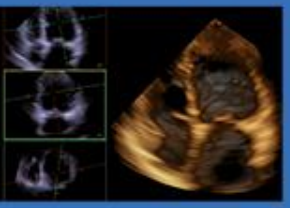


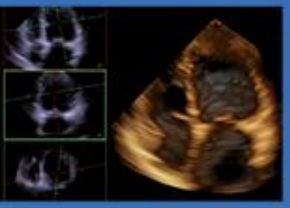
EuroValve
April 26-27, 2018

# DICE Session.
# The endocarditis team

Bernard Iung

Bichat Hospital, Paris Diderot University

Paris, France



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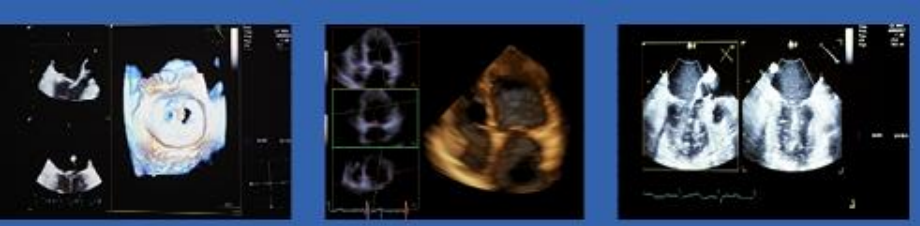
# Faculty disclosure

***First name - last name***

*I disclose the following financial relationships:*

**Consultant** for Edwards Lifesciences
**Paid speaker** for Boehringer Ingelheim, Novartis

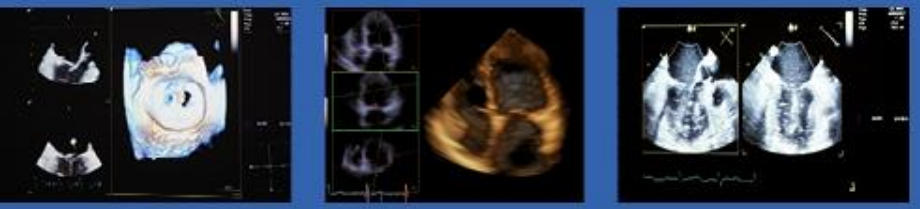
www.eurovalvecongress.com




# Case History

- 55-year old man
- Hypertension
- Hodgkin lymphoma in 1969 (7-year old) treated with chemotherapy and radiation therapy
- TAVI (CoreValve 26 mm, transfemoral) in November 2016 for severe, symptomatic AS. Choice of TAVI because of prior radiation therapy and porcelain aorta.
- Hospitalized in October 2017:
  - Intermittent fever for 3 months
  - No dyspnea, no neurologic symptom
  - No change in clinical examination

- Clinical examination
  - No heart murmur
  - No sign of congestive heart failure
  - Normal neurological examination
  - No cutaneous lesion
- ECG in sinus rhythm
- 12 000 leucocytes / $mm^3$, CRP 66 mg/L
- 6 blood cultures, positive for enterococcus faecalis
- TTE
  - Mean transprosthetic gradient 16 mmHg, trivial central regurgitation
  - LV: 45/28 mm, EF 65%
  - Mild mitral regurgitation
  - Systolic PAP estimated at 40 mmHg



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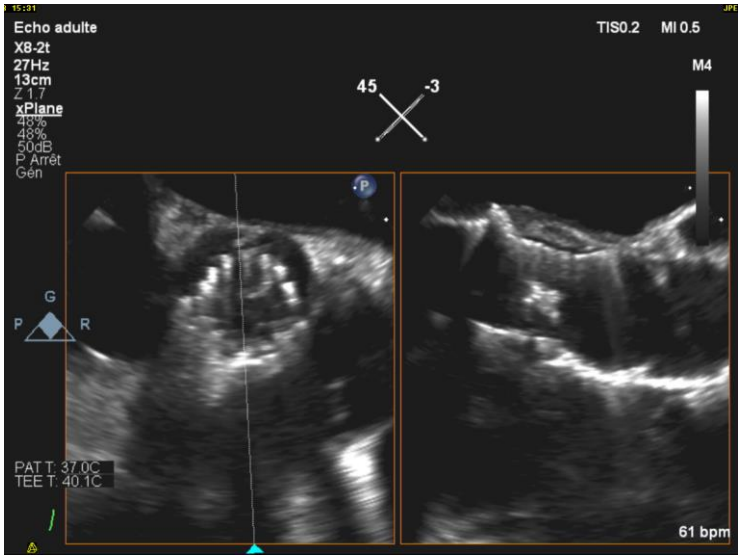
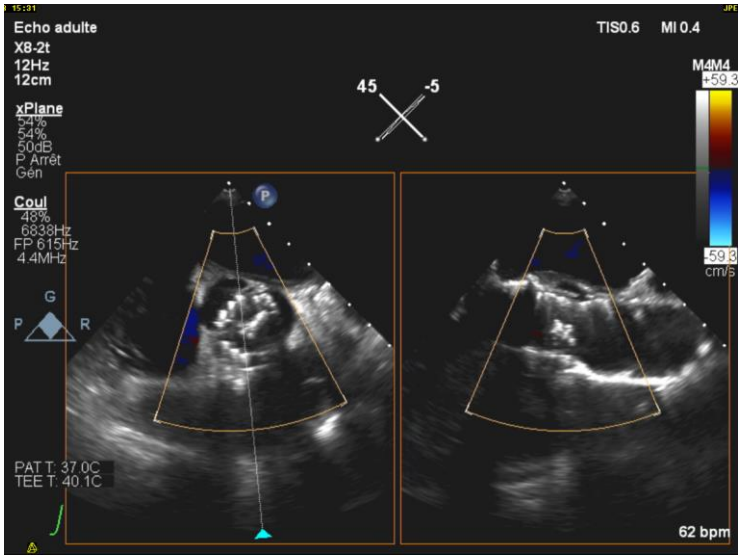
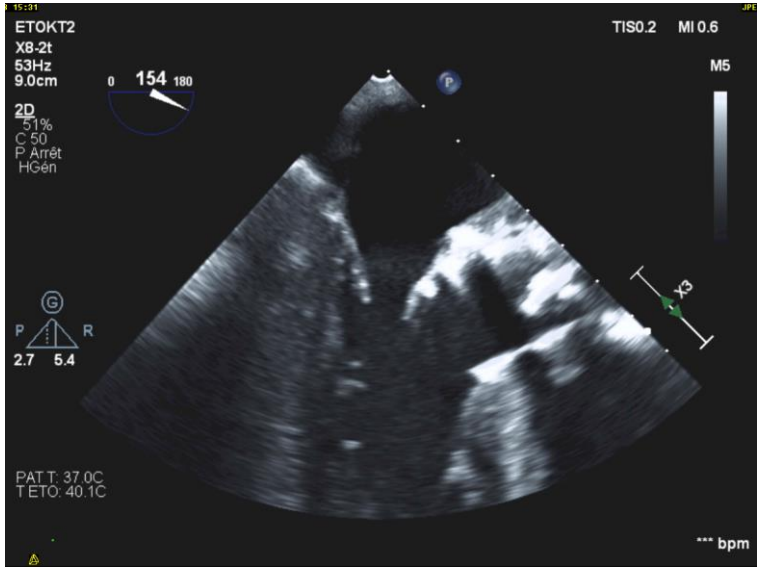
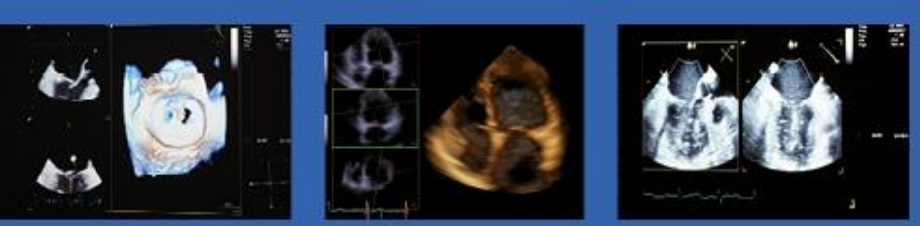


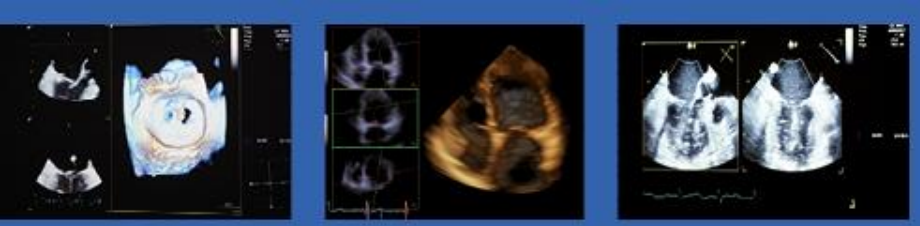






# Is there endocarditis on the TAVI prosthesis?

1. Yes
2. No because there are no signs of IE on TEE
3. Cardiac CT scan should be performed
4. PET CT should be performed
5. Cardiac CT and PET CT should be performed

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5. **Cardiac CT and PET CT should be performed**

# Incidence of IE after TAVI

Annual incidence: from 0.4 to 2.1%

TAVI

| annual incidence (%) | study | |
|---|---|---|
| 0.4 | Buellesfeld, JACC 2011 | Case and cohorts |
| 0.6 | Généreux, JACC 2012 | |
| 0.66 | Gotzmann, AJC 2014 | |
| 0.75 | PARTNER (2 years FU) | |
| 1.13 | Latib, JACC 2014 | Specific larger studies |
| 0.7 | Amat-Santos, Circulation 2015 | |
| 2.1 | Olsen, Circ Cardiovasc Int 2015 | |
| 1.82 | Mangner, JACC 2016 | |
| 1.1 | Regueiro, JAMA 2016 | |

Surgery

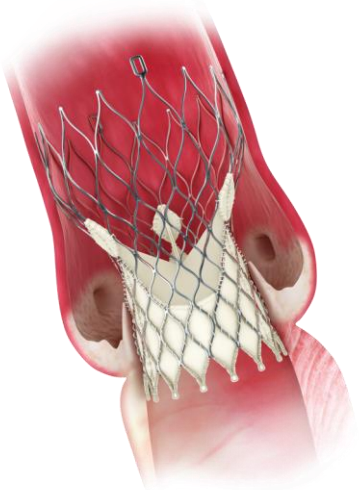
| | | |
|---|---|---|
| **0.3-1.2** | **ESC Guidelines 2015** | Surgical prosthesis |

# Bacteriological findings

| | Latib JACC 2014 | Amat-Santos Circ 2015 | Olsen Circ CV Int | Mangner JACC 2016 | Regueiro JAMA 2016 |
|---|---|---|---|---|---|
| Endocarditis n= | 29 | 53 | 18 | 55 | 250 |
| Blood cultures (%) | 73 | 89 | 100 | 96 | 95 |
| Enterococci (%) | 21 | 21 | 33 | 31 | 25 |
| Staph Aureus (%) | 14 | 21 | 22 | 38 | 23 |
| Staph coag neg (%) | 17 | 24 | 11 | 9 | 18 |
| Oral strepto (%) | 3 | 6 | 17 | 4 | 13 |

# Location of vegetations

- leaflets of the transcatheter valve : 48%
- stent frame : 18%
- mitral valve : 20%
- tricuspid valve : 4%
- pacemaker devices : 6%



X 2.5 with CoreValve

**Stent frame** 26.2% vs 10.6%, p=0.01

Valve-leaflet level 36.2% vs 56.8%, p=0.02

- Larger contact surface= more bacterial anchoring?
- Role of periprosthetic AR ?

*(Regueiro et al. JAMA 2016;316:1083-92)*

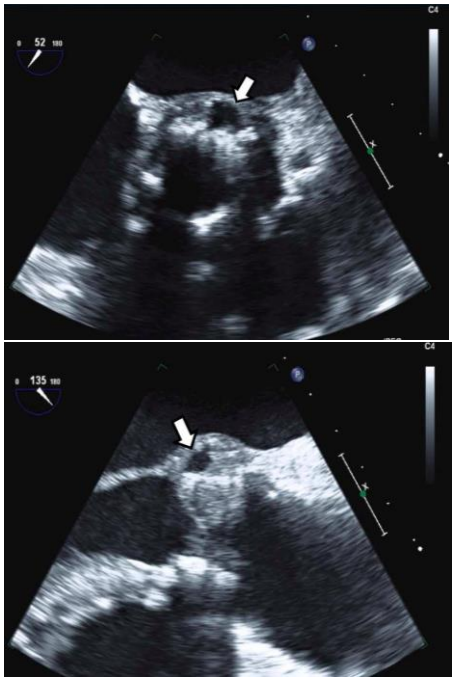
JACC: CARDIOVASCULAR IMAGING
VOL. ■, NO. ■, 2017

ISSN 1936-878X/$36.00
PUBLISHED BY ELSEVIER
http://dx.doi.org/10.1016/j.jcmg.2017.05.016

IMAGING VIGNETTE

# Diagnosis of Infective Endocarditis After TAVR

## Value of a Multimodality Imaging Approach



16 patients referred for TAVR IE suspicion
Final diagnosis (expert-team at 3 months FU):

- definite-IE in 10
- possible-IE in 1
- rejected-IE in 5.

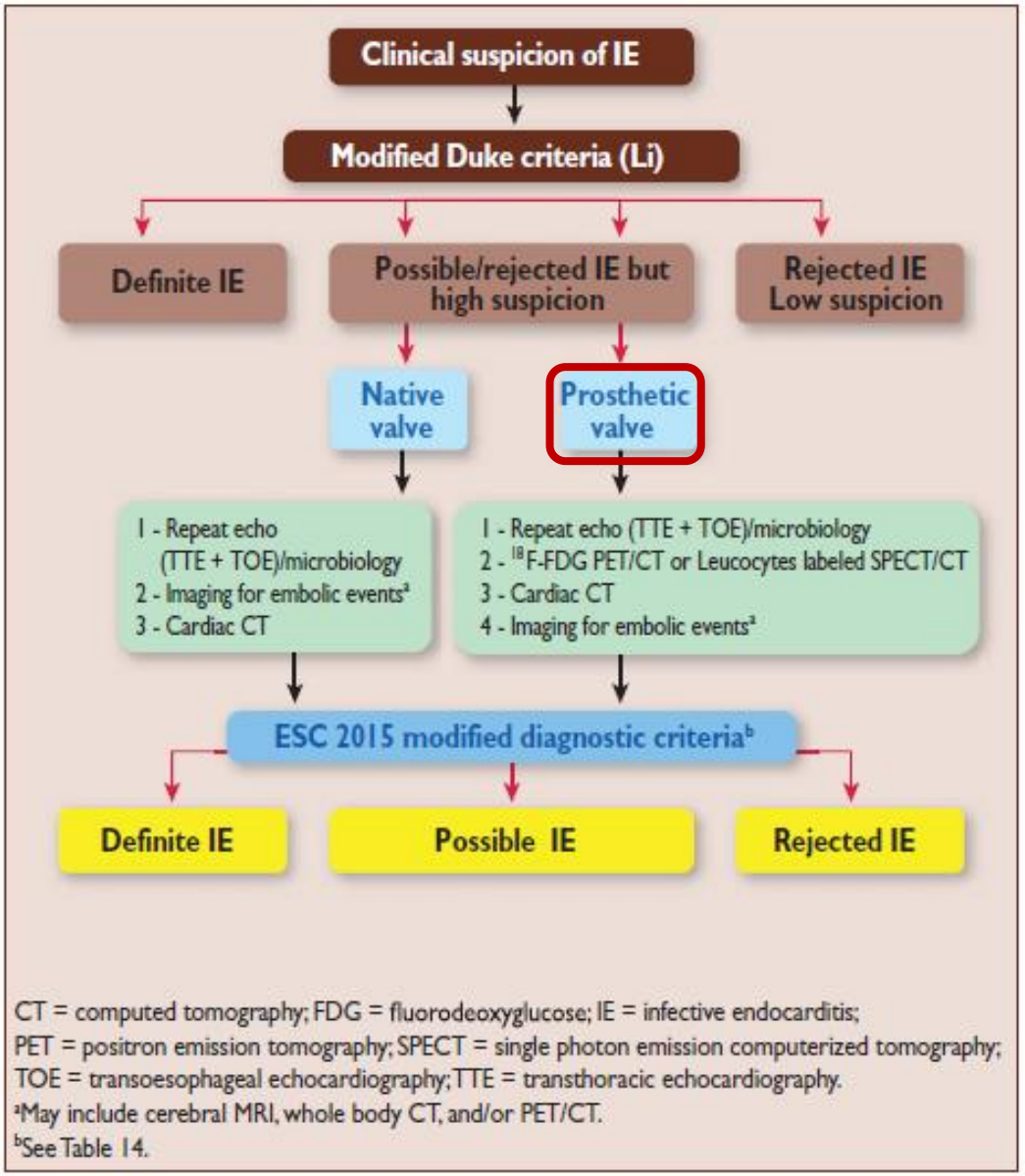
Main findings:

1) atypical lesions of obstructive pattern are frequent.
2) Conventional modified Duke criteria have a low diagnostic value

The multi-imaging approach (ESC 2015) presented with a higher diagnostic value (sensitivity 100%) than the modified Duke criteria (sensitivity 50%).

*(Salaun E et al. JACC Cardiovasc Imaging 2018;11:143-6)*

# Algorithm for the diagnosis of infective endocarditis

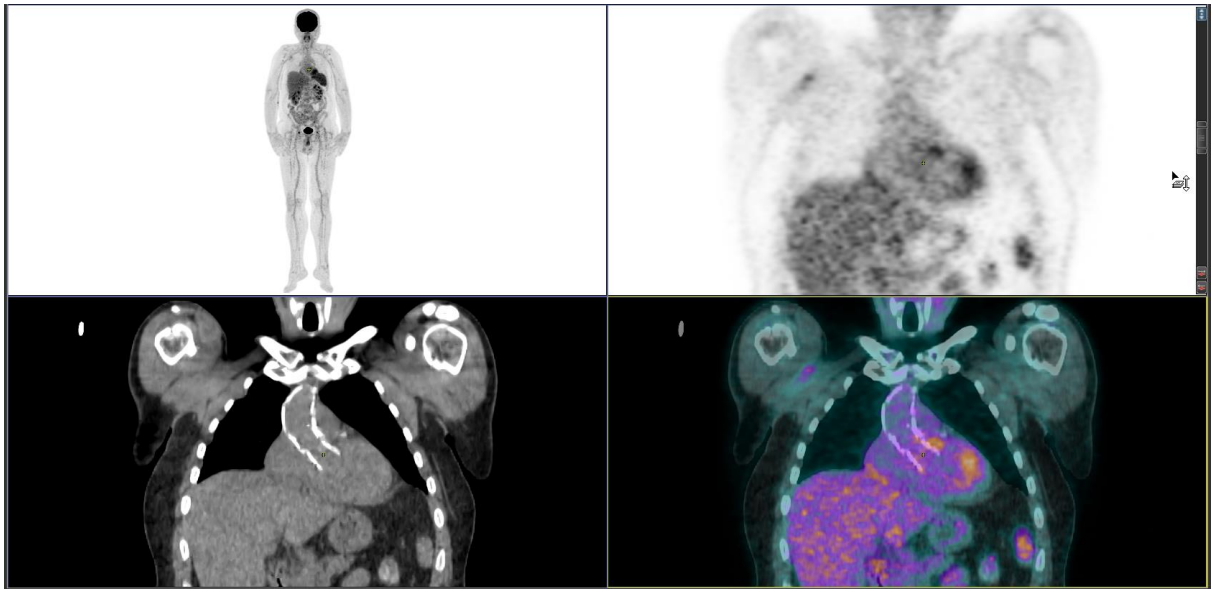


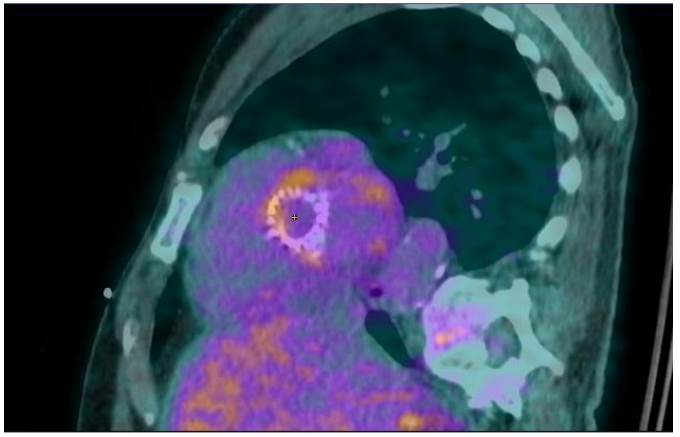

CT = computed tomography; FDG = fluorodeoxyglucose; IE = infective endocarditis; PET = positron emission tomography; SPECT = single photon emission computerized tomography; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.

[a]May include cerebral MRI, whole body CT, and/or PET/CT.

[b]See Table 14.

# PET/CT





# Modified diagnostic criteria for infective endocarditis

**Major criteria**

**1. Blood cultues positive for IE**

a. Typical microorganisms consistent with IE from 2 separate blood cultures:
- *Viridans streptococci, Streptococcus gallolyticus (Streptococcus bovis), HACEK group, Staphylococcus aureus;* 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 Coxiella burnetii or phase I IgG antibody titre >1:800

**2. Imaging positive for IE**

a. Echocardiogram positive for IE:
- 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.

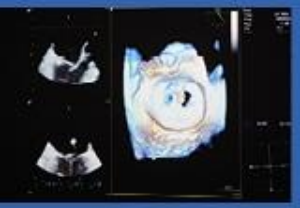
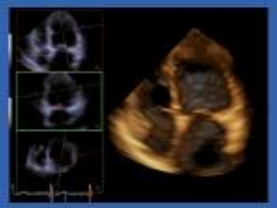
c. Definite paravalvular lesions by cardiac CT.

**Minor criteria**

1. Predisposition such as predisposing heart condition, or injection drug use.
2. Fever defined as temperature >38°C.
3. Vascular phenomena (including those detected by imaging only): major arterial emboli, septic pulmonary infarcts, infectious (mycotic) aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway's lesions.
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.



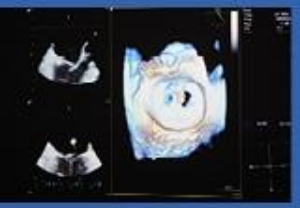
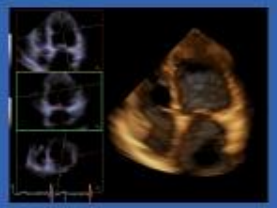
European Heart Journal (2015) doi:10.1093/eurheartj/ehv319



# How would you treat this patient?

1. 6-weeks antibiotic therapy
2. Lifelong antibiotic therapy
3. Surgical aortic valve replacement
4. TAVI valve-in-valve



# How would you treat this patient?

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# Indications and timing of surgery in left-sided valve infective endocarditis (native /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 | |



European Heart Journal (2015) doi:10.1093/eurheartj/ehv319

- No class I or IIa indication for surgery
  - No heart failure, no aortic regurgitation
  - No clinical embolism, no vegetation
  - No abscess
- High risk for surgery
- Need for close follow-up

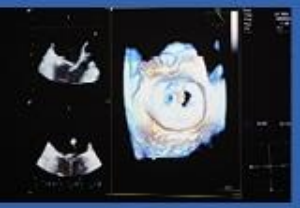
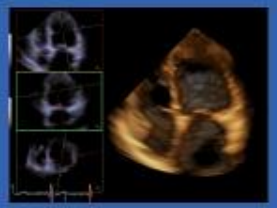
# IE management

| | Latib JACC 2014 | Amat-Santos Circ 2015 | Olesen Circ CV Int 2015 | Mangner JACC 2016 | Regueiro JAMA 2016 | Wang JAMA 2007 |
|---|---|---|---|---|---|---|
| Endocarditis (n=) | 29 | 53 | 18 | 55 | 250 | 556 |
| Surgery indication(%) | | 87 | - | 65 | 81 | |
| Surgery (%) | 10 | 8 | 6 | 16 | 15 | 49 |
| Valve in valve (%) | 3 | 4 | - | | 1 | - |

TAVI

Surgery

+ PM lead extraction in 3%



# Conclusion

- IE seems as frequent on TAVI prostheses than on surgical prostheses.
- Staphylococci and enterococci are the most frequent responsible micoorganisms.
- The diagnosis of prosthesis involvement is difficult and frequently requires multimodality imaging.
- Indications for surgery should take into account the high-risk profile of patients.