

# TAVI Endocarditis

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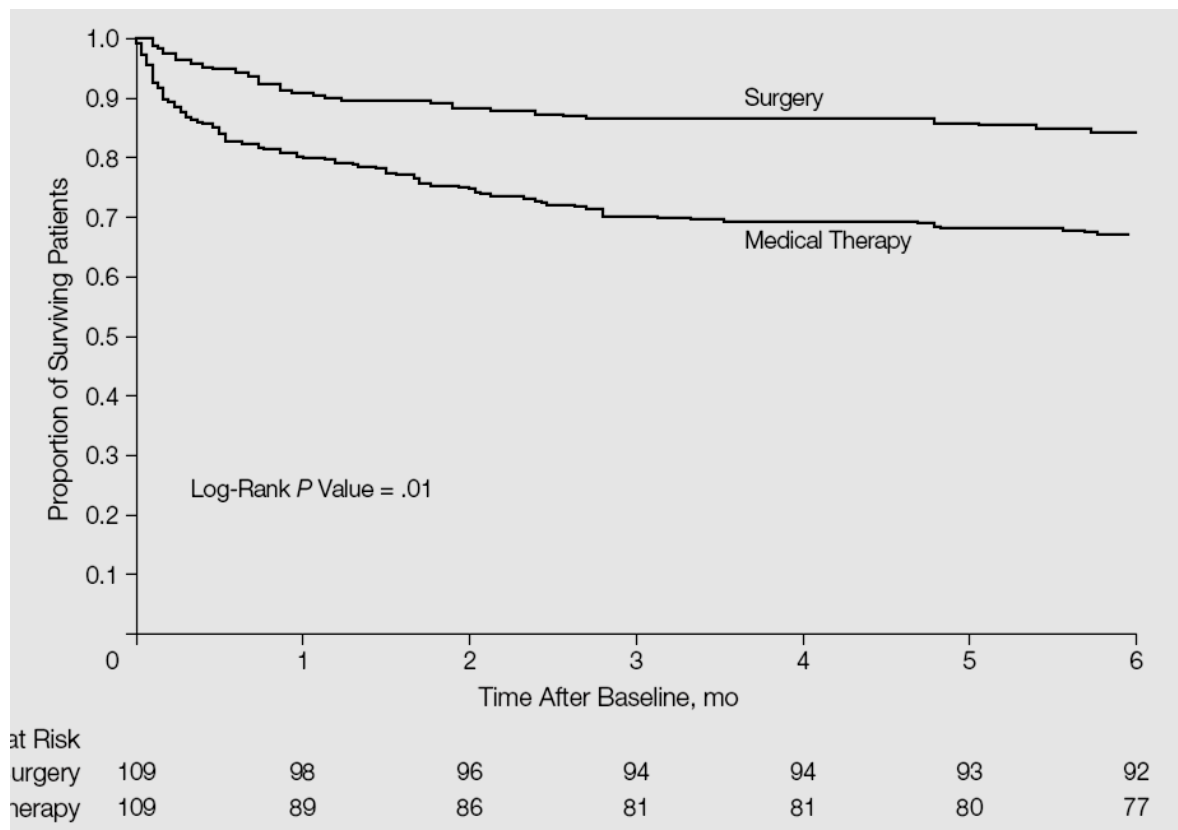
Gilbert Habib  
La Timone Hospital  
Marseille - France

EuroValves Brussels, 10 March 2016

# IE: a deadly disease!!: native valves

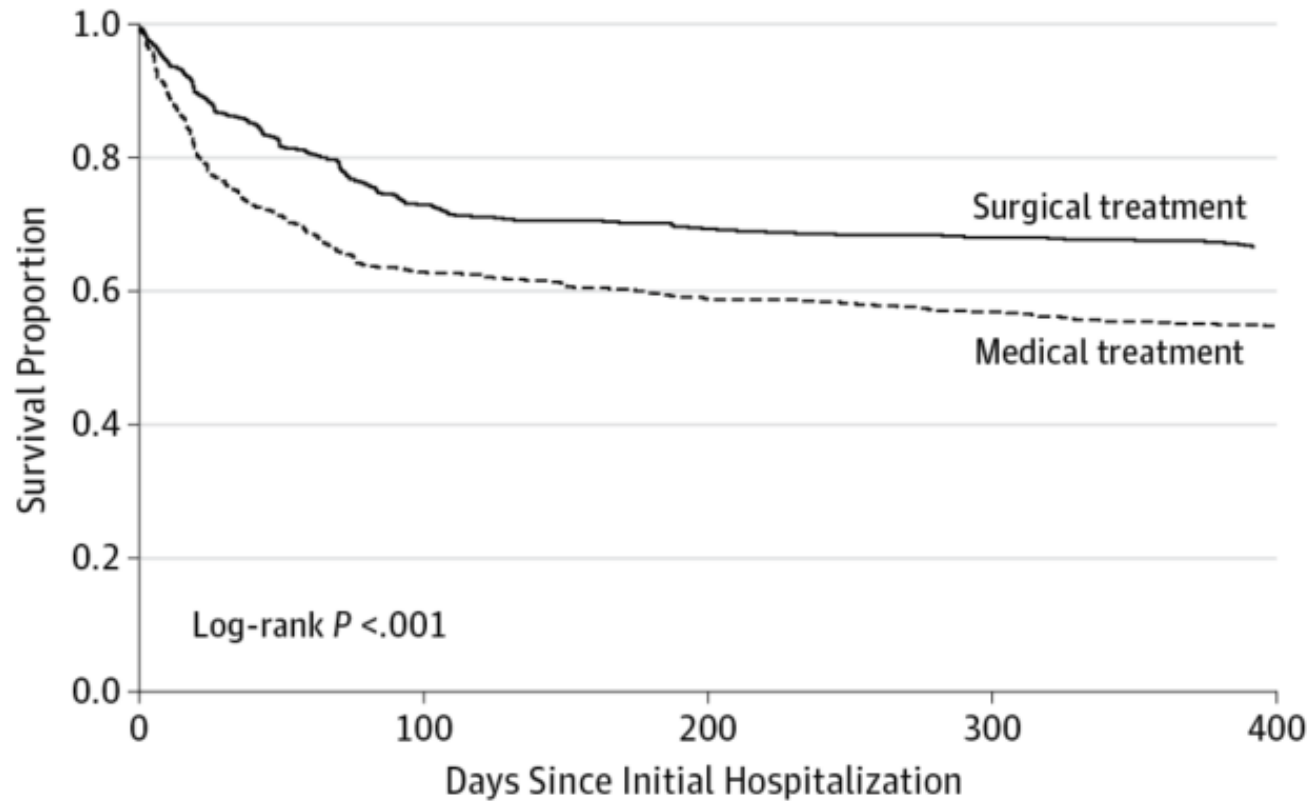
Vikram- JAMA 2003 ; 290 : 3207

- ✦ 513 patients with complicated IE , 230 (40%) surgical therapy
- ✦ 6 month mortality



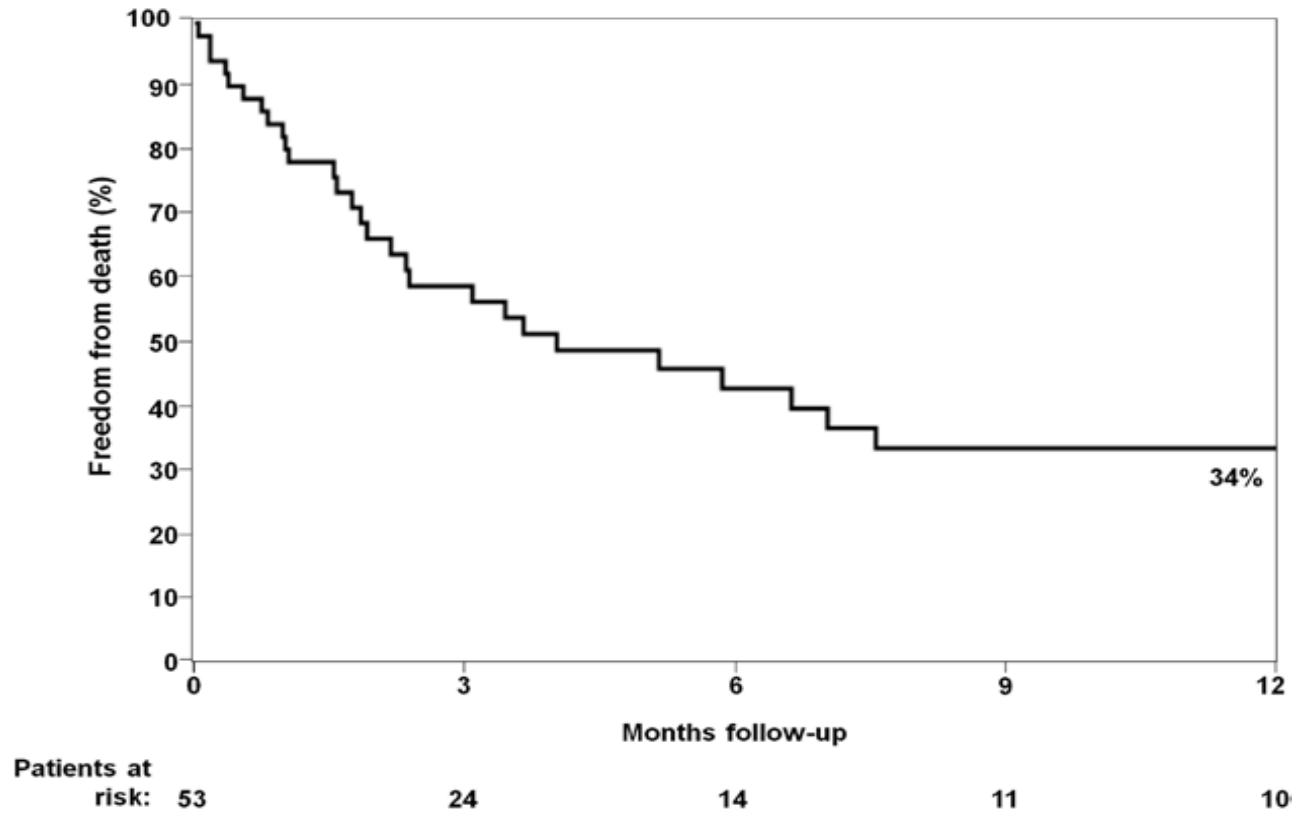
# IE: a deadly disease!!: Prosthetic IE

Lalani T- JAMA 2013



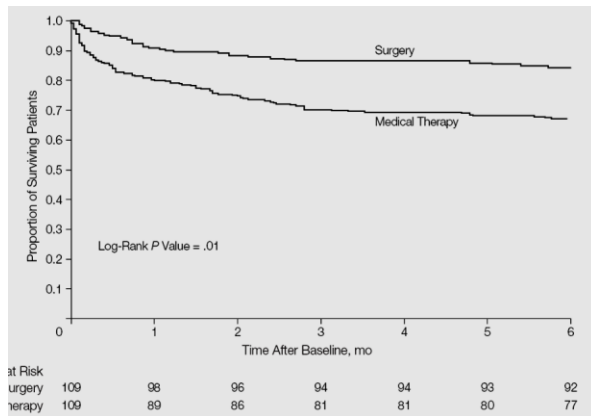
# Survival after TAVI endocarditis

Amat-Santos IJ et al. *Circulation* 2015



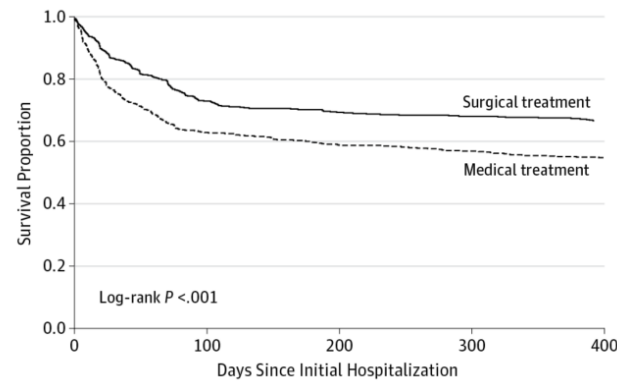
# IE: a deadly disease!!

## Vikram- JAMA 2003



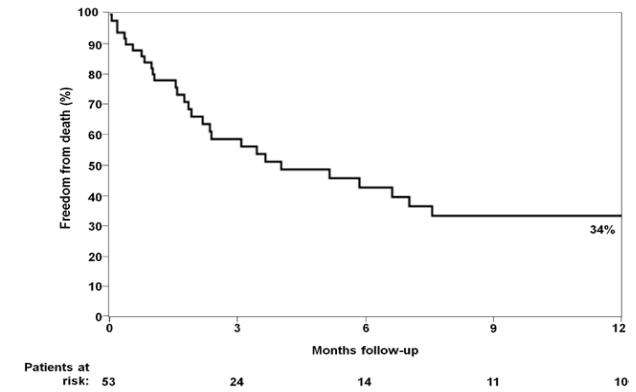
**513 patients**  
**Native Valve IE**

## Lalani T- JAMA 2013



**1025 patients**  
**Prosthetic Valve IE**

## Amat-Santos IJ et al. Circulation 2015

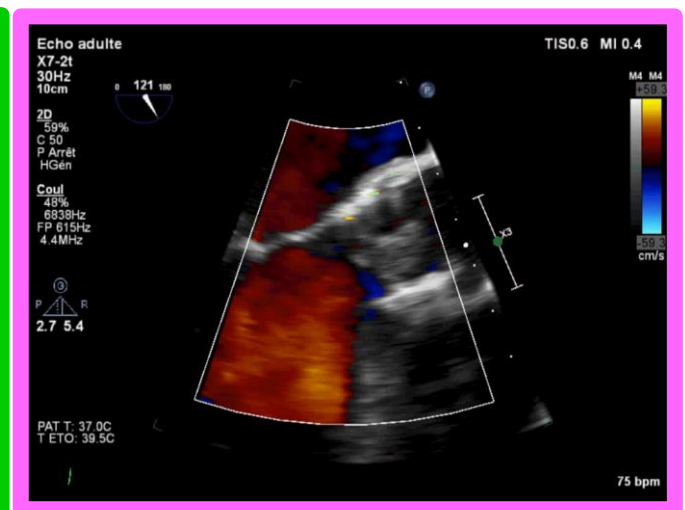
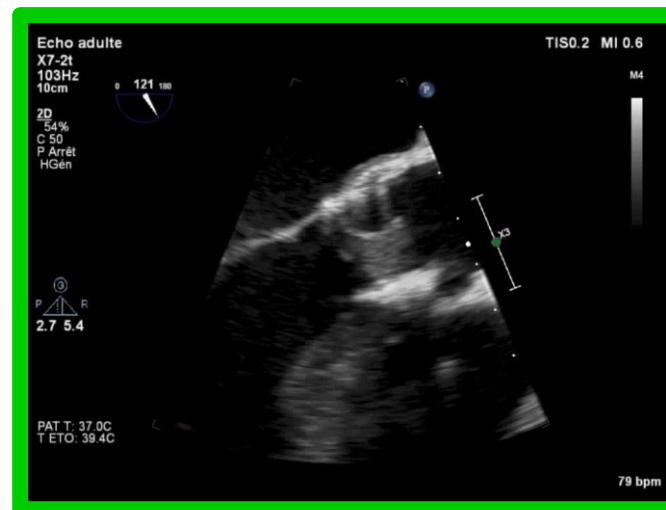
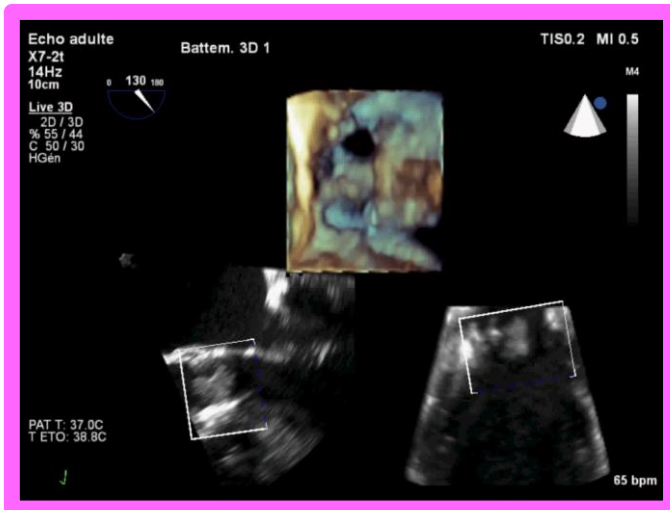


**53 patients**  
**TAVI IE**

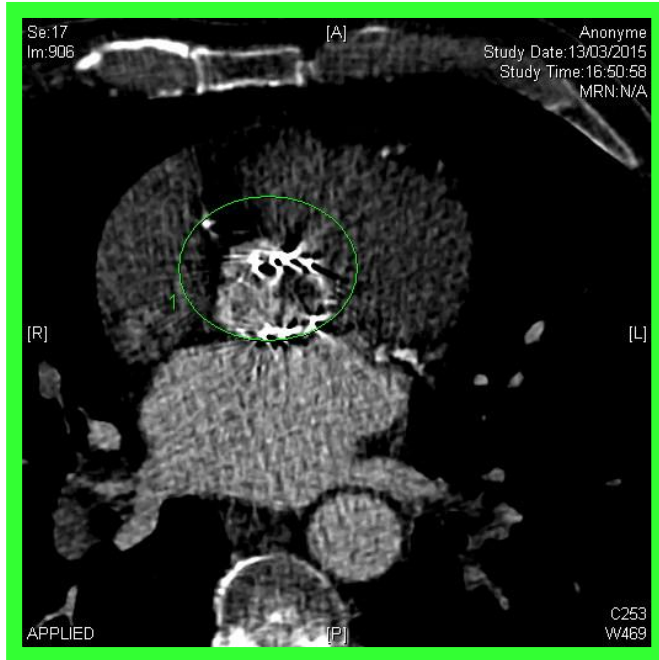
# Case 1: TAVI endocarditis

- 80 year-old man
- CHF
- TAVI 2 years ago

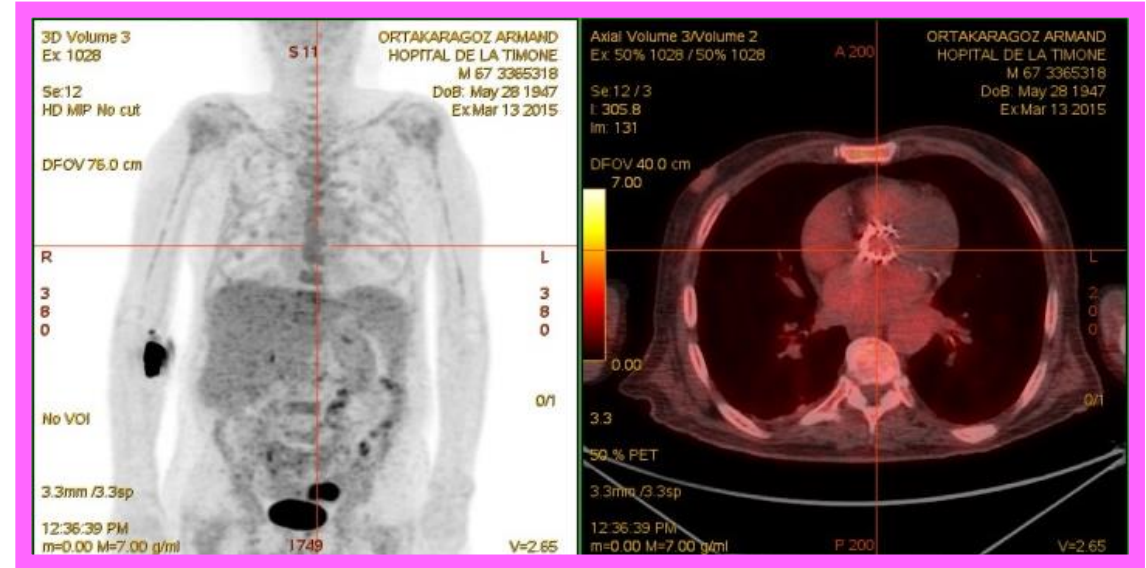
- fever = 38°
- BC: staphylococcus coagulase -



# Multimodality Imaging



CT scan : positive



PET CT: negative

# Patient 2: Valve-in-valve PVE

## History of the disease

- 71 year-old man
- mitral bioprosthesis 2000
- severe Parkinson disease
- valve-in-valve MV replacement (transapical) June 2015
- october 2015: fever / suspected endocarditis

## Clinical examination

- CHF
- systolic murmur 2/6
- blood pressure: 100/70 mmHg
- arrhythmia (atrial fibrillation)



# Patient 2: Valve-in-valve PVE

## Laboratory data

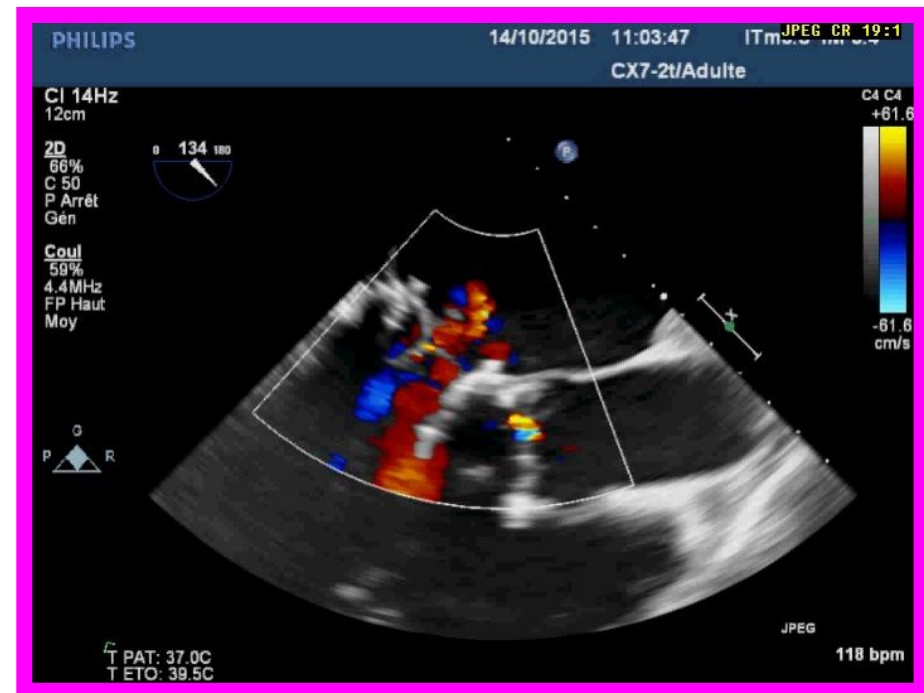
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- ✦ haemoglobin: 9 g / dl
- ✦ white blood cell: 13,000 / mm<sup>3</sup>
- ✦ CRP = 130 mg/l
- ✦ creatinin = 125 mg/l
- ✦ BNP = 1100 ng/l

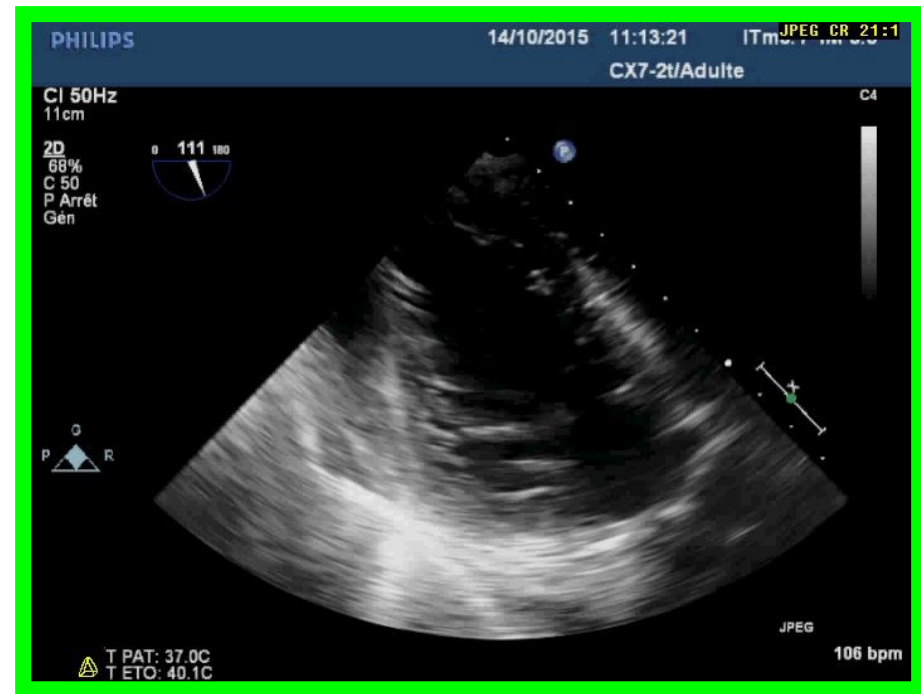
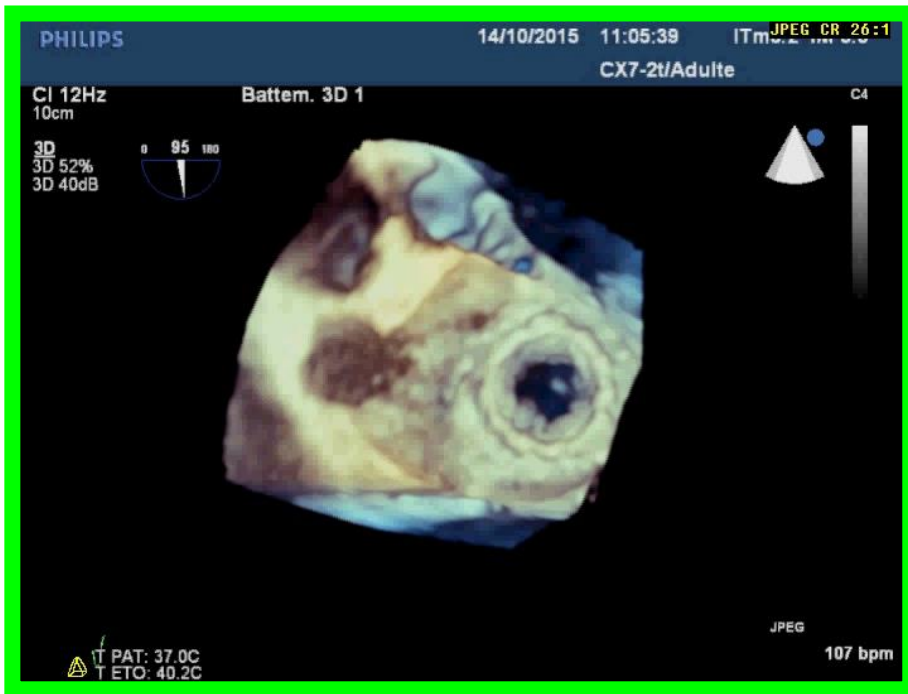
**Blood cultures:** Staphylococcus Methi-R (x 3)

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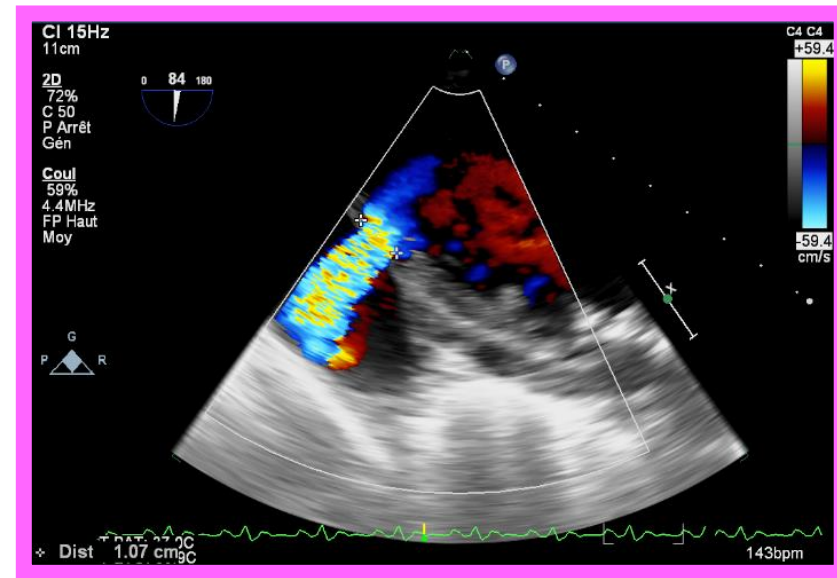
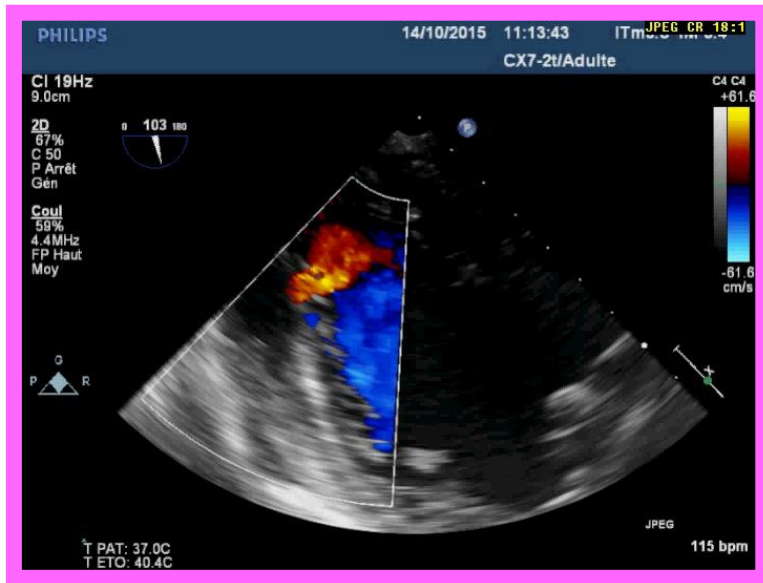
# TOE October 14<sup>th</sup>, 2015



# TOE October 14<sup>th</sup>, 2015



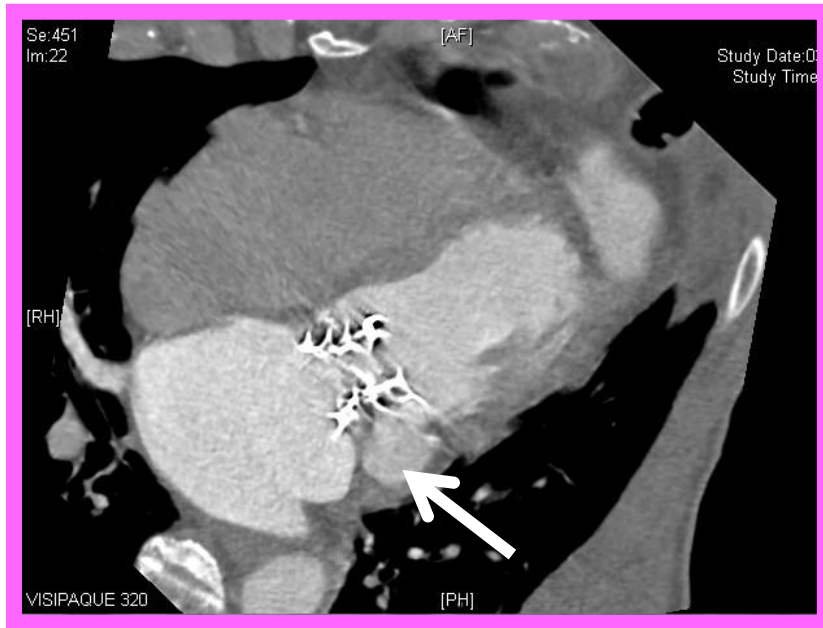
# TOE October 14<sup>th</sup>, 2015



# Q1: What is your diagnosis?

1. **Bioprosthetic Valve-in-valve endocarditis ?**
2. **Pericardial effusion?**
3. **LV aneurysm?**
4. **LV false aneurysm?**

# cardiac CT scan

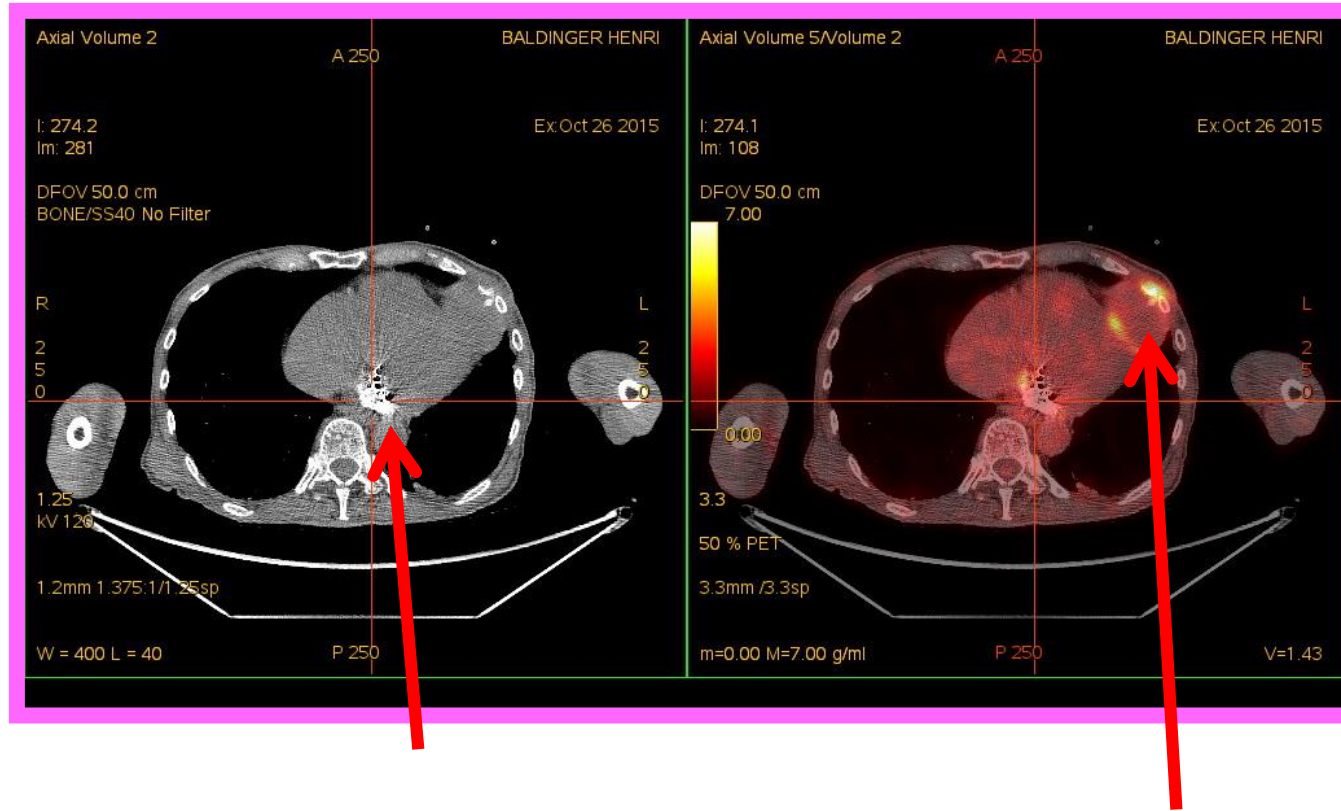


**Mitral annulus  
pseudo-aneurysm**



**Apical false aneurysm**

# $^{18}\text{F}$ FDG-PET-CT November 4<sup>th</sup>



**Uptake on the  
prosthesis**

**Uptake on the apical  
LV false aneurysm**

# What is your diagnosis?

1. **Bioprosthetic Valve-in-valve endocarditis**
2. **Pericardial effusion**
3. **LV aneurysm**
4. **LV false aneurysm**





# Decision and management

## 1. Definite IE

## 2. Initiation of antibiotic therapy

- **initially:** Vancomycin with Gentamycin:
- **then:** Cotrimoxazole with Clindamycin

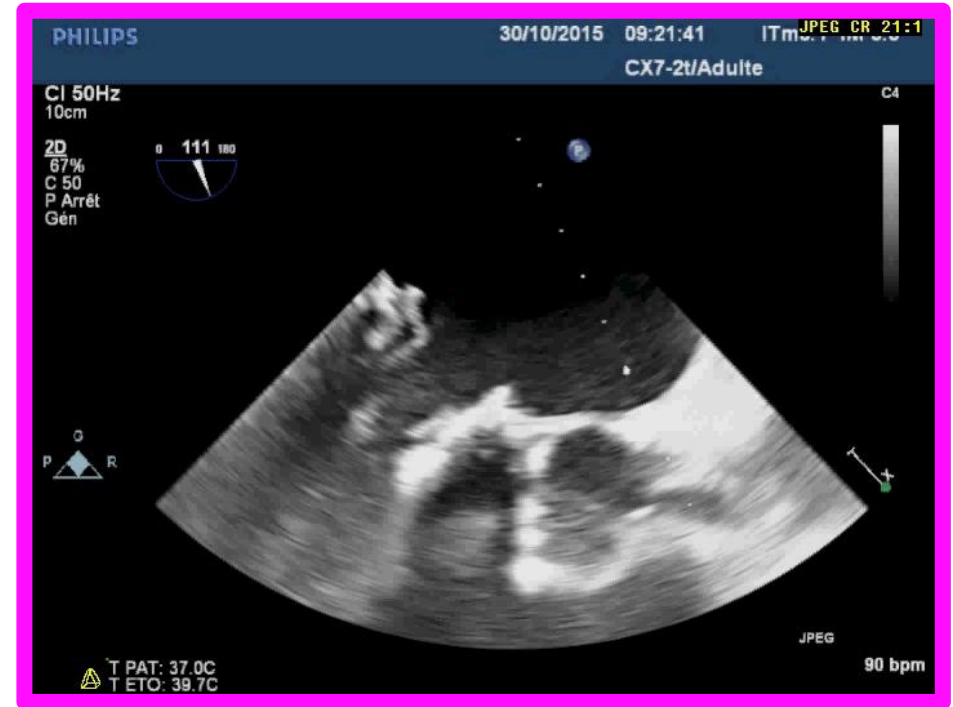
## 3. follow-up

- repeat TEE
- repeat CT scan

# Evolution under ATB therapy

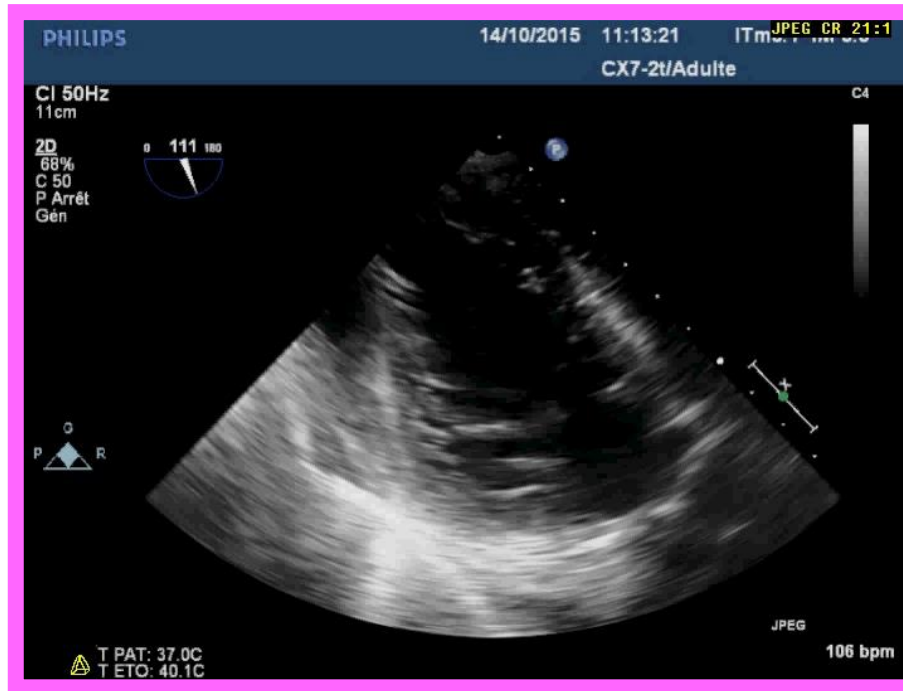


October 14<sup>th</sup>, 2015

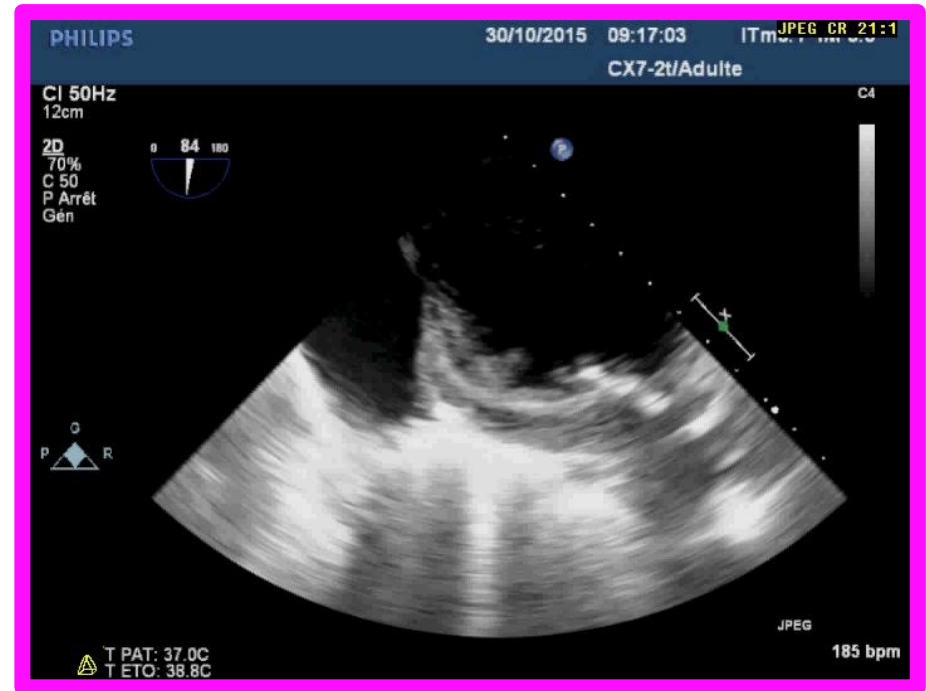


October 30<sup>th</sup>, 2015

# Evolution under ATB therapy

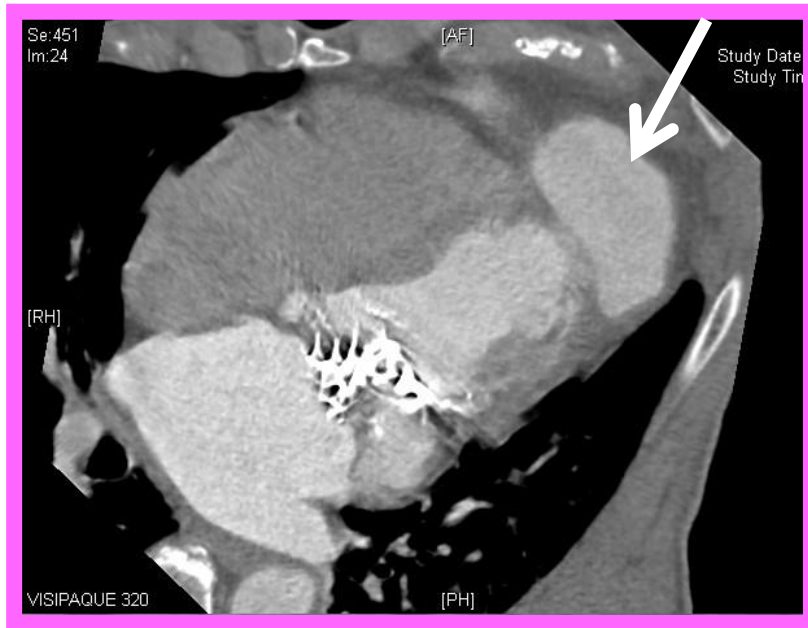


October 14<sup>th</sup>, 2015

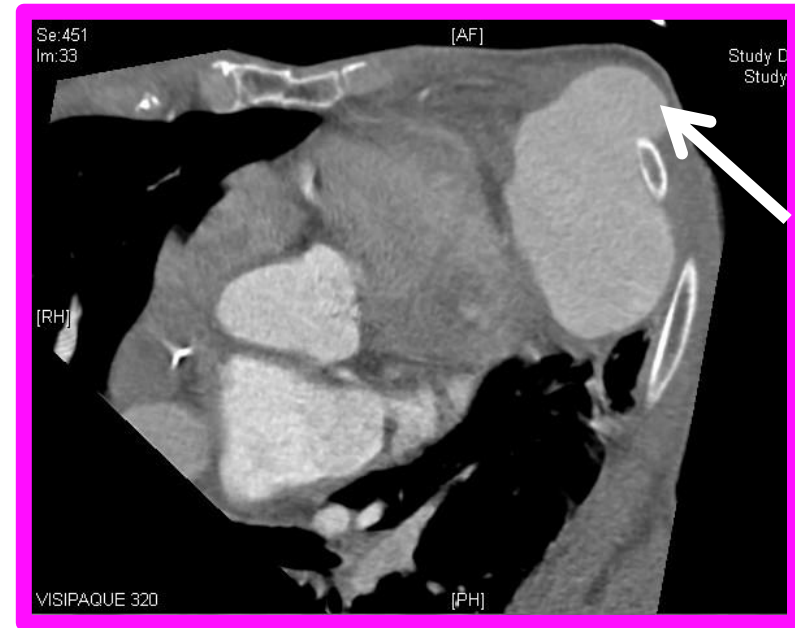


October 30<sup>th</sup>, 2015

# Evolution under ATB therapy



October 14<sup>th</sup>, 2015



October 30<sup>th</sup>, 2015

# Pulsatile false aneurysm



# What is your management?

1. **Antibiotic therapy alone?**
2. **Emergency surgery ?**
3. **Elective surgery?**
4. **Other?**



# TAVI Endocarditis

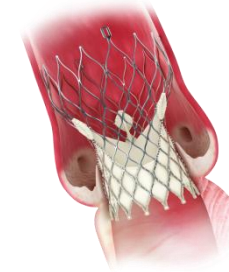
1. incidence
2. prevention
3. diagnosis
4. treatment



# TAVR-Associated Prosthetic Valve Infective Endocarditis

Results of a Large, Multicenter Registry

- 2572 patients between 2008-2013
- 14 centers
- Sapien/Corevalve: 40-60%
- Median follow-up 1.1 year
- 29 IE



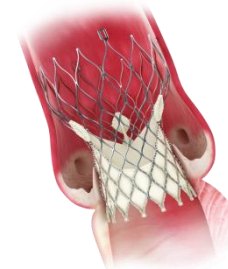


## Infective Endocarditis Following Transcatheter Aortic Valve Implantation: Results from a Large Multicenter Registry

Ignacio J. Amat-Santos, David Messika-Zeitoun, Helene Eltchaninoff, Samir Kapadia, Stamatios Lerakis, Asim Cheema, Enrique Gutiérrez-Ibanes, Antonio Munoz-Garcia, Manuel Pan, John G. Webb, Howard Herrmann, Susheel Kodali, Luis Nombela-Franco, Corrado Tamburino, Hasan Jilaihawi, Jean-Bernard Masson, Fabio Sandoli de Brito, Maria Cristina Ferreira, Valter Correa Lima, José Armando Mangione, Bernard Iung, Eric Durand, Alec Vahanian, Murat Tuzcu, Salim S. Hayek, Rocio Angulo-Llanos, Juan J. Gómez-Doblas, Juan Carlos Castillo, Danny Dvir, Martin B. Leon, Eulogio Garcia, Javier Cobiella, Isidre Vilacosta, Marco Barbanti, Raj Makkar, Henrique Barbosa Ribeiro, Marina Urena, Eric Dumont, Philippe Pibarot, Javier Lopez, Alberto San Roman and Josep Rodés-Cabau

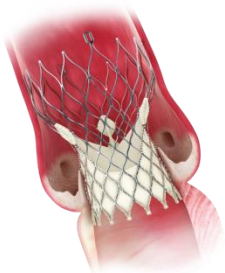


- 7944 patients between 2007-2014
- 21 centers
- Sapien/Corevalve: 80-20%
- Mean follow-up of  $1.1 \pm 1.2$  year
- 53 IE



## Prosthetic Valve Endocarditis After Transcatheter Aortic Valve Implantation

Niels Thue Olsen, Ole De Backer, Hans G.H. Thyregod, Niels Vejlstrup, Henning Bundgaard, Lars Søndergaard and Nikolaj Ihlemann



- 509 patients between 2007-2014
- Single-center
- Only CoreValve
- Median follow-up 1.4 year
- 18 IE

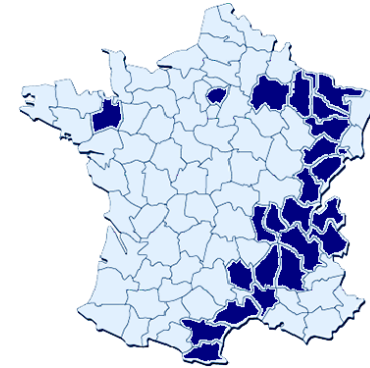
# TAVI Endocarditis

1. *incidence*
2. prevention
3. diagnosis
4. treatment

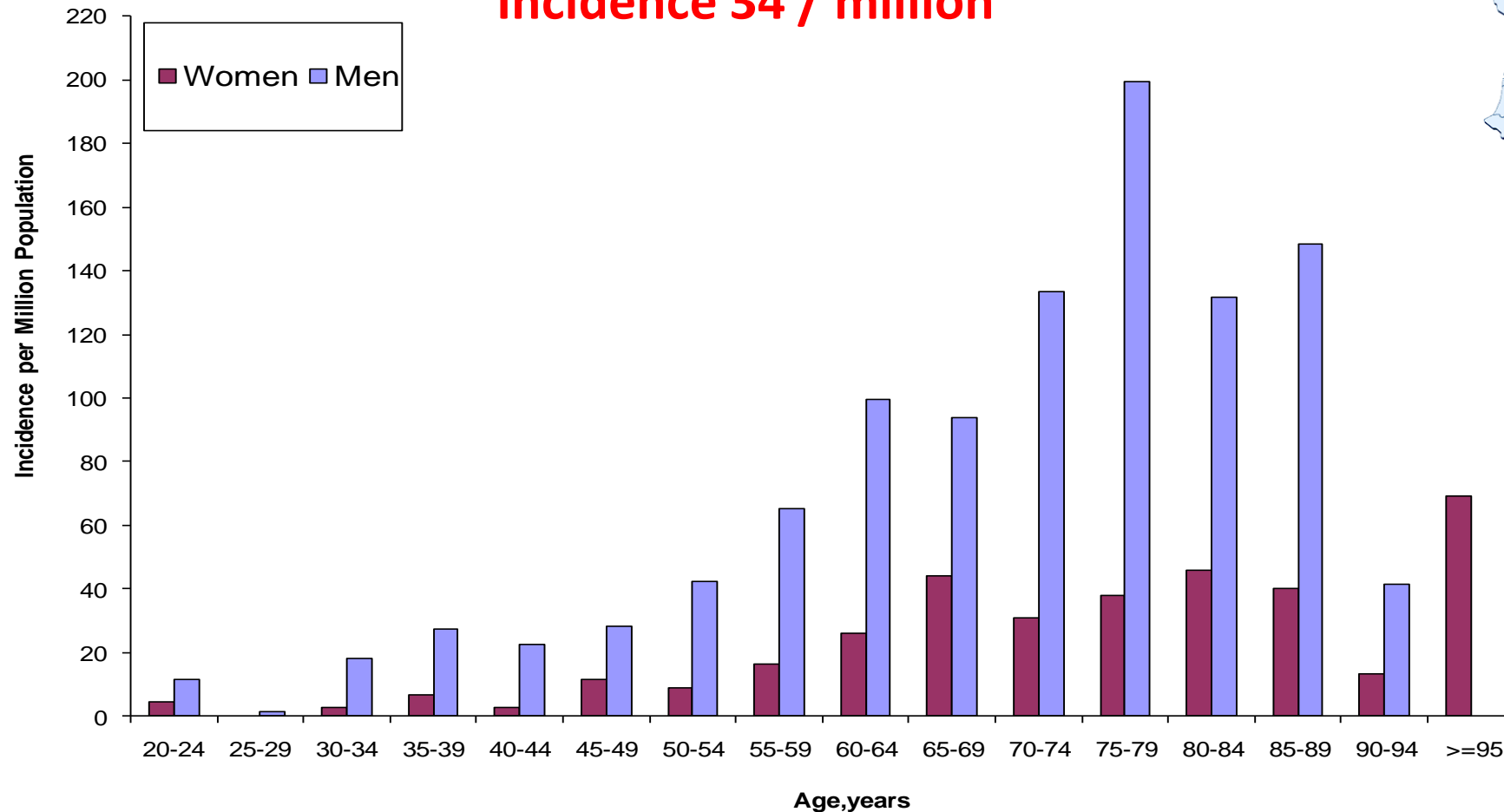


# Incidence of TAVI endocarditis

All cases (n=497) of definite IE in 15 million inhabitants

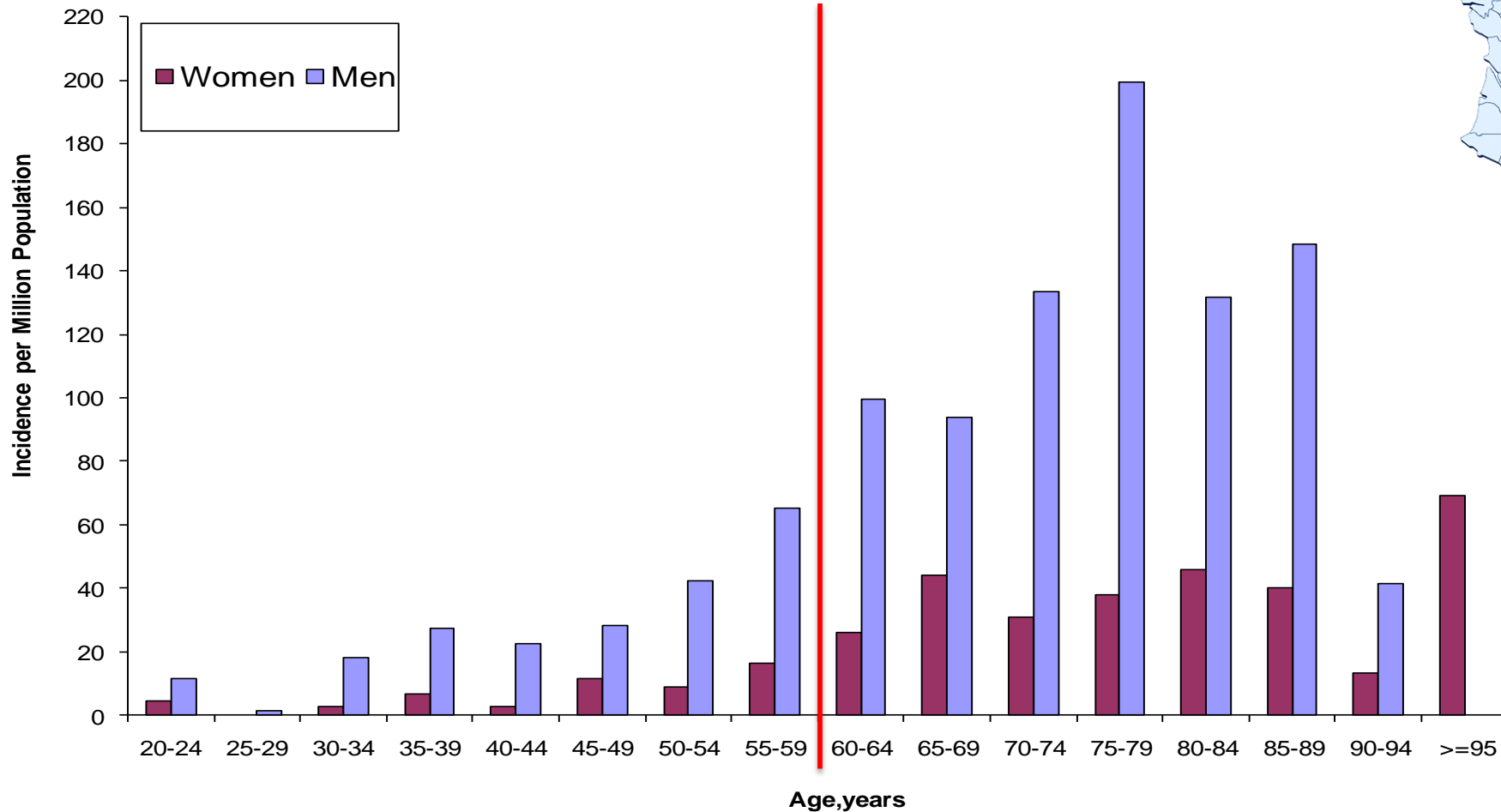
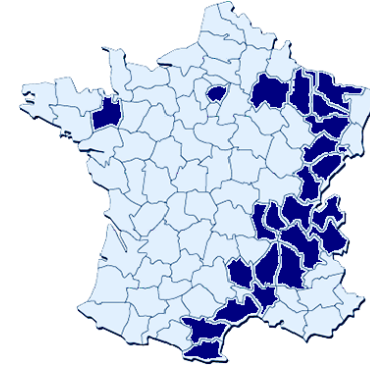


**Incidence 34 / million**



# Incidence of TAVI endocarditis

Incidence 34 / million

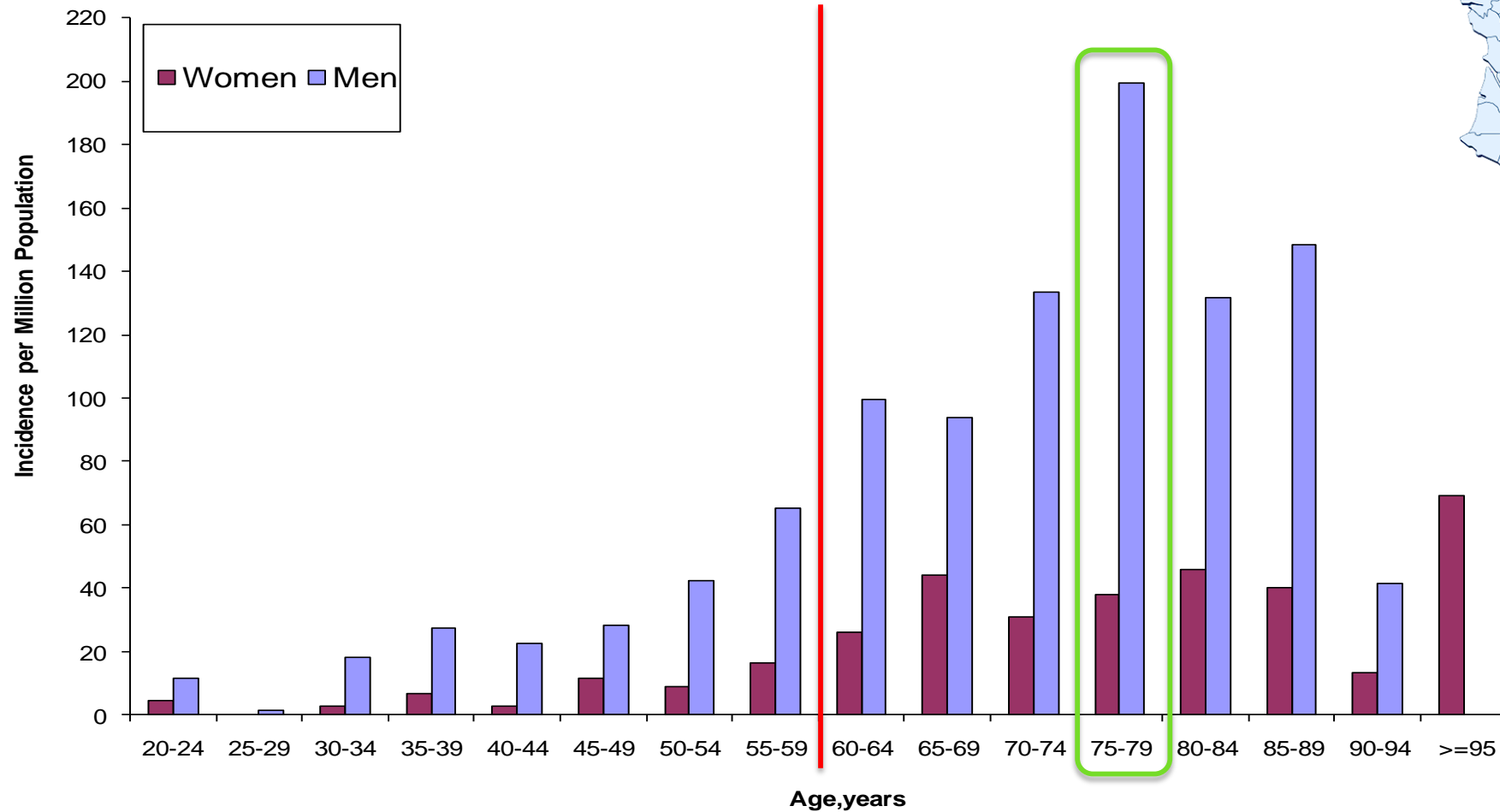
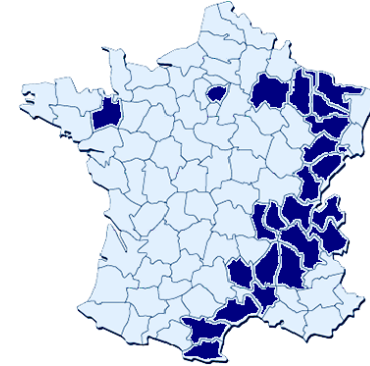


# Incidence of TAVI endocarditis

Incidence 34 / million



194 / million



# Incidence of TAVI endocarditis

Annual incidence: from 0.4 to 2.1 per 100 pts/year

TAVI

annual incidence (%)	study
0.4	Buellesfeld, JACC 2011
0.6	Généreux, JACC 2012
0.66	Gotzmann, AJC 2014
0.75	PARTNER (2 years FU)
1.1	Latib, JACC 2014
0.7	Amat-Santos, Circulation 2015
2.1	Olsen, Circ Cardiovasc int 2015

Case and cohorts

Specific large studies

# Incidence of TAVI endocarditis

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Case and cohorts

Specific large studies

Surgery

0.3-1.2 ESC Guidelines 2015

Surgical prosthesis




# TAVI Endocarditis


1. incidence
2. ***prevention***
3. diagnosis
4. treatment




# Bacteriological findings

	JACC	Circ	Circ cardiovasc
 Blood culture (%)	73	89	100
Enterococci (%)	21	21	33
Staph Aureus (%)	14	21	22
Staph coag neg (%)	17	24	11
Oral strepto (%)	3	6	17


# Bacteriological findings

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# Bacteriological findings

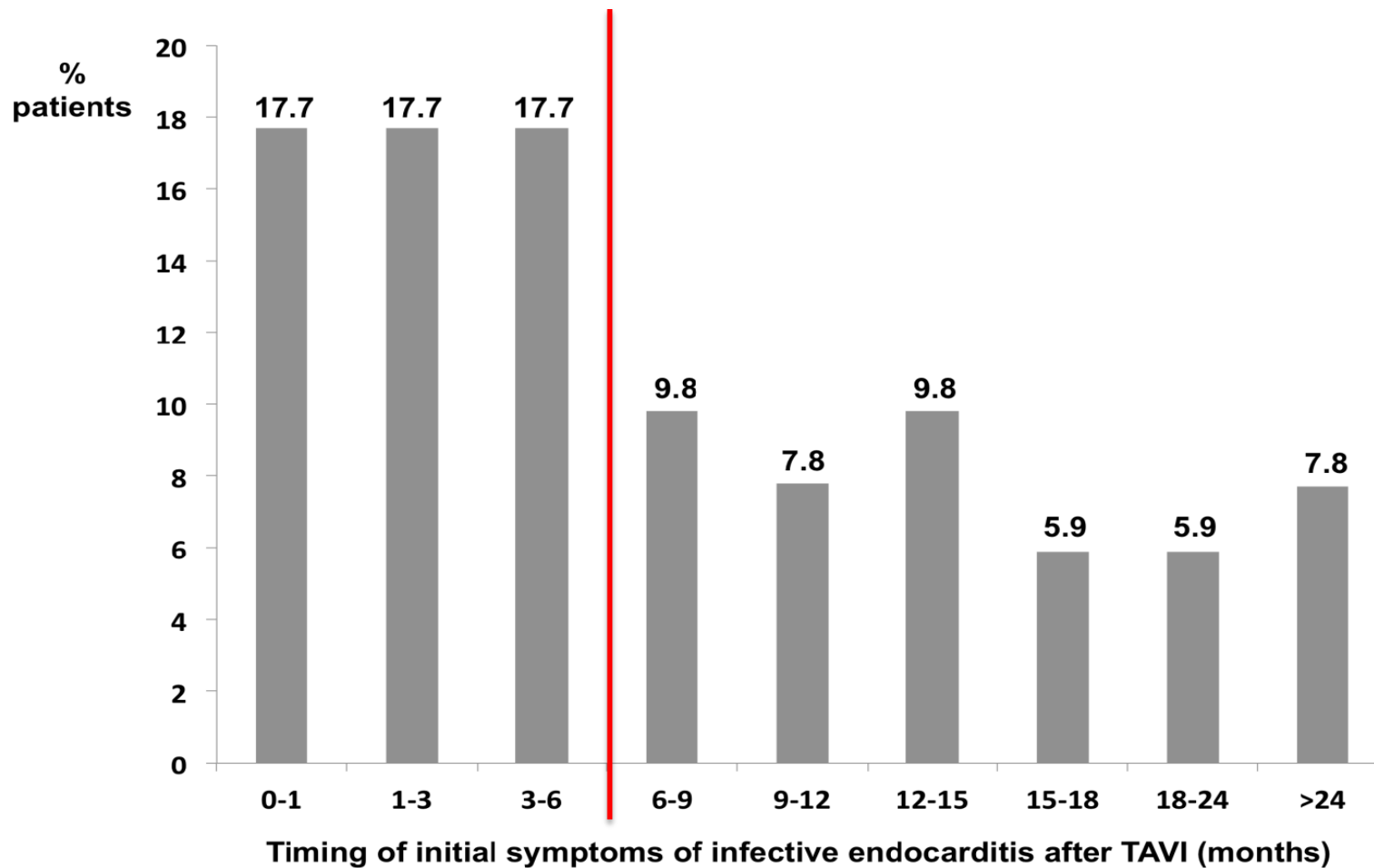
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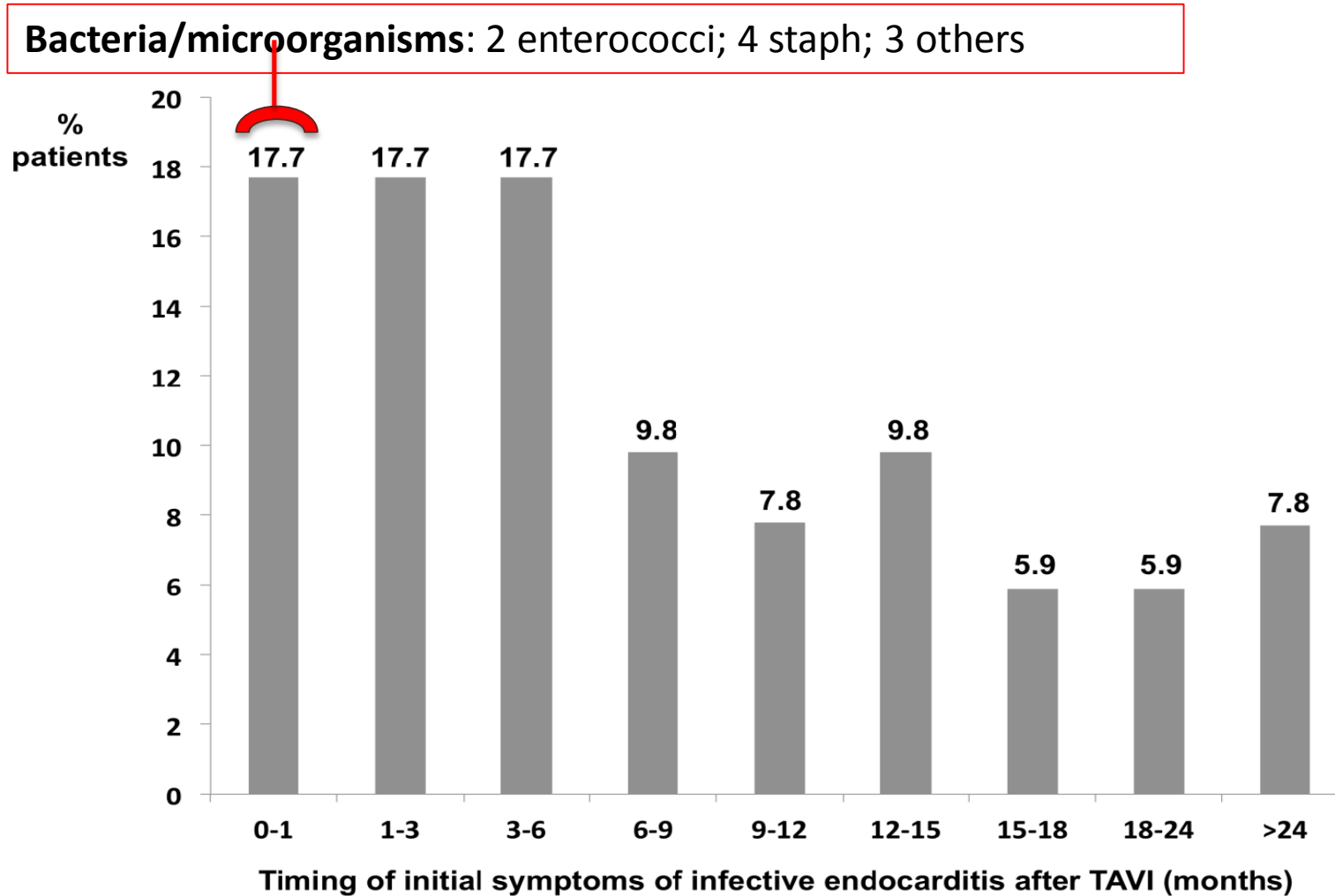
# Timing of initial symptoms

Amat-Santos IJ et al. Circulation 2015



# Timing of initial symptoms

Amat-Santos IJ et al. Circulation 2015



Amat-Santos IJ et al. Circulation 2015

# Cardiac conditions at highest risk of IE

Recommendations	Class	Level
<p>Antibiotic prophylaxis should only be considered for patients at highest risk of IE:</p> <ol style="list-style-type: none"><li>1. Patients with a prosthetic valve, including transcatheter valve or a prosthetic material used for cardiac valve repair.</li><li>2. Patients with previous IE.</li><li>3. Patients with congenital heart disease.<ol style="list-style-type: none"><li>a. any cyanotic congenital heart disease</li><li>b. congenital heart disease repaired with prosthetic material whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if there remains residual shunt or valvular regurgitation.</li></ol></li></ol>	<b>IIa</b>	<b>C</b>
<p>Antibiotic prophylaxis is not recommended in other forms of valvular or congenital heart disease.</p>	<b>III</b>	<b>C</b>





# Non-specific prevention measures

These measures should ideally be applied to the general population and particularly reinforced in high-risk patients.

- Strict dental and cutaneous hygiene. Dental follow-up should be performed twice a year in high-risk patients and yearly in the others.
- Disinfection of wounds.
- Eradication or decrease of chronic bacterial carriage: skin, urine.
- Curative antibiotics for any focus of bacterial infection.
- No self-medication with antibiotics.
- Strict asepsis control measures for any at-risk procedure.
- Discourage piercing and tattooing.
- Limit the use of infusion catheters and invasive procedure when possible. Favour peripheral over central catheters, and systematic replacement of the peripheral catheter every 3–4 days. Strict adherence to care bundles for central and peripheral cannulae should be performed.



# Antibiotic prophylaxis before cardiac or vascular interventions

Recommendations	Class	Level
Pre-operative screening of nasal carriage of <i>Staphylococcus aureus</i> is recommended before elective cardiac surgery in order to treat carriers.	I	A
Peri-operative prophylaxis is recommended before pacemaker or implantable cardioverter defibrillator implantation.	I	B
Elimination of potential sources of dental sepsis is recommended >2 weeks before implantation of a prosthetic valve or other intracardiac or intravascular foreign material, except in urgent procedures.	I	C
Peri-operative antibiotic prophylaxis should be considered in patients undergoing surgical or transcatheter implantation of a prosthetic valve, intravascular prosthetic, or other foreign material.	IIa	C
Systematic local treatment without screening for <i>Staphylococcus aureus</i> is not recommended.	III	C



# Prophylaxis before TAVI

- ✓ **In the 3 papers: All patients received antibiotic prophylaxis**
- **JACC: according to institutional practice...**
- **Circulation: Cephalosporins in 14/21 centers (67%), vancomycin in 6 (28%) and piperacillin/tazobactam in 1 (5%) .**
- **Circ cardiovasc int: cefuroxime 1.5 g IV pre TAVI, 8 and 16 h after.**



# Prophylaxis before TAVI

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**“Cephalosporins are traditionally used, but this choice could be reconsidered if it is confirmed that enterococci are important pathogens in very early TAVI-PVE.”**



# TAVI Endocarditis

1. incidence
2. prevention
3. ***diagnosis***
4. treatment



# The Duke echographic criteria

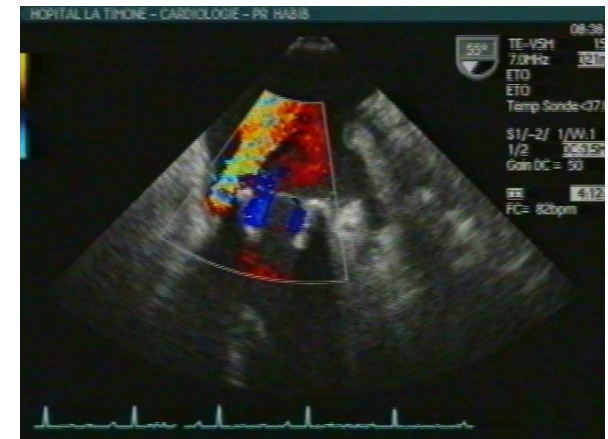
Durack DT Am J Med 1994 ; 96 : 200-9



*vegetation*

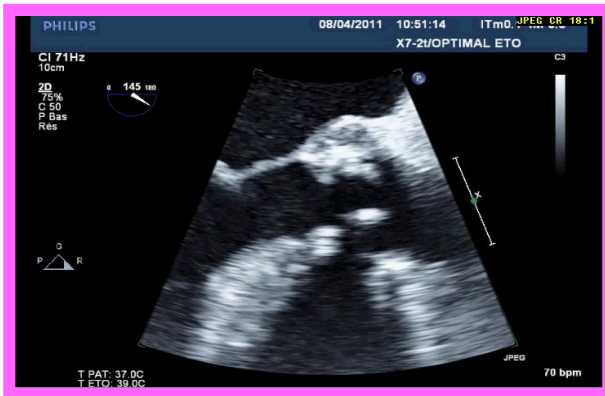


*abscess*

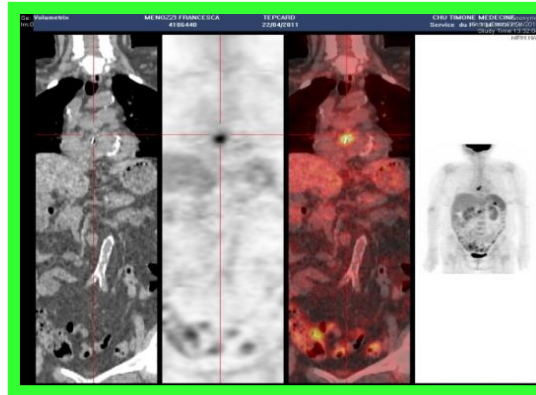


*new dehiscence  
of prosthetic valve*

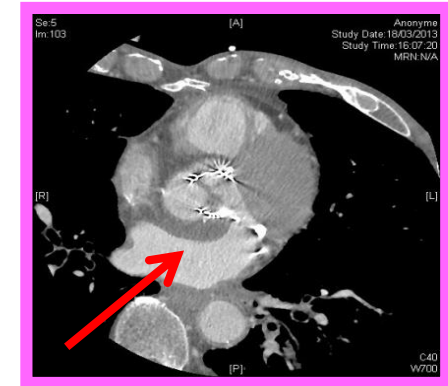
# Multimodality imaging in IE



**TOE**  
**Morphology**

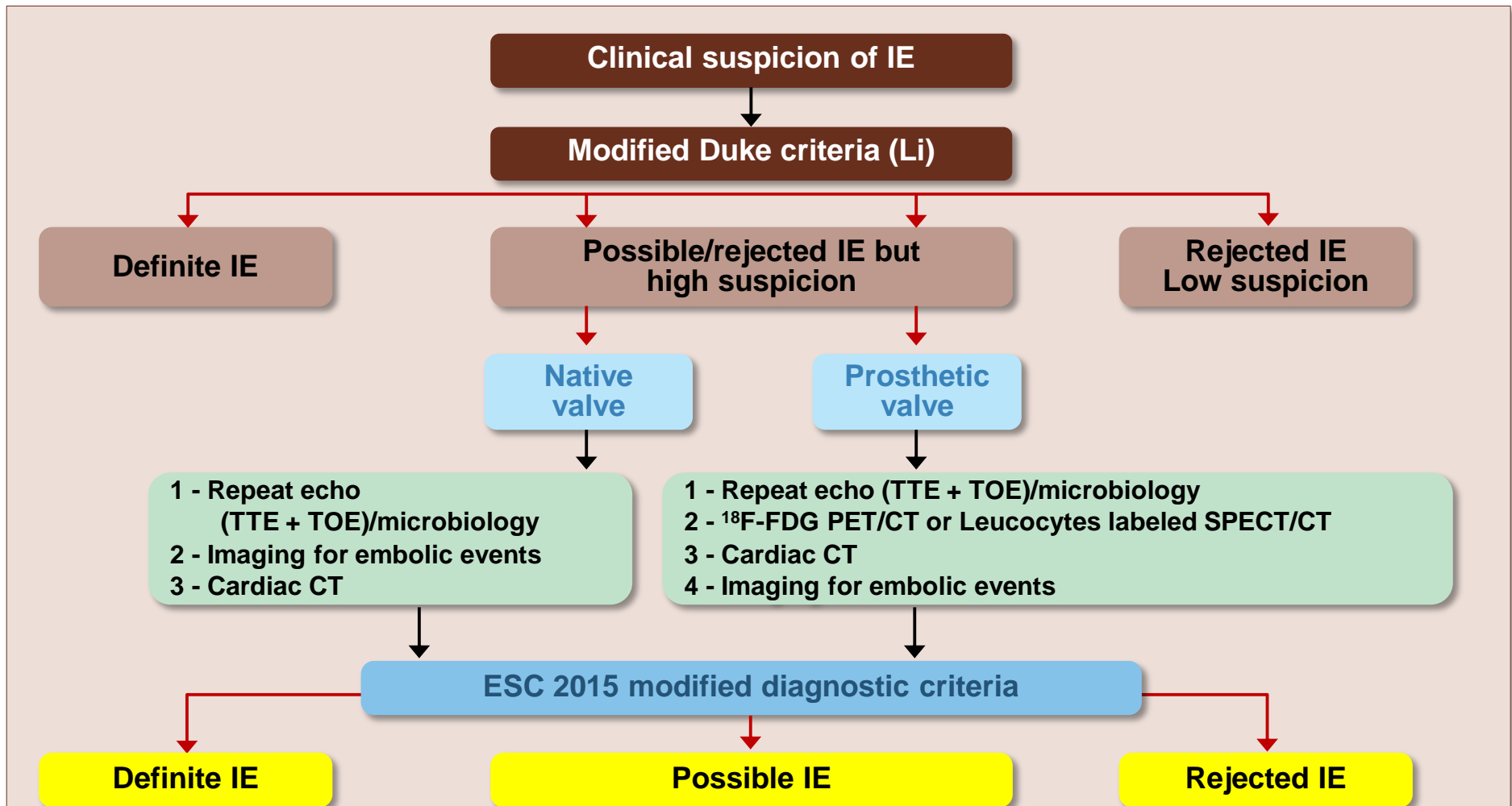


**PET CT**  
**Inflammation /  
infection**



**Cardiac CT**  
**Perivalvular lesions**

# ESC 2015 algorithm for diagnosis of IE





# TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. ***treatment***

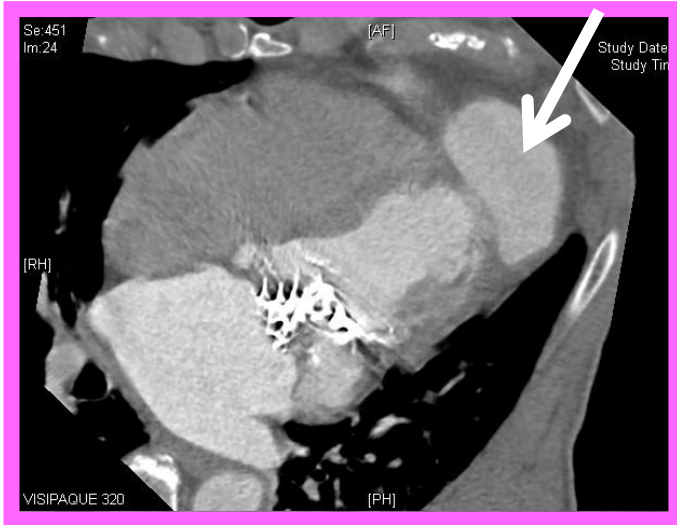


# Indications and timing of surgery

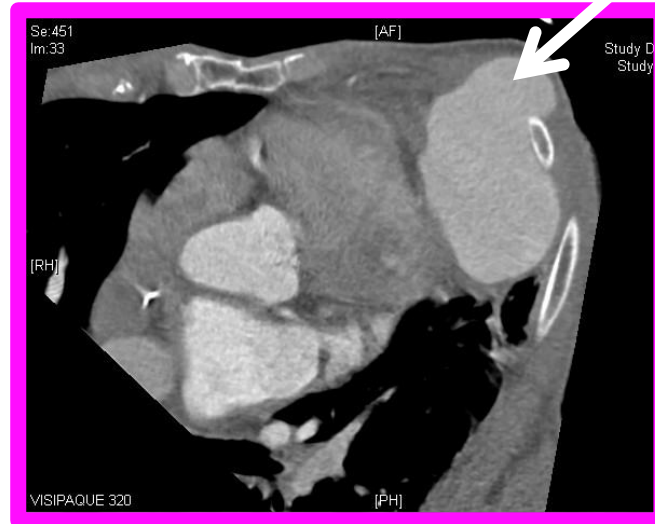
Indications for surgery	Timing	Class	Level
<b>1. Heart Failure</b>			
Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock.	Emergency	I	B
Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance.	Urgent	I	B
<b>2. Uncontrolled infection</b>			
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
<b>3. Prevention of embolism</b>			
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



# Evolution under ATB therapy



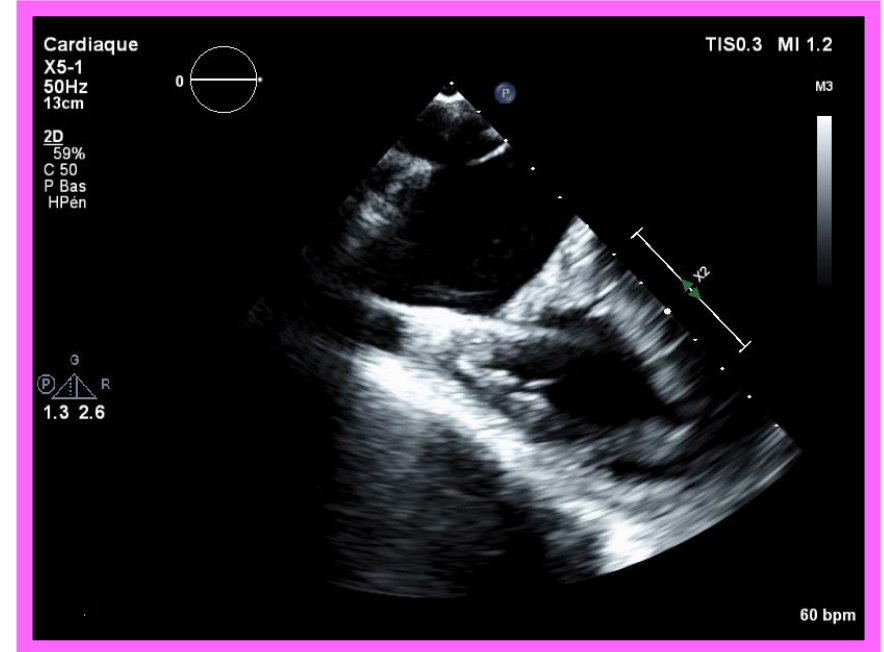
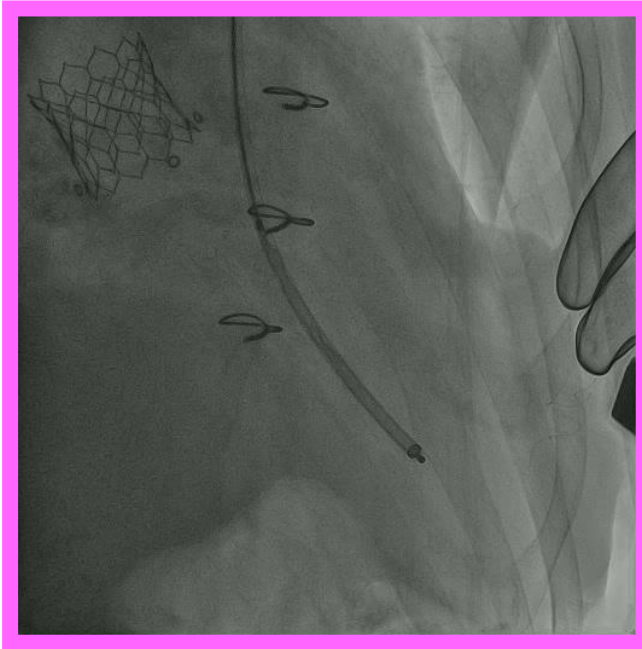
October 14th, 2015



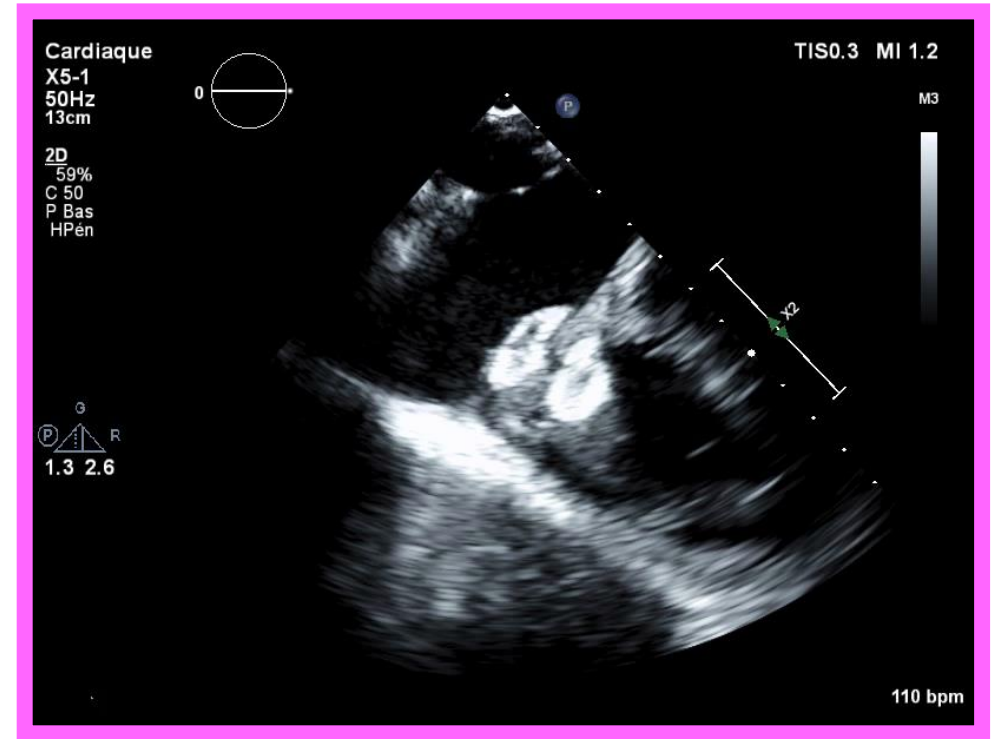
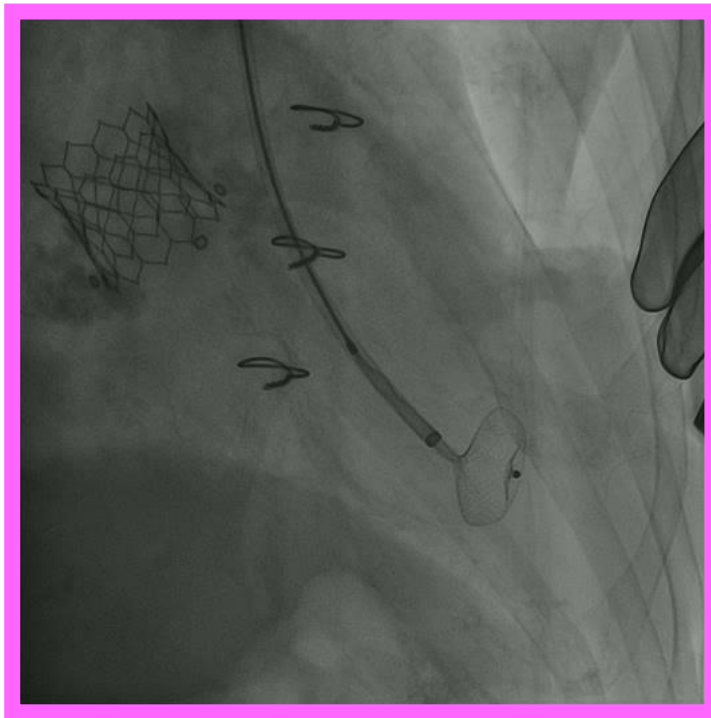
October 30th, 2015



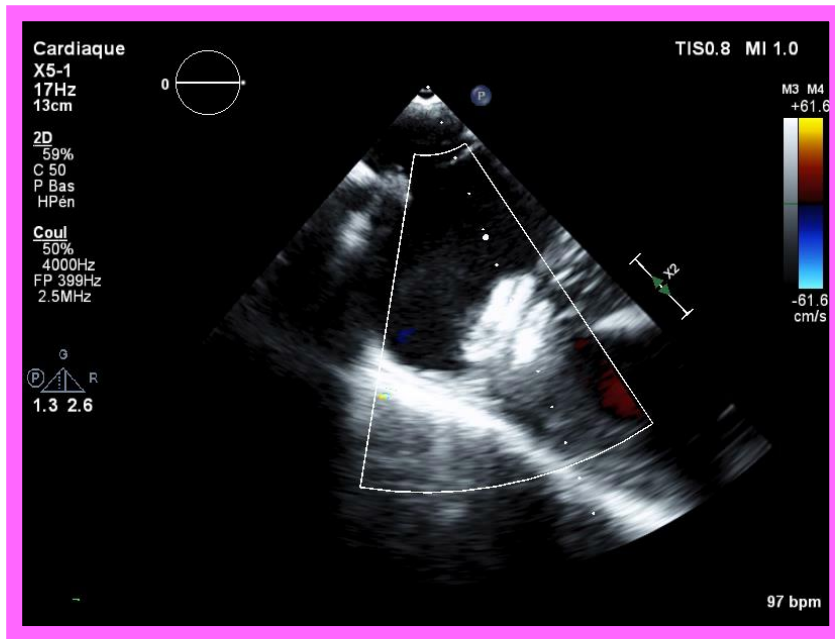
# Decision: transcatheter closure



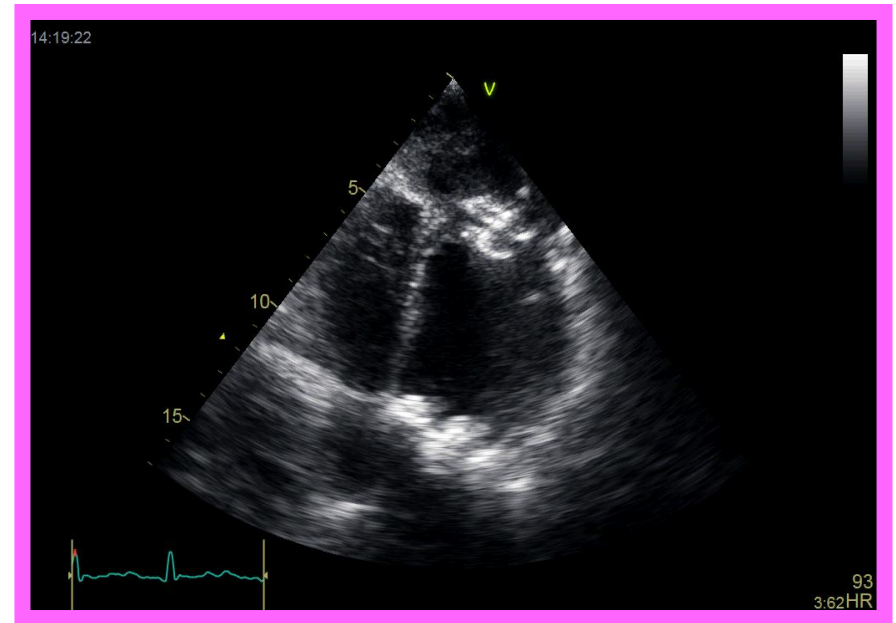
# Amplatzer deployment



# Final result



Per procedure



TTE November 9, 2015

# Take-home messages: TAVI endocarditis

- 1. Incidence 0.4-2.1%**
- 2. Frail patients, atypical presentation**
- 3. Diagnosis more difficult**
- 4. Role of PET-CT?**
- 5. Specific Antibiotic prophylaxis?**





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