



A case of prosthetic valve endocarditis



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Patient's records

- 70 y.o man
- High BP. Dyslipidemia. Smoked in the past.
- Chronic renal failure (Cr 1.5/GFR 42 ml/min)
- 2006: Severe symptomatic aortic regurgitation + dilated sinus valsalva + 3 vessels disease
- Full aortic root replacement (Bono-Bentall procedure) + triple coronary bypass (one mammary artery and 2 vein grafts)



October 2015

- Admitted to another hospital: Fever without source.

TOE: no signs of endocarditis.

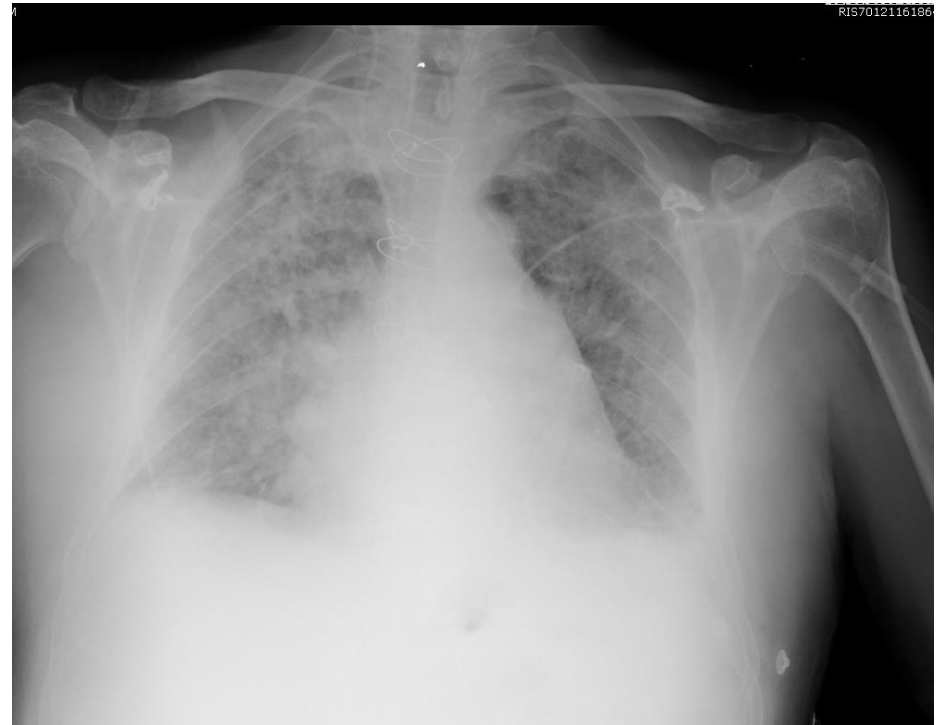
Cefixime

- One week later
 - Heart failure + severe sepsis. ICU.
 - 2/2 positive blood cultures for *S. coagulase negative*
 - TOE: Native mitral valve endocarditis
 - CT scan: splenic infarcts

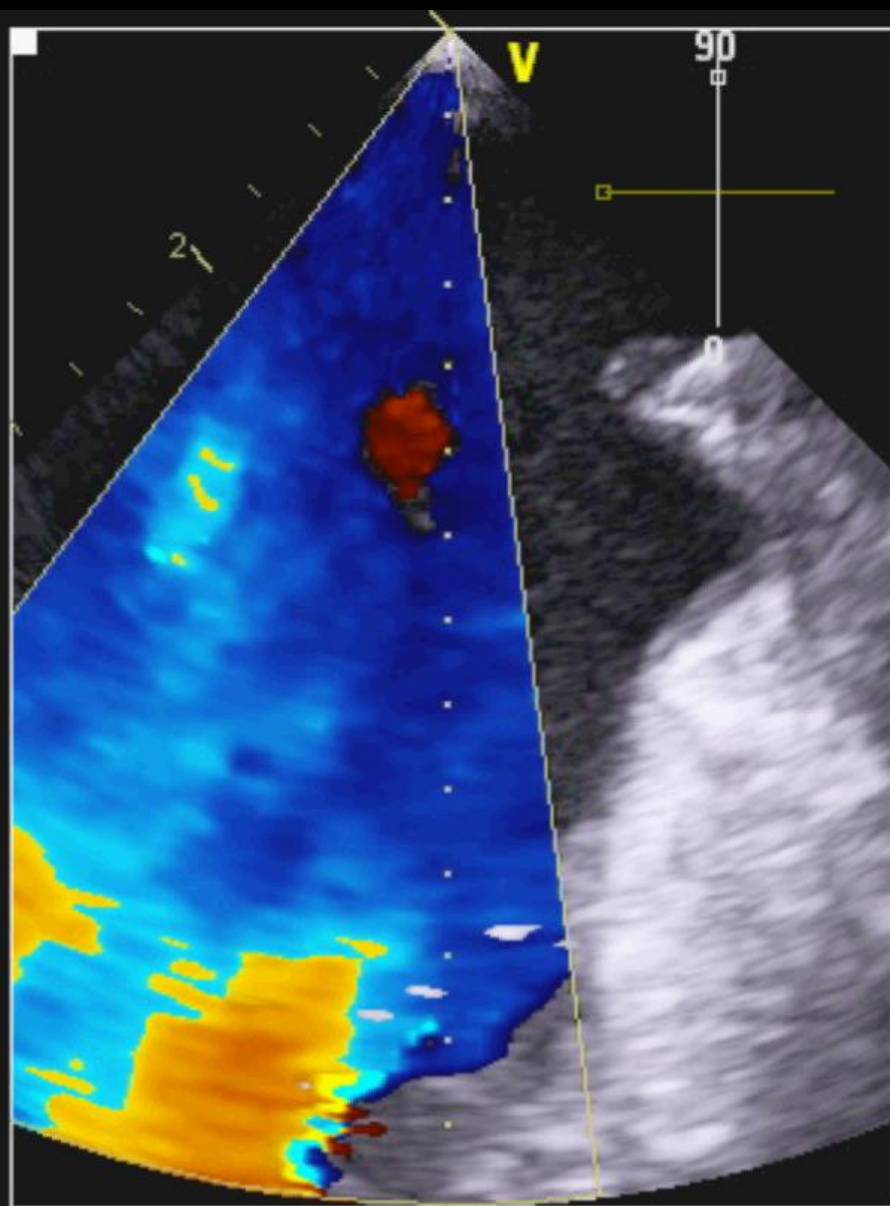


On arrival

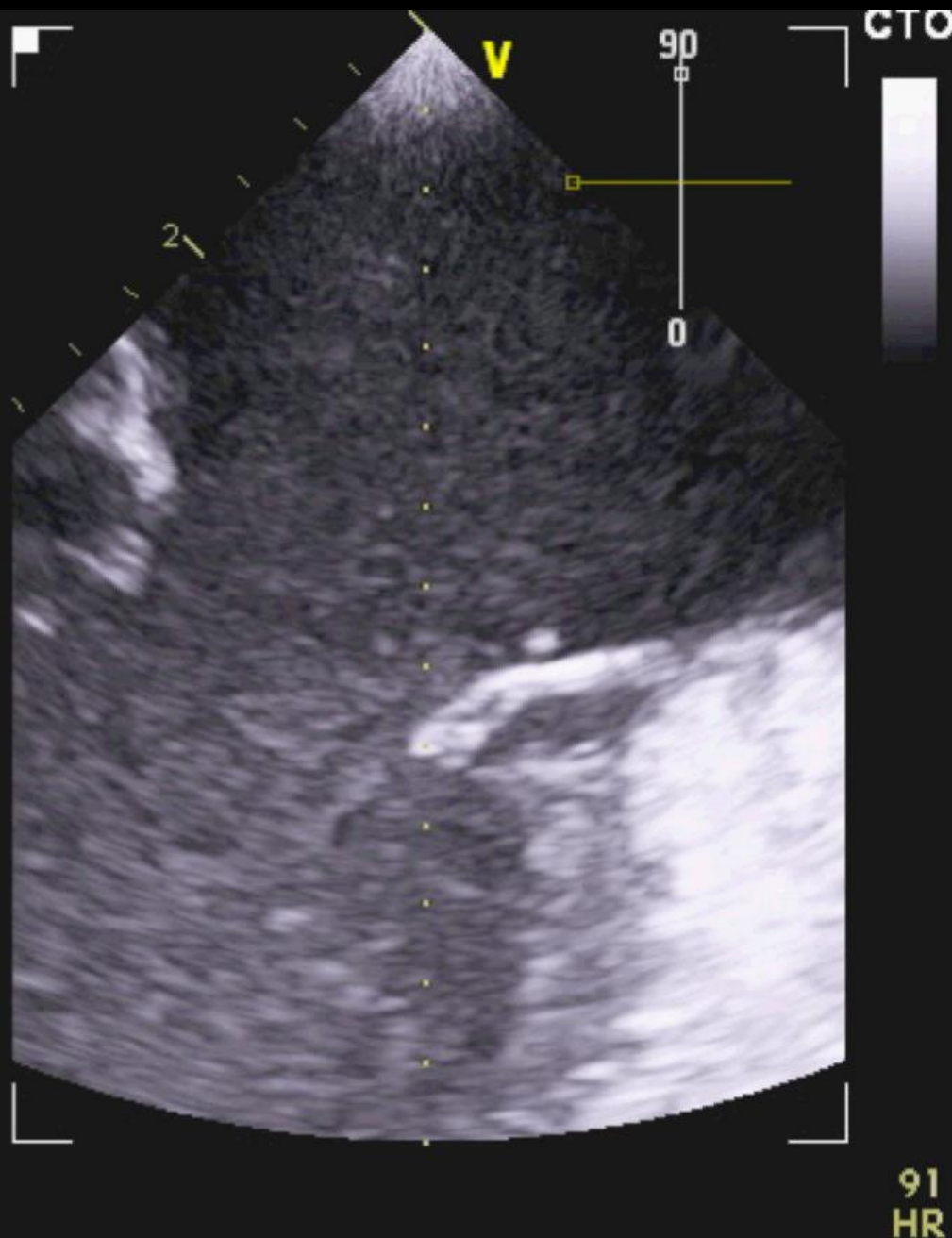
- BP 100/60 mmHg HR: 90 bpm.
- Apical systolic murmur. Rales in the basal and middle fields
- Cr 1.8 (GRF: 32 ml/min)
Hb 9.8



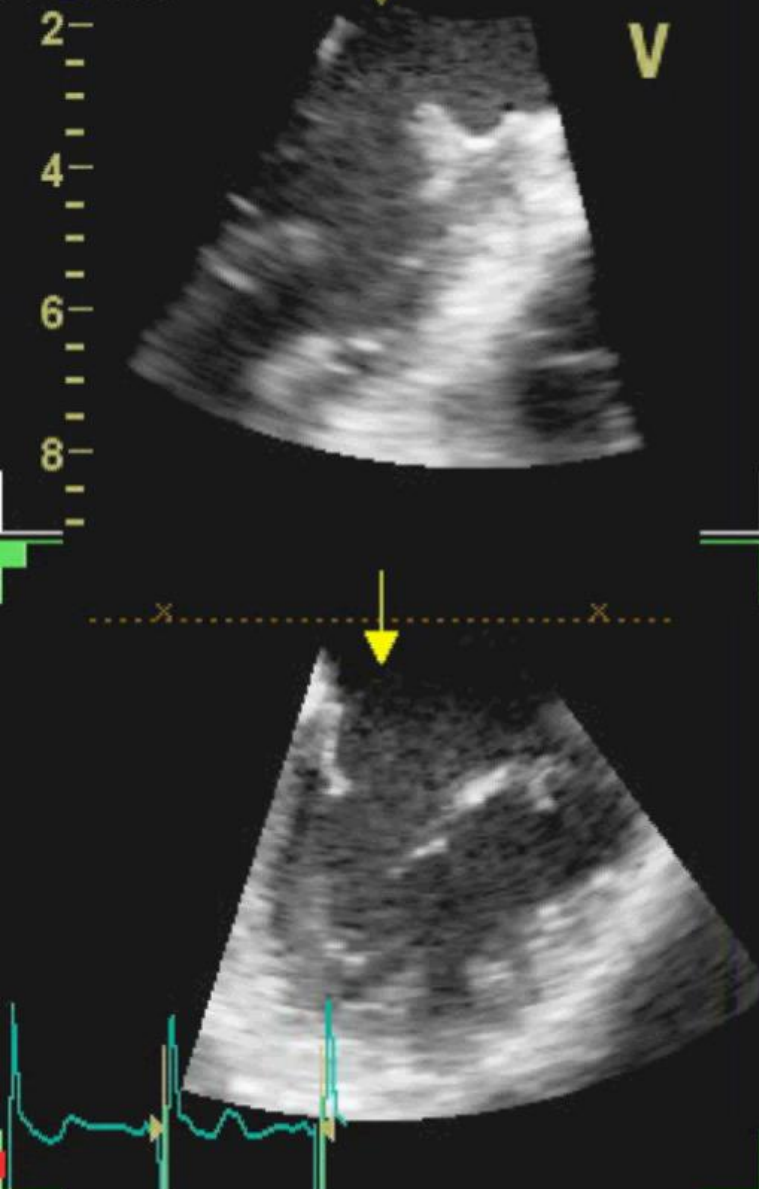
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FPS: 22.7/22.7



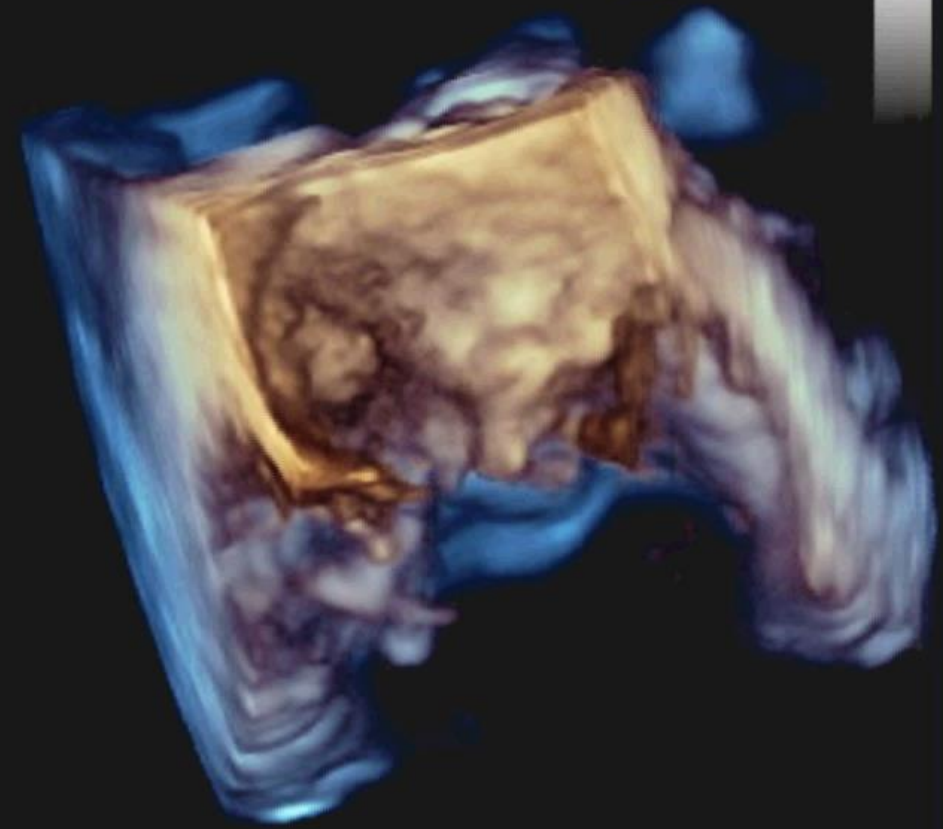
82
HR



FreC: 5.0 MHz/5.0 MHz
FPS: 14.1



121



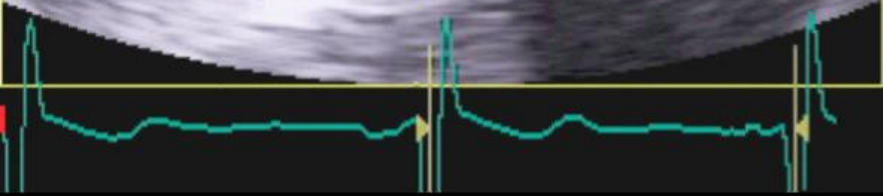
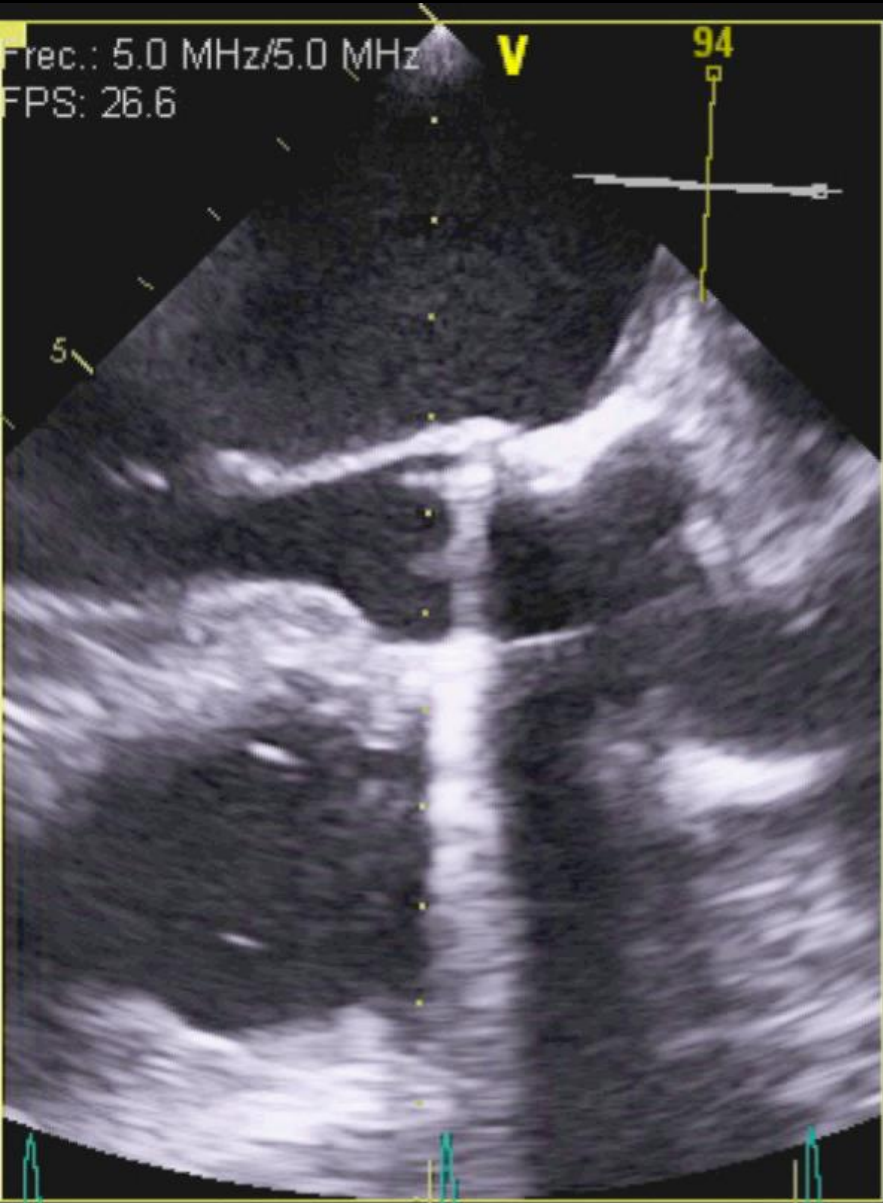
2 cm

RC 81

Freq.: 5.0 MHz/5.0 MHz
FPS: 26.6

V

94



CTO

V

-1

176



84
HR

Frec.: 5.0 MHz/5.0 MHz
FPS: 46.7

CTO

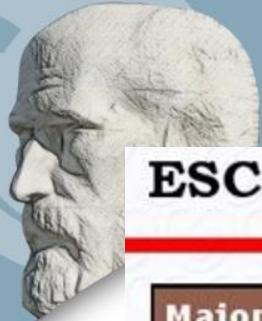


81
HR



Echo findings

	Surgery/ necropsy	Echocardiography
Vegetation	Infected mass attached to an endocardial structure or on implanted intracardiac material.	Oscillating or non-oscillating intracardiac mass on valve or other endocardial structures, or on implanted intracardiac material.
Abscess	Perivalvular cavity with necrosis and purulent material not communicating with the cardiovascular lumen.	Thickened, non-homogeneous perivalvular area with echodense or echolucent appearance.
Pseudoaneurysm	Perivalvular cavity communicating with the cardiovascular lumen.	Pulsatile perivalvular echo-free space, with colour-Doppler flow detected.
Perforation	Interruption of endocardial tissue continuity.	Interruption of endocardial tissue continuity traversed by colour-doppler flow.
Fistula	Communication between two neighbouring cavities through a perforation.	Colour-Doppler communication between two neighbouring cavities through a perforation.
Valve aneurysm	Saccular outpouching of valvular tissue.	Saccular bulging of valvular tissue.
Dehiscence of a prosthetic valve	Dehiscence of the prosthesis.	Paravalvular regurgitation identified by TTE/TOE, with or without rocking motion of the prosthesis.



ESC 2015 modified criteria for diagnosis of IE:

Major criteria

1. Blood cultures 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 $>38^{\circ}\text{C}$.
3. Vascular phenomena (including those detected only by imaging): 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.



Diagnosis

- Native mitral valve endocarditis
- Prosthetic aortic valve endocarditis
- St. CoNS
- Heart failure
- Embolic event



Treatment

Indications for surgery	Timing	Class	Level
A - HEART FAILURE			
Obstruction of mitral causing 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 - UNCONTROLLED INFECTION			
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
C - PREVENTION OF EMBOLISM			
therapy.			
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



Treatment

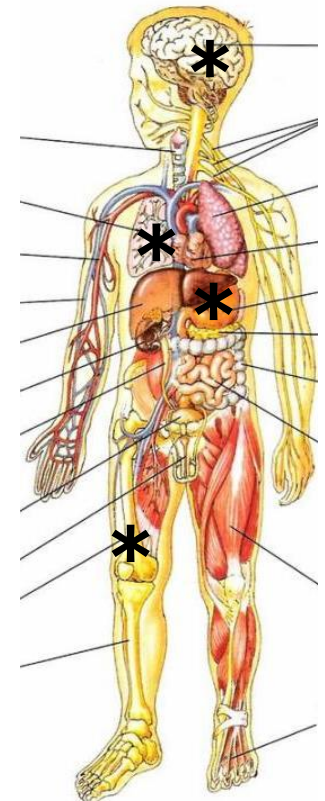
A - HEART FAILURE

C - PREVENTION OF EMBOLISM

Indications for surgery	Timing	Class	Level
A - HEART FAILURE			
cardiogenic shock.			
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
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> 40%



20-50% silent



Risk Model and Variables - STS Adult Cardiac Surgery Database Version 2.81

RISK SCORES	
About the STS Risk Calculator	
Procedure: MV Replacement Only	
Risk of Mortality:	53.776%
Morbidity or Mortality:	85.09%
Long Length of Stay:	80.103%
Short Length of Stay:	0.482%
Permanent Stroke:	4.738%
Prolonged Ventilation:	86.493%
DSW Infection:	2.242%
Renal Failure:	N/A
Reoperation:	44.096%

PREOPERATIVE
RISK IS ON

OPERATIVE

- Previous
- Chronic
- Active

VE

graft)

HF

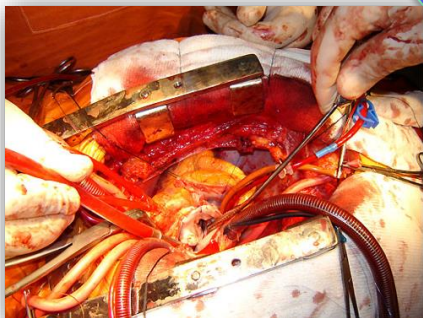
K



Treatment



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TEAM



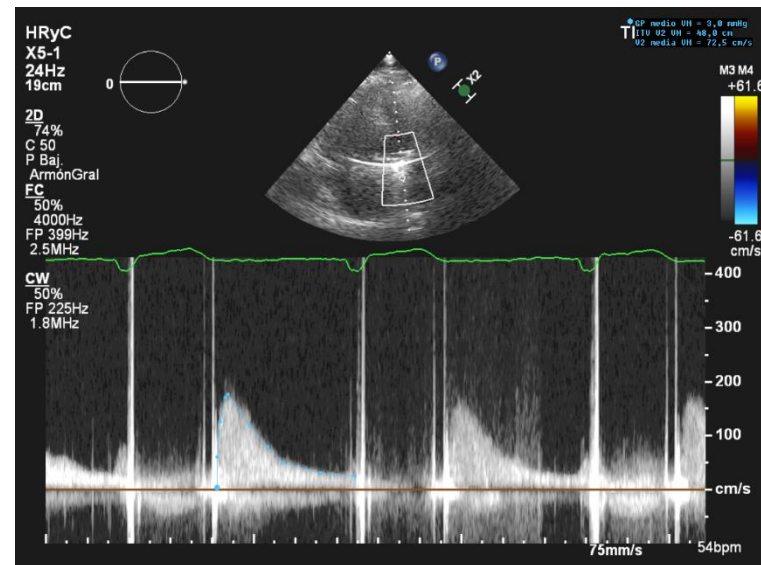
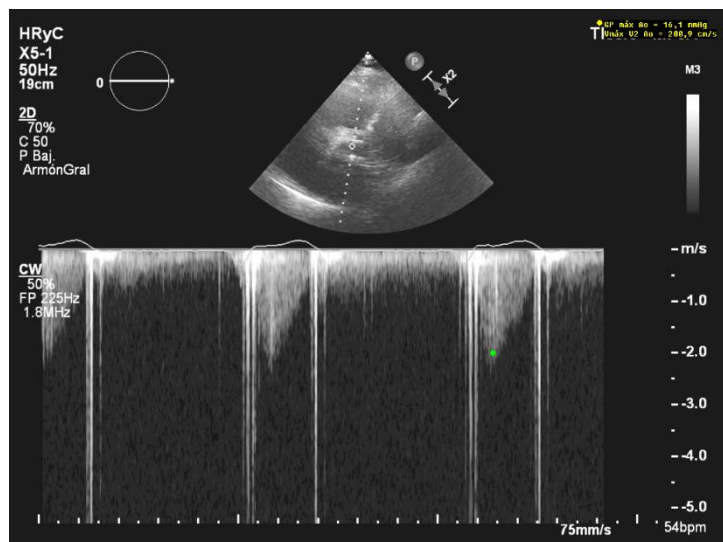
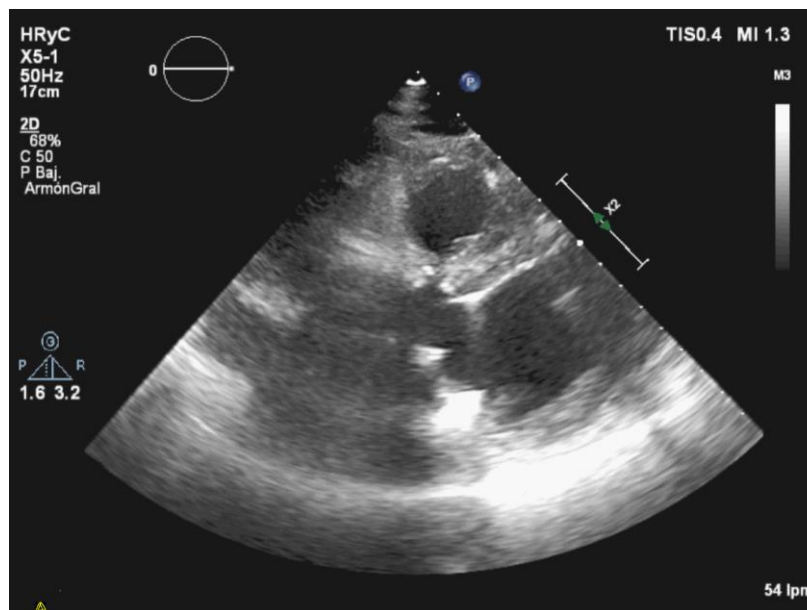


Surgery

- Right thoracotomy approach
- Mitral valve replacement: Mechanical prosthetic valve (St Jude 27)
- “Cleaned” the aortic prosthetic valve, vegetation extraction

Antibiotic	Dosage and route	Duration (weeks)	Class	Level
Prosthetic valves				
Methicillin-susceptible staphylococci				
(Flu) cloxacillin or oxacillin	12 g/day i.v. in 4–6 doses	≥6	I	B
WITH Rifampin	900–1200 mg i.v. or orally in 2 or 3 divided doses	≥6		
AND Gentamicin	3 mg/kg/day i.v. or i.m. in 1 or 2 doses	2		
Penicillin-allergic patients and methicillin-resistant staphylococci				
Vancomycin	30–60 mg/kg/day i.v. in 2–3 doses	≥6	I	B
WITH Rifampin	900–1200 mg i.v. or orally in 2 or 3 divided doses	≥6		
AND Gentamicin	3 mg/kg/day i.v. or i.m. in 1 or 2 doses	2		

After surgery





September 2016

- Presents to the ER: dyspnea+ fever $>38^{\circ}$

All Blood cultures + *S. aureus*



Ecocrd. adultos

TIS0.1 MI 0.4

X7-2t

53Hz

12cm

0 42 180



2D

63%

C 50

P Des.

Gral.

M4



PAT T: 37.0C

TEE T: 38.4C

90 lpm



Ecocrd. adultos

TIS0.6 MI 0.3

X7-2t

16Hz

9.8cm

Z 1.2

xPlane

68%

68%

50dB

P Des.

Gral.

FC

48%

6838Hz

FP 615Hz

4.4MHz

P

G

R

P

R

P

R

P

R

P

R

P

R

P

R

P

R

PAT T: 37.0C

TEE T: 39.8C

40

130

M4 M4

+59.3

-59.3

cm/s

94 lpm

Ecocrd. adultos

TIS0.1 MI 0.4

X7-2t
53Hz
11cm

2D
57%
C 50
P Des.
Gral.



M4



PAT T: 37.0C
TEE T: 41.0C

90 lpm



Ecocrd. adultos

TIS0.2 MI 0.4

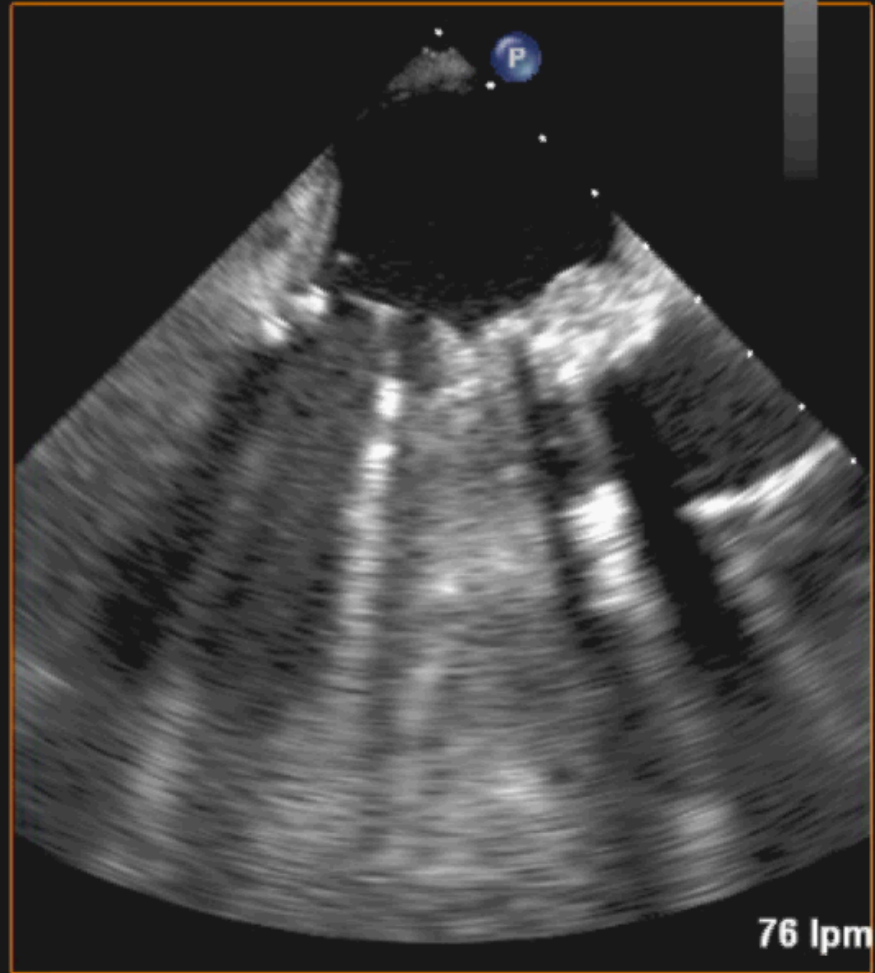
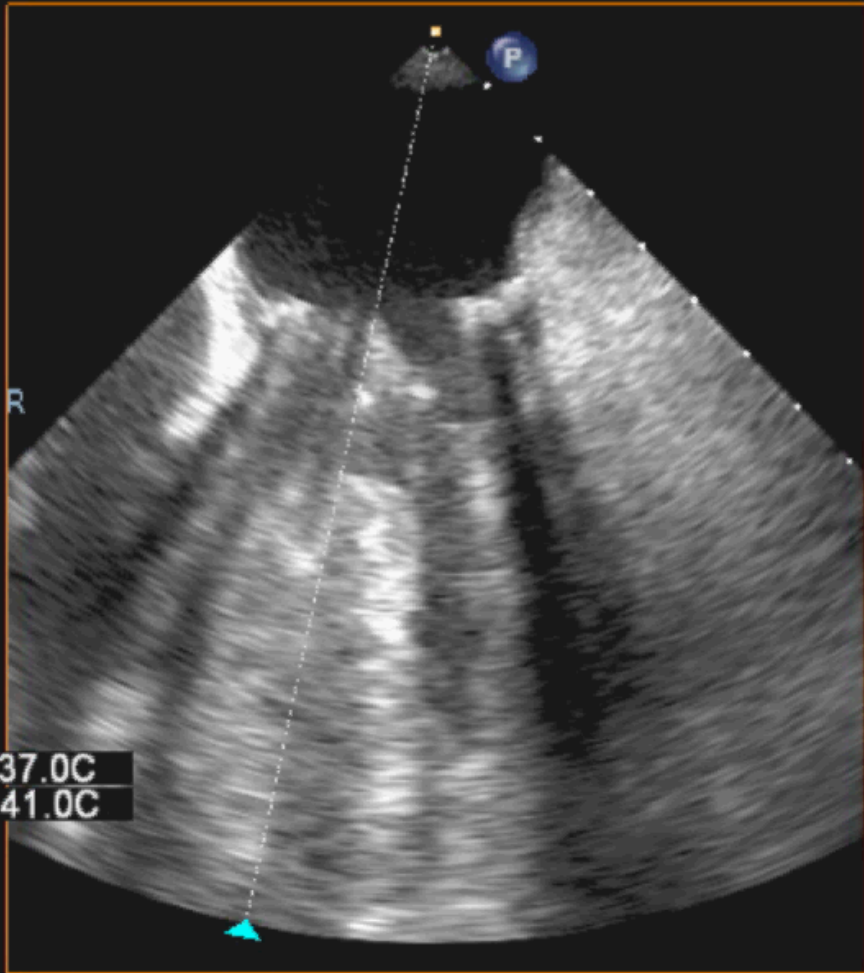
X7-2t
52Hz
12cm

xPlane
63%
63%
50dB
P Des.
Gral.

M4



PAT T: 37.0C
TEE T: 41.0C



76 lpm



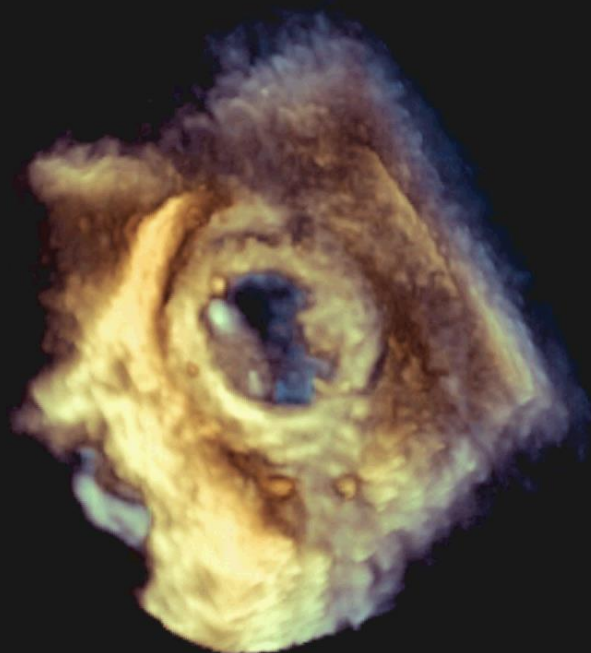
Ecocrd. adultos
X7-2t
23Hz
7.0cm
Zoom 3D
2D / 3D
% 51 / 44
C 50 / 30
Gral.



Latidos 3D Alta TVol

TIS0.1 MI 0.3

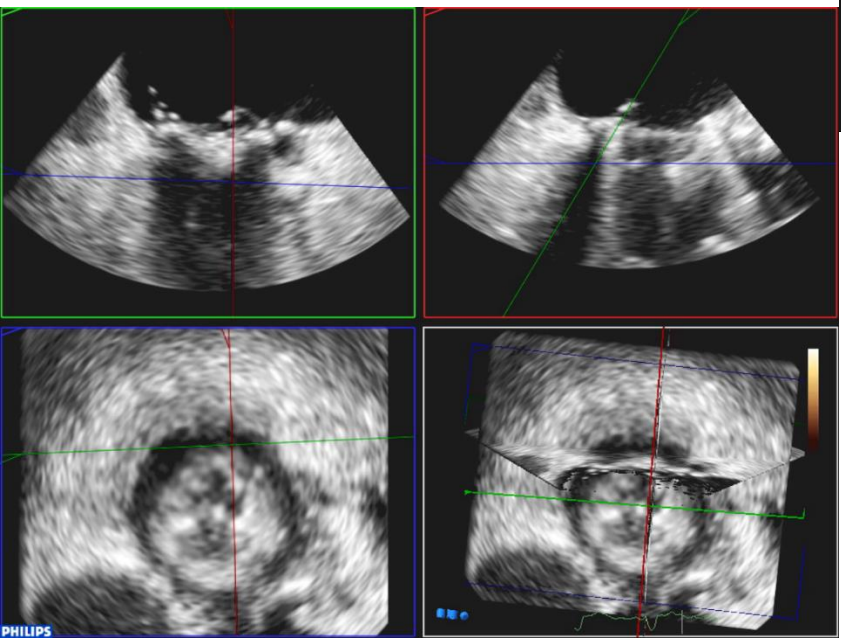
M4

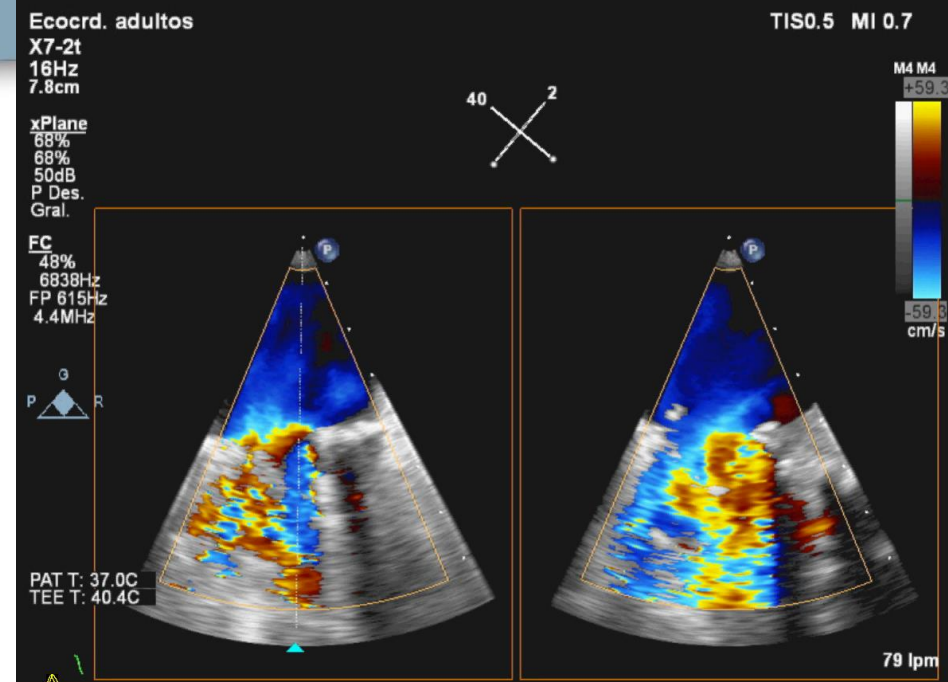
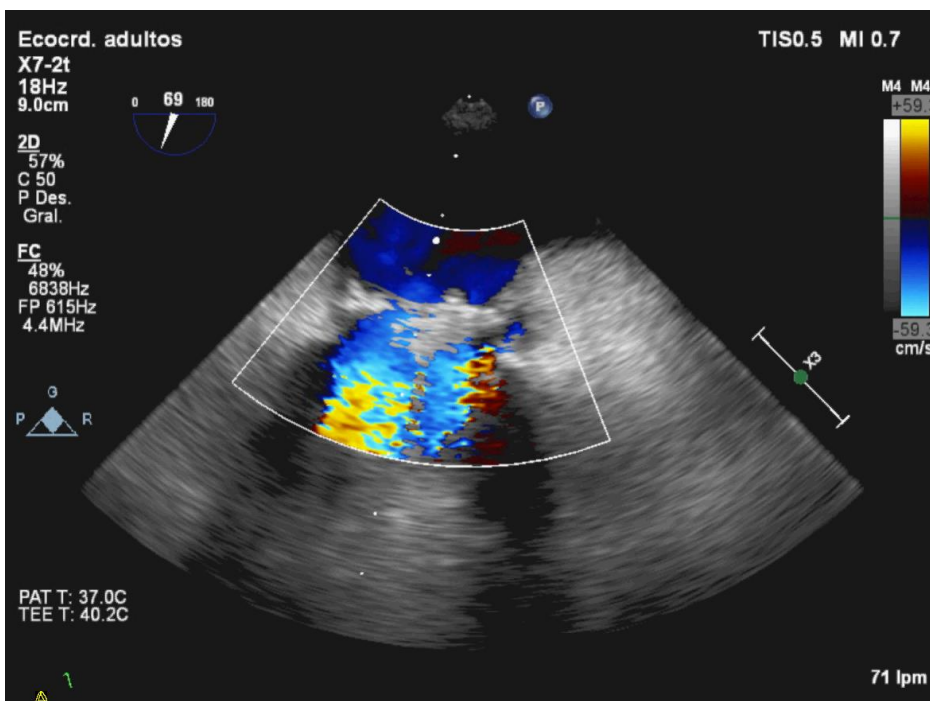


PAT T: 37.0C
TEE T: 41.2C

Demora 0ms

84 lpm





Ecocrd. adultos

X7-2t

9Hz

6.1cm

Zoom 3D

2D / 3D

% 65 / 44

C 50 / 30

Gral.

FC

% 51 / 50

6838Hz

FP 683Hz

4.4MHz

Latidos 3D 4

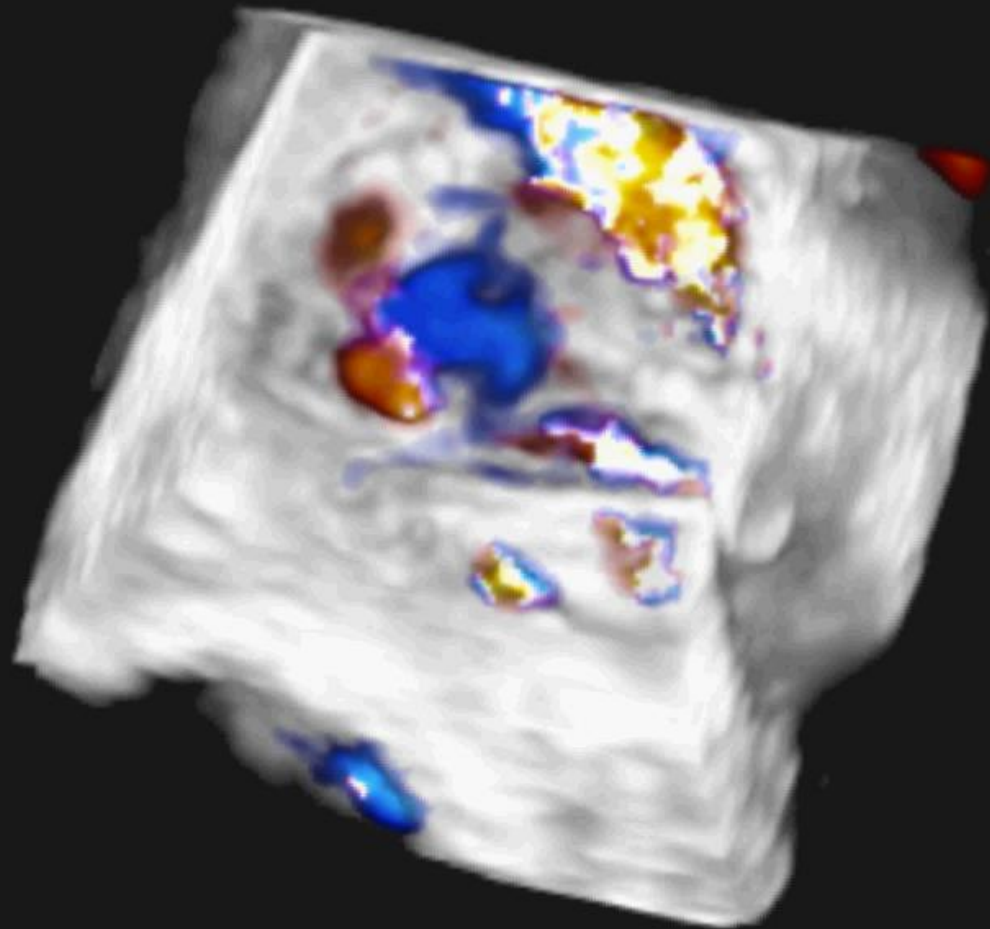
TIS0.5 MI 0.7



M4 M4
+59.3



-59.3



PAT T: 37.0C

TEE T: 40.3C



Demora 0ms

82 lpm

Echo findings

	Surgery/ necropsy	Echocardiography
Vegetation	Infected mass attached to an endocardial structure or on implanted intracardiac material.	Oscillating or non-oscillating intracardiac mass on valve or other endocardial structures, or on implanted intracardiac material.
Abscess	Perivalvular cavity with necrosis and purulent material not communicating with the cardiovascular lumen.	Thickened, non-homogeneous perivalvular area with echodense or echolucent appearance.
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Fistula	Communication between two neighbouring cavities through a perforation.	Colour-Doppler communication between two neighbouring cavities through a perforation.
Valve aneurysm	Saccular outpouching of valvular tissue.	Saccular bulging of valvular tissue.
Dehiscence of a prosthetic valve	Dehiscence of the prosthesis.	Paravalvular regurgitation identified by TTE/TOE, with or without rocking motion of the prosthesis.



CT scan

Huge collection of unknown origin in the mediastinal space, adjacent to the Dacron graft and in close contact with the thoracic wall. No flow of contrast inside.





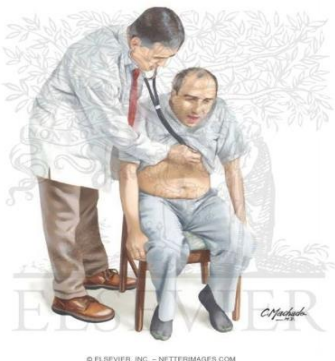
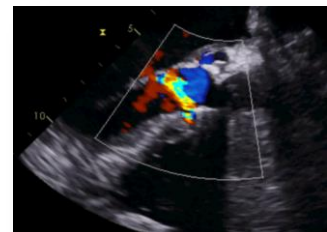
Diagnosis

- Prosthetic mitral valve endocarditis: peri-prosthetic leak, severe MR
- Prosthetic aortic valve endocarditis. Peri-prosthetic abscess.
- Collection of unknown origin in the mediastinal space, purulent? hemorrhagic?
- *S. aureus*
- Heart failure
- 3 vessels disease



Treatment

Indications for surgery	Timing	Class	Level
A - HEART FAILURE			
Obstruction of mitral causing pulmonary edema or cardiogenic shock.	Emergency	I	B
Aortic or mitral NVE or PVE with severe regurgitation or obstruction		I	B
B - 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



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Table 15 Predictors of poor outcome in patients with infective endocarditis

Patient characteristics

- Older age
- Prosthetic valve IE
- Diabetes mellitus
- Comorbidity (e.g., frailty, immunosuppression, renal or pulmonary disease)

Clinical complications of IE

- Heart failure
- Renal failure
- >Moderate area of ischaemic stroke
- Brain haemorrhage
- Septic shock

Microorganism

- *Staphylococcus aureus*
- Fungi
- Non-HACEK Gram-negative bacilli

Echocardiographic findings

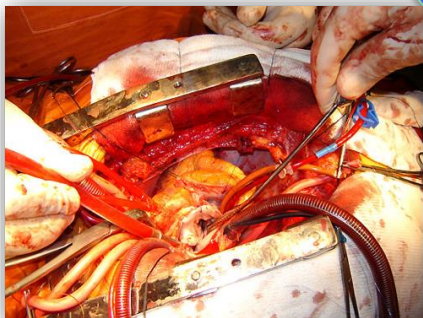
- Periannular complications
- Severe left-sided valve regurgitation
- Low left ventricular ejection fraction
- Pulmonary hypertension
- Large vegetations
- Severe prosthetic valve dysfunction
- Premature mitral valve closure and other signs of elevated diastolic pressures



Treatment



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Surgery

- Before opening the sternum, peripheral cannulation was performed and cardiopulmonary bypass was established.
- During the sternal opening, a massive bleeding occurred. Controlled by digital pressure and the sternal opening was completed.
- Site of bleeding: the previous vein-graft anastomosis was completely detached from the aorta, due to endocarditic affectation.



Surgery

Total detachment of a previous vein graft anastomosis due to endocarditic involvement of the ascending aortic graft, with the formation of a big collection of blood contained by the adhesions of the previous surgeries





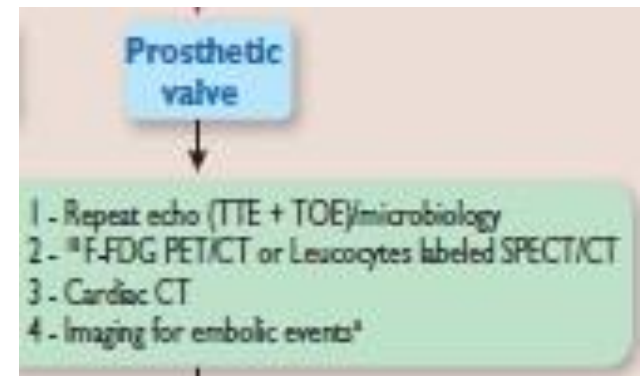
Surgery

- Mitral and full-root replacement. New Bentall procedure with the Cabrol modification.
- The patient was transferred to the Intense Care Unit in a stable hemodynamic situation.
- Bacteremia by *Klebsiella pneumoniae* and he died due to an acute septic shock.



Take home messages

- PVE is a serious condition, severe form of IE.
- Diagnosis is challenging.
 - TOE is mandatory in suspected PVE
 - Other imaging techniques



- Complicated PVE and staphylococcal PVE are associated with worse prognosis.
- Endocarditis team is crucial in decision making