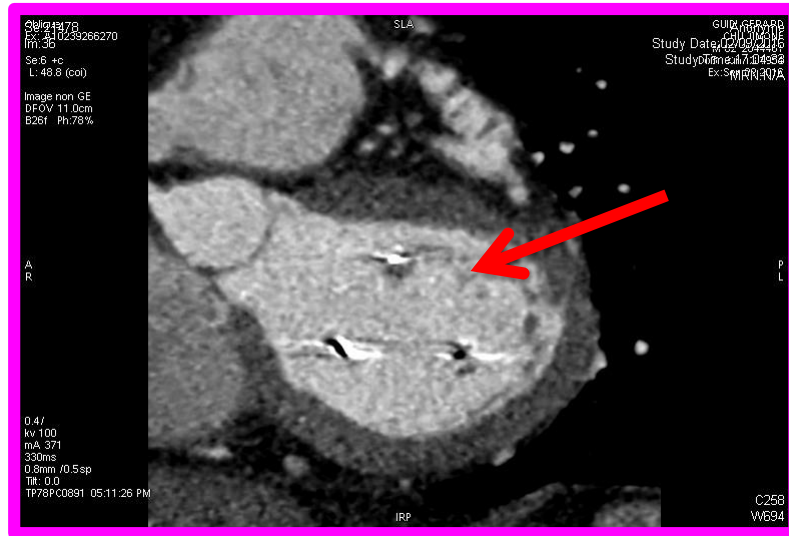


Cardiac CT
Perivalvular lesions

Suspected bioprosthetic mitral IE



False positive of PET/CT and CT



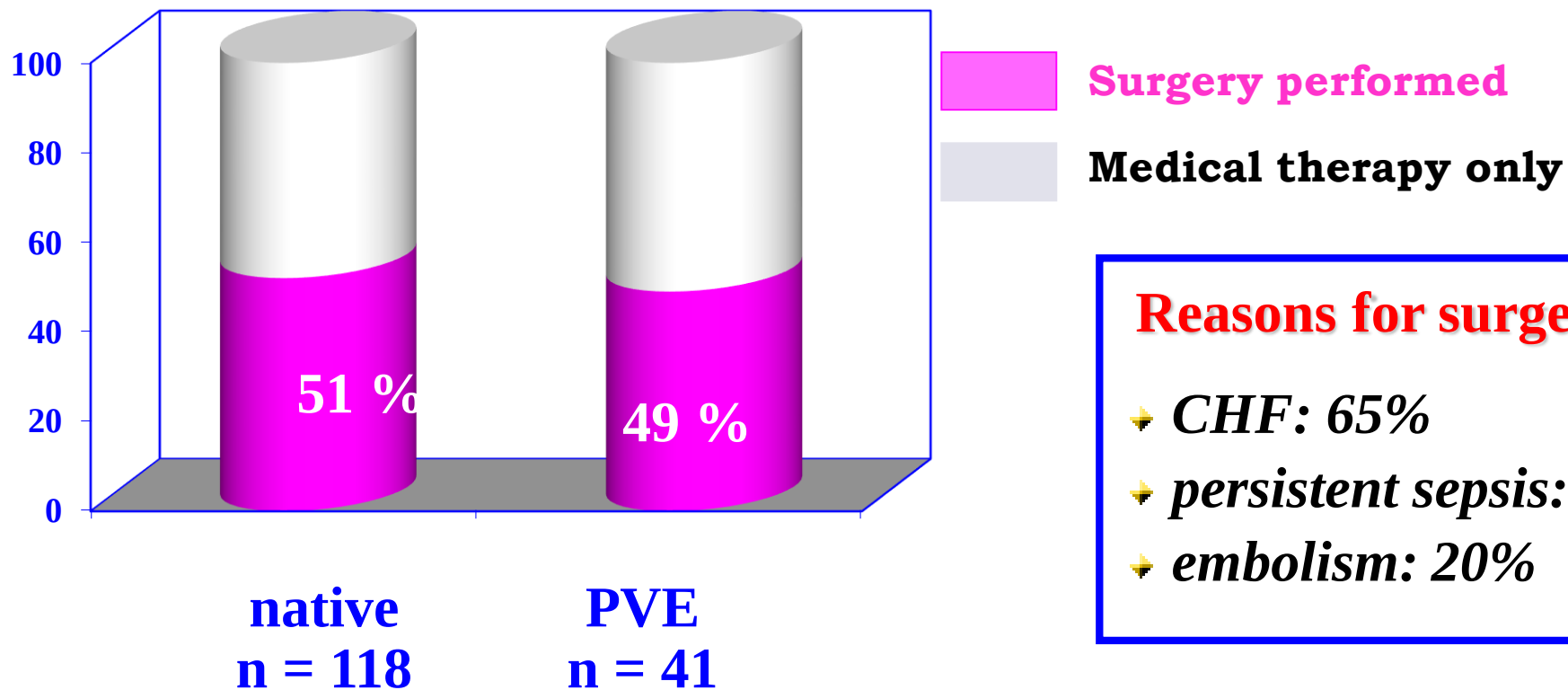
Team approach in endocarditis

1. The “Endocarditis Team”
2. Team approach for diagnosis
3. ***Team approach for treatment***
4. Specific situations



Surgery in IE : Euro Heart Survey

Tornos P – Heart 2005 ; 91 : 571-5



Reasons for surgery

- ✦ *CHF*: 65%
- ✦ *persistent sepsis*: 45%
- ✦ *embolism*: 20%

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

Team approach in endocarditis

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Specific situations

1. ***TAVI endocarditis***
2. ***pacemaker / defibrillator IE***
3. ***neurological complications***



TAVI endocarditis

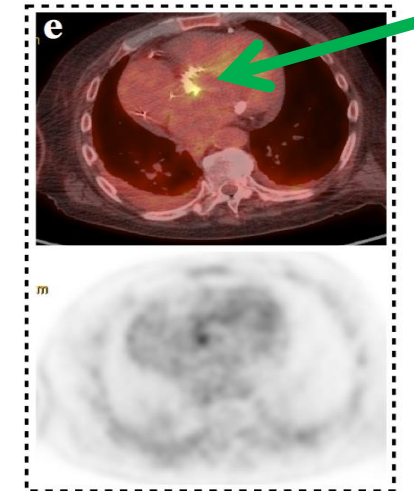


May, 27th 2016



May, 28th 2016

- 83 year-old man
- streptococcus salivarius IE
- 6 months after Edwards Sapien 3 implantation
- TEE: thickening of THV leaflets
- MSCT: leaflets thickening and vegetation
- PET/CT showed the THV ¹⁸F-FDG uptake

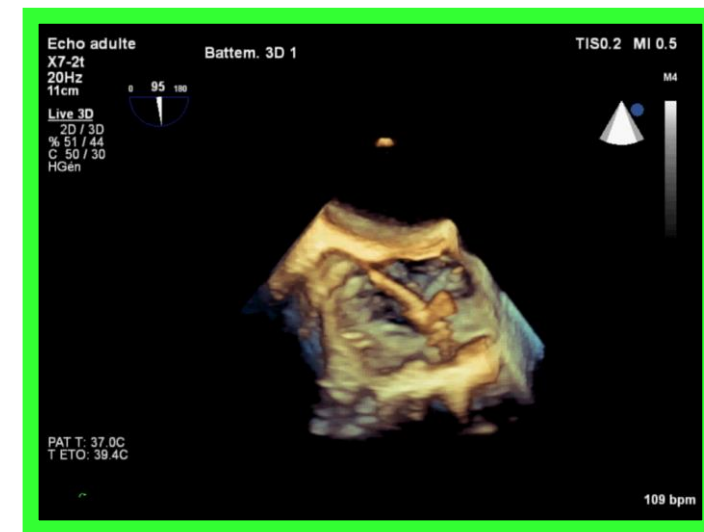
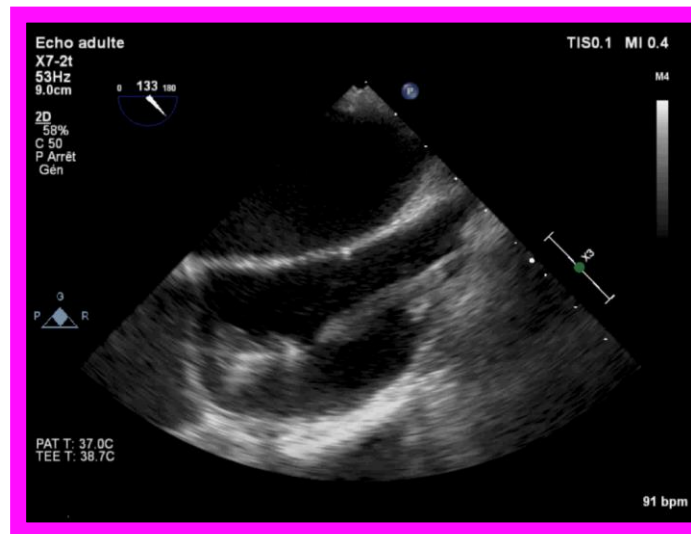
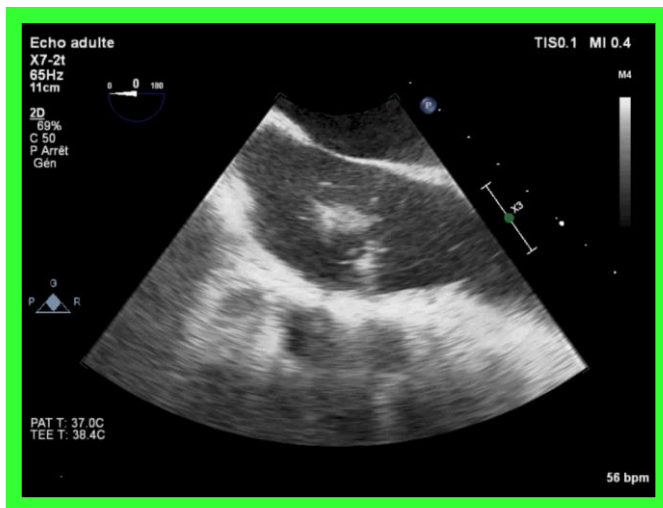


Specific situations

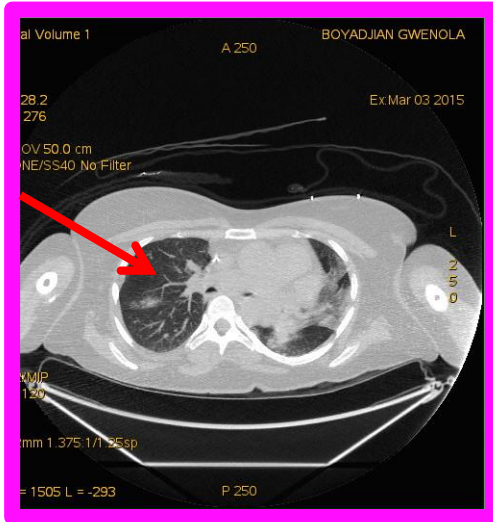
1. ***TAVI endocarditis***
2. ***pacemaker / defibrillator IE***
3. ***neurological complications***

47 year-old woman

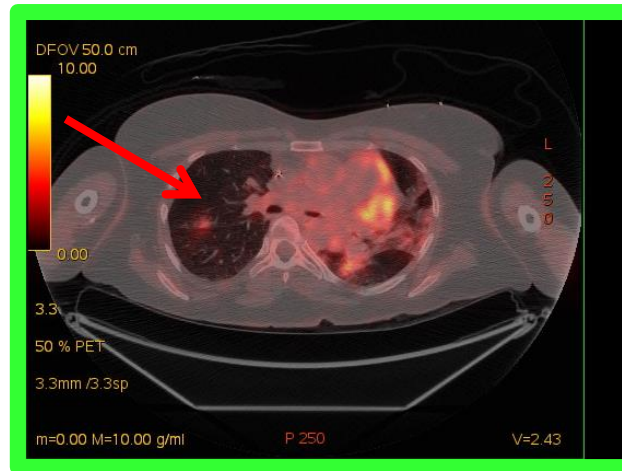
- Steinert myopathy
- ASD operated 1980
- PM for AV block 1997
- fever
- peripheral embolism
- BC: staphylococcus aureus



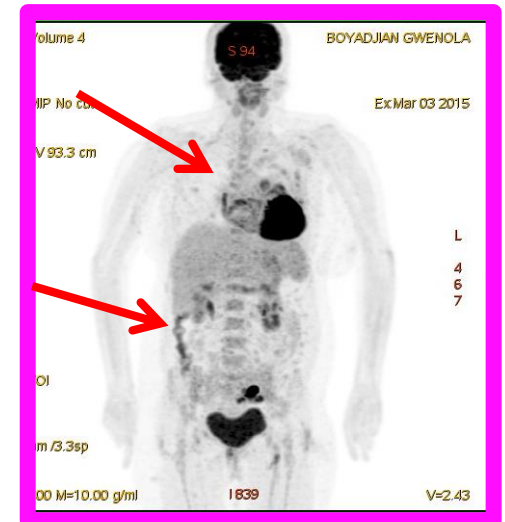
^{18}F FDG-PET



**Pulmonary
embolisms**

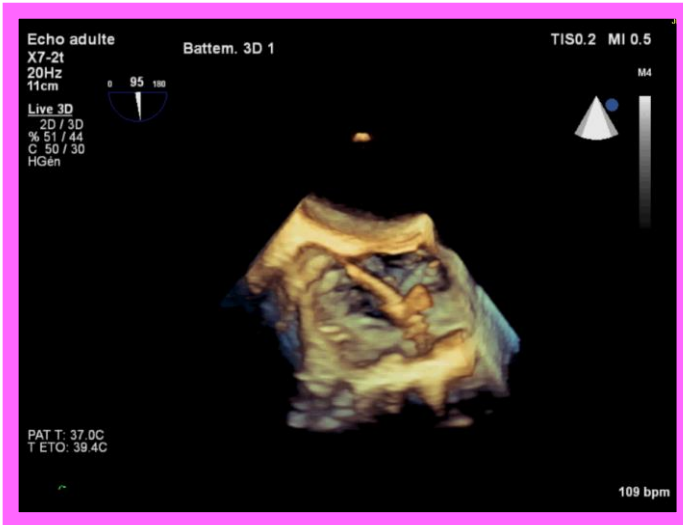


**Pulmonary
uptake**

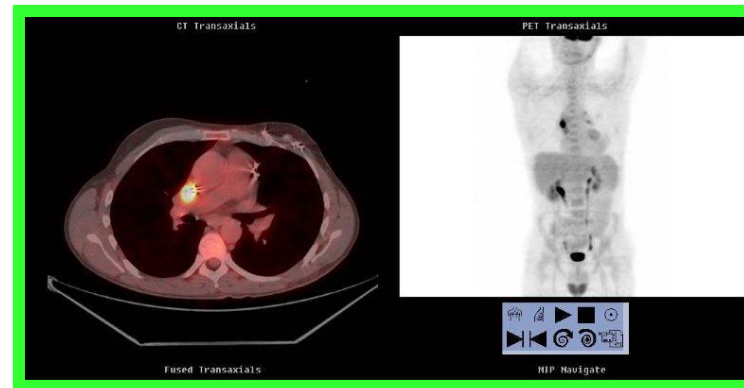


**Device uptake
Colic uptake**

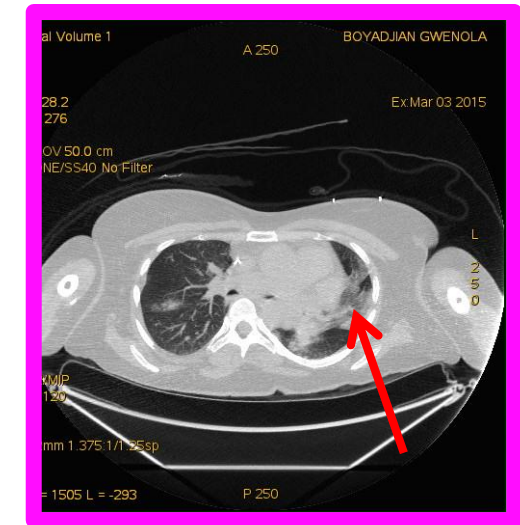
Multimodality imaging in CDRIE



**TOE
Morphology**



**PET CT
Inflammation /
infection**



**Cardiac CT
Pulmonary embolism**

PMLIE: PET / CT

Valvular Heart Disease

Improving the Diagnosis of Infective Endocarditis in Prosthetic Valves and Intracardiac Devices With ^{18}F -Fluorodeoxyglucose Positron Emission Tomography/ Computed Tomography Angiography Initial Results at an Infective Endocarditis Referral Center

María N. Pizzi, MD; Albert Roque, MD; Nuria Fernández-Hidalgo, MD, PhD;
Hug Cuéllar-Calabria, MD; Ignacio Ferreira-González, MD, PhD;
María T. González-Alujas, MD, PhD; Gerard Oristrell, MD; Laura Gracia-Sánchez, MD;
Juan J. González, PhD; José Rodríguez-Palomares, MD; Manuel Galiñanes, MD, PhD;
Olga Maisterra-Santos, MD; David García-Dorado, MD, PhD; Joan Castell-Conesa, MD, PhD;
Benito Almirante, MD, PhD; Santiago Aguadé-Bruix, MD; Pilar Tornos, MD, PhD

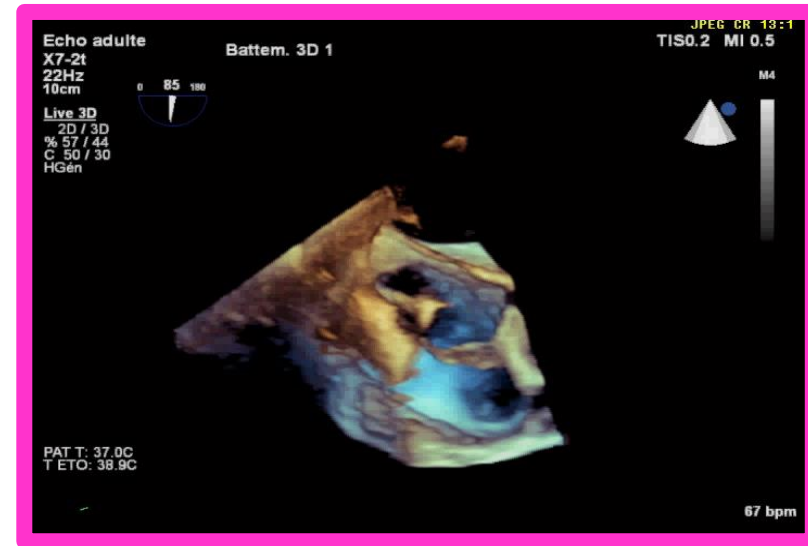
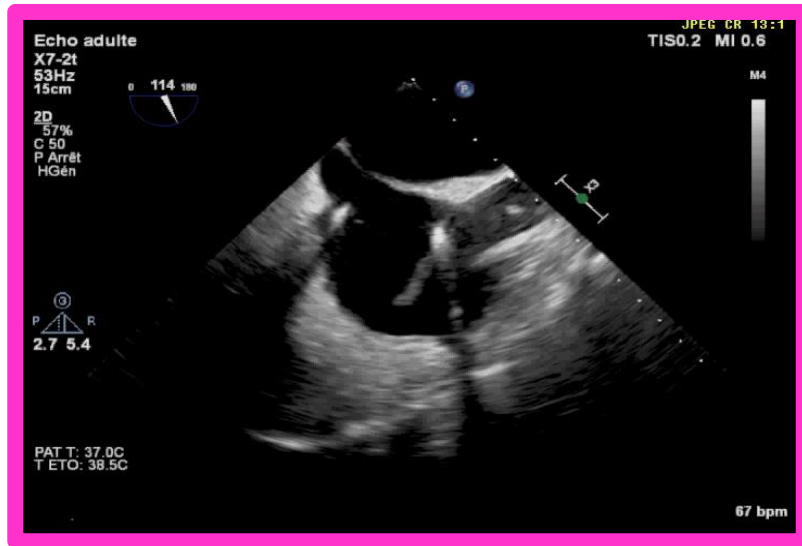
Background—The diagnosis of infective endocarditis (IE) in prosthetic valves and intracardiac devices is challenging because both the modified Duke criteria (DC) and echocardiography have limitations in this population. The added value of ^{18}F -fluorodeoxyglucose (^{18}F -FDG) positron emission tomography (PET)/computed tomography (CT) and ^{18}F -FDG PET/CT angiography (PET/CTA) was evaluated in this complex scenario at a referral center with a multidisciplinary IE unit.

Methods and Results—Ninety-two patients admitted to our hospital with suspected prosthetic valve or cardiac device IE between November 2012 and November 2014 were prospectively included. All patients underwent echocardiography and PET/CT, and 76 had cardiac CTA. PET/CT and echocardiography findings were evaluated and compared, with concordant results in 54% of cases ($\kappa=0.23$). Initial diagnoses with DC at admission, PET/CT, and DC+PET/CT were compared with the final diagnostic consensus reached by the IE Unit. DC+PET/CT enabled reclassification of 90% of cases initially classified as possible IE with DC and provided a conclusive diagnosis (definite/rejected) in 95% of cases. Sensitivity, specificity, and positive and negative predictive values were 52%, 94.7%, 92.9%, and 59.7% for DC; 87%, 92.1%, 93.6%, and 84.3% for PET/CT; and 90.7%, 89.5%, 92%, and 87.9% for DC+PET/CT. Use of PET/CTA yielded even better diagnostic performance values than PET/nonenhanced CT (91%, 90.6%, 92.8%, and 88.3% versus 86.4%, 87.5%, 90.2%, and 82.9%) and substantially reduced the rate of doubtful cases from 20% to 8% ($P<0.001$). DC+PET/CTA reclassified an additional 20% of cases classified as possible IE with DC+PET/nonenhanced CT. In addition, PET/CTA enabled detection of a significantly larger number of anatomic lesions associated with active endocarditis than PET/nonenhanced CT ($P=0.006$) or echocardiography ($P<0.001$).

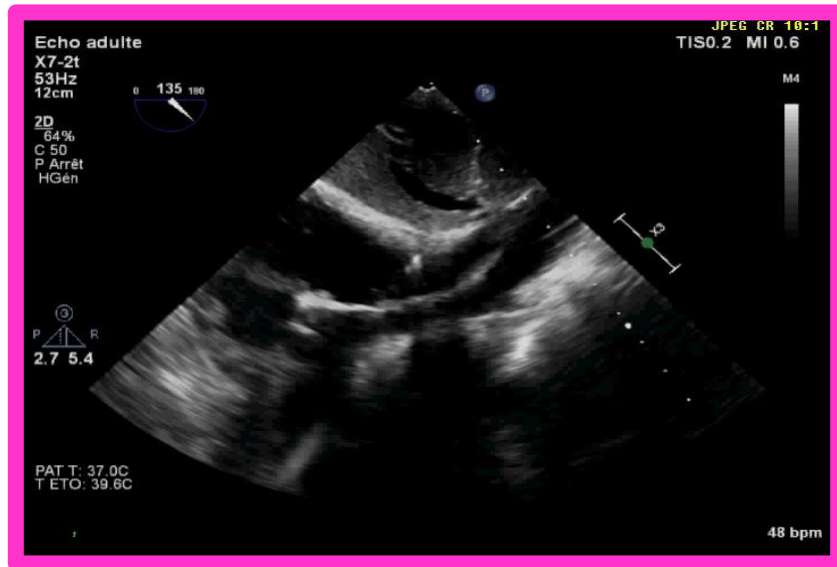
Conclusions— ^{18}F -FDG PET/CT improves the diagnostic accuracy of the modified DC in patients with suspected IE and prosthetic valves or cardiac devices. PET/CTA yielded the highest diagnostic performance and provided additional diagnostic benefits. (*Circulation*. 2015;132:1113-1126. DOI: 10.1161/CIRCULATIONAHA.115.015316.)



Thrombus or vegetation?



Thrombo-aspiration !!



Specific situations

1. *prosthetic valve endocarditis*
2. *pacemaker / defibrillator IE*
3. *neurological complications*



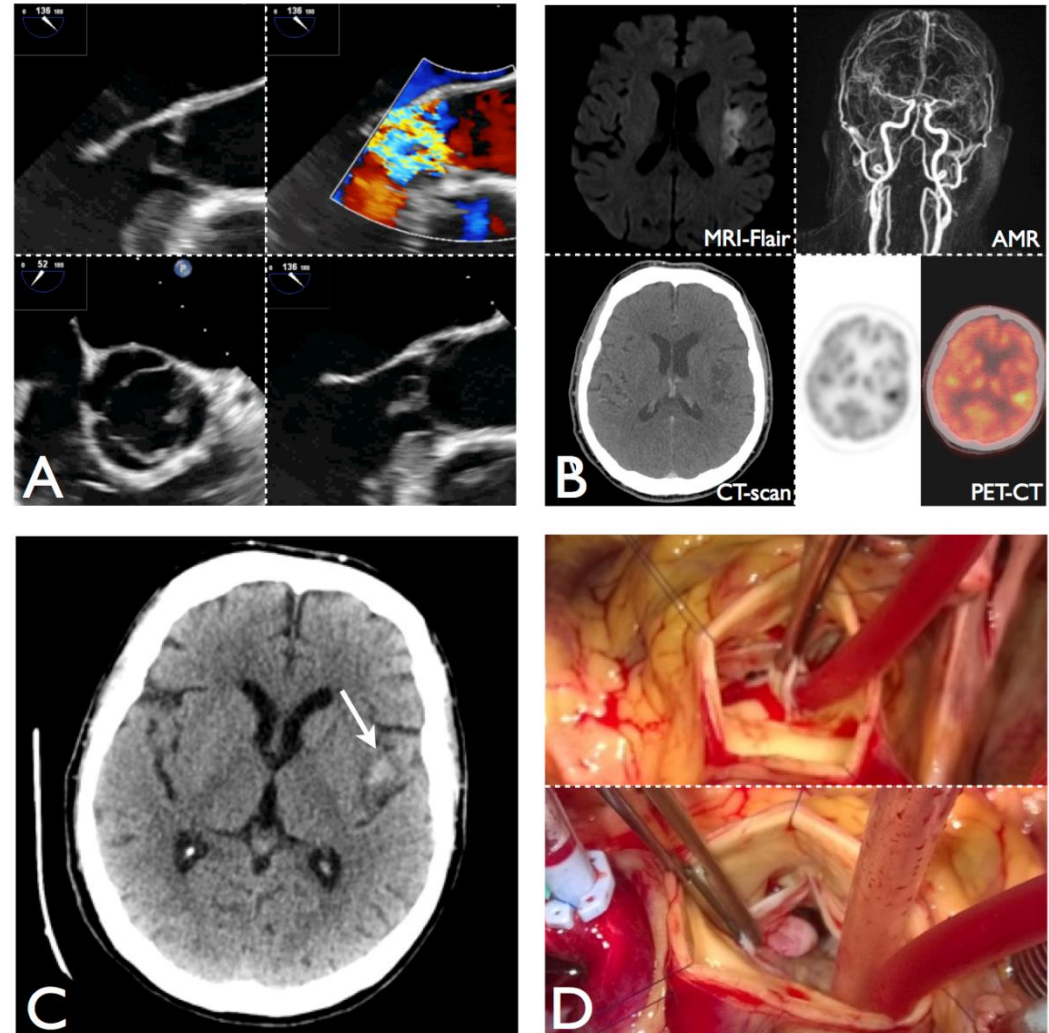
Multimodality imaging in IE with stroke

A: severe AR (perforated aneurysm)

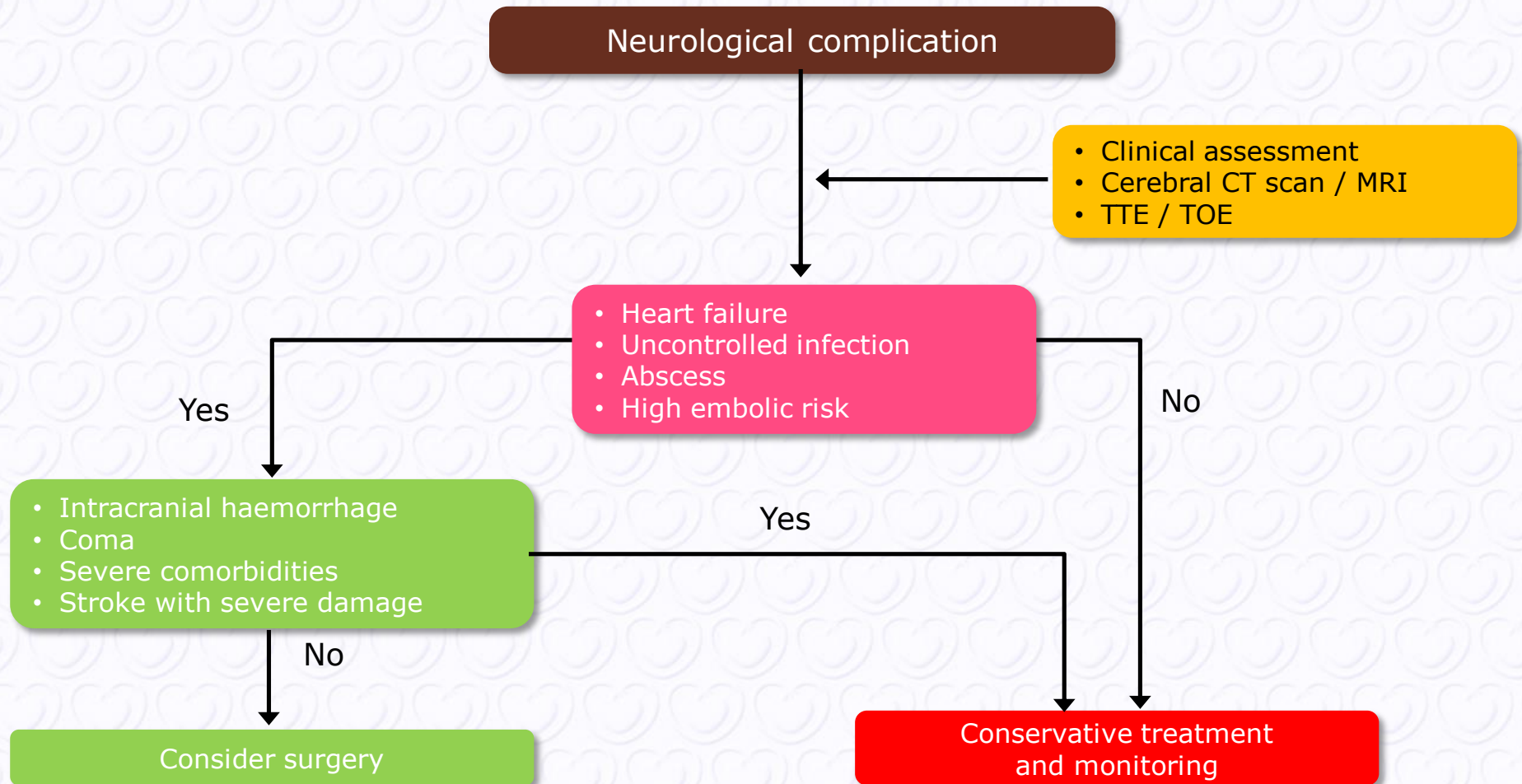
B: multimodality imaging of ischemic Stroke

C: hemorrhagic transformation on day 7

D: surgical findings 3 weeks later



Management of neurological complications



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**

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

Yes

No

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

Urgent surgery

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

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

Take-Home messages : IE team

- 1. The presence of an 'Endocarditis Team' is crucial in IE. This multidisciplinary approach has been shown to significantly reduce the 1-year mortality in infective endocarditis.**
- 2. A multidisciplinary approach is mandatory, including cardiologists, cardiac surgeons, and specialists of infectious diseases.**
- 3. Patients with complicated IE, i.e. endocarditis with HF, abscess, or embolic or neurological complication or CHD, should be referred early and managed in a reference centre with immediate surgical facilities**
- 4. Patients with non-complicated IE can be initially managed in a non-reference centre, but with regular communication with the reference centre, consultations with the multidisciplinary 'Endocarditis Team' and, when needed, with external visit to the reference centre**

European Infective Endocarditis (EURO ENDO)

an ESC EURObservational Research
Programme Registry

Gilbert Habib, Chair



EURO-ENDO: Objectives

- **Main objective**

- The main goal of the European Infective Endocarditis Registry (EURO-ENDO) is to evaluate the outcome of patients diagnosed with Infective Endocarditis.

- **Secondary objectives**

- To assess the current clinical, epidemiological, microbiological, therapeutic, and prognostic characteristics of IE in Europe.
- To assess the current practices of imaging in IE in Europe.
- To assess the degree of implementation of the ESC guidelines in practice.
- To compare these current data with those obtained in the Euro Heart Survey.



Current Registry Status

Submission status per country

In total:

- 269 invited centres
- 131 confirmed participation
- 11 countries with Ethics Committee approved
- 8 active centres with 14 enrolled patients

No participation confirmed for:

- Austria
- Netherlands
- USA

Country	Centres registered	Nb of enrolled Patients
Argentina	13	17
Austria	2	2
Belgium	7	15
Brazil	12	16
Croatia	4	4
Czech Republic	12	42
Egypt	5	11
France	12	3
Germany	7	16
Greece	8	6
India	3	3
Iran	1	20
Italy	5	13
Japan	12	12
Korea, Republic Of	3	14
Lithuania	3	19
Malta	1	2
Netherlands	3	11
New Caledonia	1	2
Poland	5	8
Portugal	9	23
Romania	3	2
Saudi Arabia	2	12
Serbia	3	17
Spain	12	34
Turkey	8	40
	162	364

Registry status report on 09JAN17

Non ESC country members	Nr. Invited Centres	Part.Sheet received	Nb of patient enrolled	EC submission status
Argentina	15	13	4	Approved
Brazil	13	7		Approved
Canada	4	1		
India	5	3		
Iran	1	1		Approved
Japan	16	11		Ongoing
Korea	3	2		
Mexico	1	0		
Saudi Arabia	1	0		Ongoing
United Arab Emirates	1	0		Ongoing
United States				
Total	60	38	4	