Endocardite infectieuse

Prof. Alexandre OUATTARA

Service d'Anesthésie-Reanimation cardiovasculaire,

Hôpital Haut-Lévêque, 33600 Pessac, France

E-mail: alexandre.ouattara@chu-bordeaux.fr

CHU BDX CENTRE HOSPITALIER UNIVERSITAIRE BORDEAUX

université de BORDEAUX

Inserm La science pour la santé From science to health

Définition et épidémiologie

Définition

Greffe d'agent infectieux (bactérie, levure)

- Endocarde valvulaire antérieurement lésé (endocardite subaiguë ou maladie d'Osler)
- Plus rarement sain (endocardite aiguë)

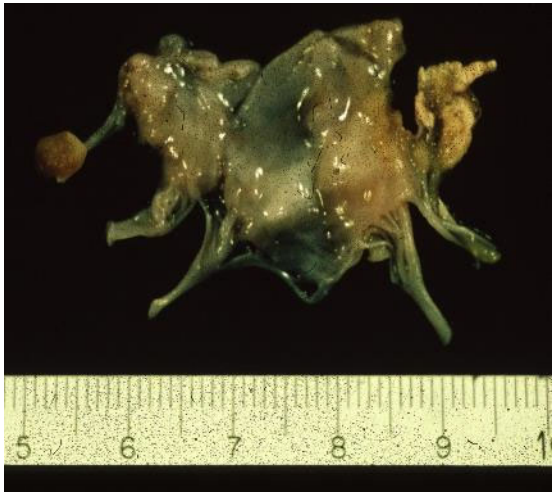
Epidémiologie

Incidence : 32 cas/million hab./an (≈1500-2000 cas en France)

Endocardite cœur gauche > droite

40-50% des patients bénéficient d'une chirurgie cardiaque

Mortalité 15-30%



Physiopathologie (1)

Lésion cardiaque à « risque »

- Valvulopathies aortiques, mitrales (régurgitations+++)
- Bicuspidie
- Prothèses valvulaires +++
- Cardiopathies congénitales cyanogènes

Portes d'entrée

- ORL+++, digestive, cutanée…

Germes

- Bactériens : *Strepto (alpha-hémolytique, D), Staph, BGN...*
- Champignon : *candida...*

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

2015 ESC Guidelines for the management of infective endocarditis

Recommendations	Class[a]	Level[b]
Antibiotic prophylaxis should be considered for patients at highest risk for IE: (1) Patients with any prosthetic valve, including a transcatheter valve, or those in whom any prosthetic material was used for cardiac valve repair. (2) Patients with a previous episode of IE. (3) Patients with CHD: (a) Any type of cyanotic CHD. (b) Any type of CHD repaired with a prosthetic material, whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if residual shunt or valvular regurgitation remains.	IIa	C
Antibiotic prophylaxis is not recommended in other forms of valvular or CHD.	III	C

Recommendations	Class[a]	Level[b]
A. Dental procedures		
• Antibiotic prophylaxis should only be considered for dental procedures requiring manipulation of the gingival or periapical region of the teeth or perforation of the oral mucosa	IIa	C
• Antibiotic prophylaxis is not recommended for local anaesthetic injections in non-infected tissues, treatment of superficial caries, removal of sutures, dental X-rays, placement or adjustment of removable prosthodontic or orthodontic appliances or braces or following the shedding of deciduous teeth or trauma to the lips and oral mucosa	III	C
B. Respiratory tract procedures[c]		
• Antibiotic prophylaxis is not recommended for respiratory tract procedures, including bronchoscopy or laryngoscopy, or transnasal or endotracheal intubation	III	C
C. Gastrointestinal or urogenital procedures or TOE[c]		
• Antibiotic prophylaxis is not recommended for gastroscopy, colonoscopy, cystoscopy, vaginal or caesarean delivery or TOE	III	C

Prophylaxis for dental procedures

Oral Strepotococci

Situation	Antibiotic	Single-dose 30–60 minutes before procedure	
		Adults	Children
No allergy to penicillin or ampicillin	Amoxicillin or ampicillin[a]	2 g orally or i.v.	50 mg/kg orally or i.v.
Allergy to penicillin or ampicillin	Clindamycin	600 mg orally or i.v.	20 mg/kg orally or i.v.

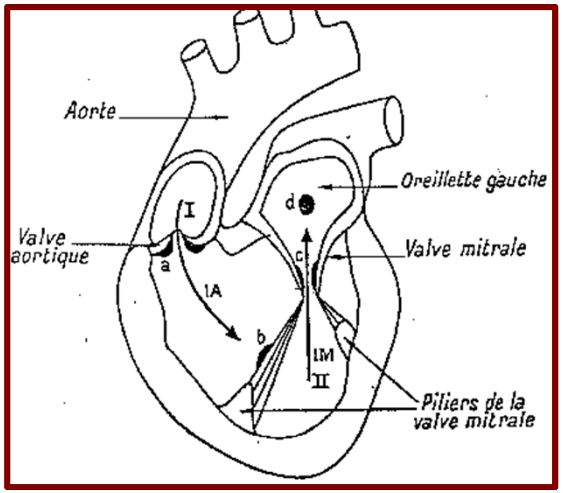
Physiopathologie de l'atteinte valvulaire (1)

- **Stade I:** Lésions jet régurgitant sur face valvulaire exposée aux plus basses pressions

- **Stade II:** Dépôts fibrino-plaquettaires

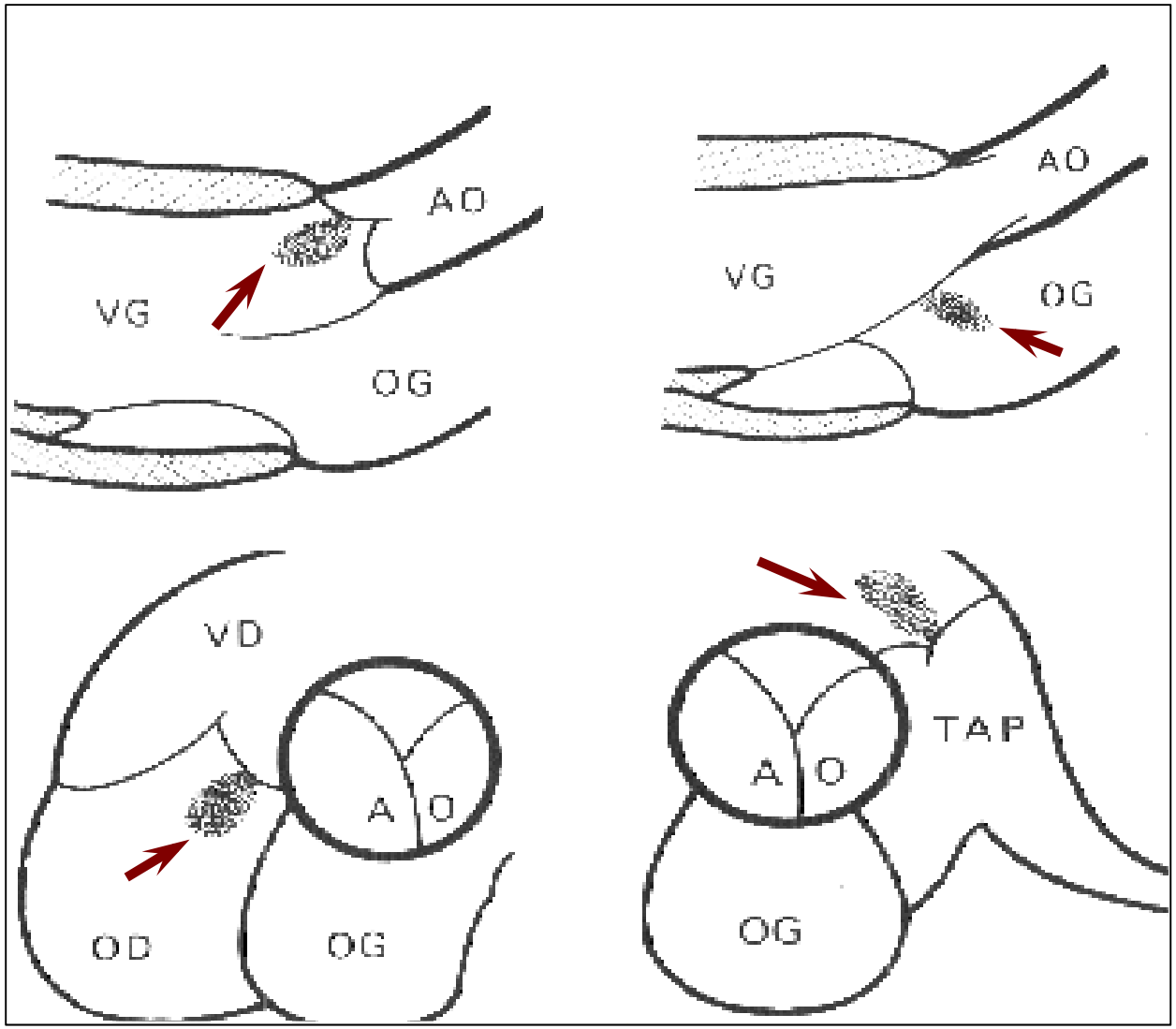
- **Stade III:** Colonisation bactérienne

- **Stade IV:** Lésions végétantes et destructrices



- **Stade V:** Complexe immuns circulants (purpura vasculaire, faux panaris d'Osler, protéinurie, hématurie, …)

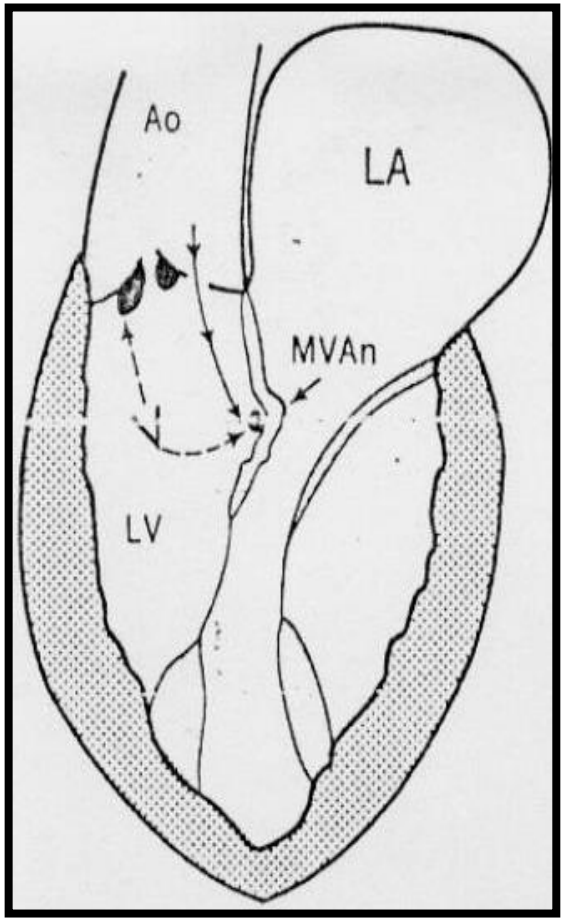
Physiopathologie de l'atteinte valvulaire (2)

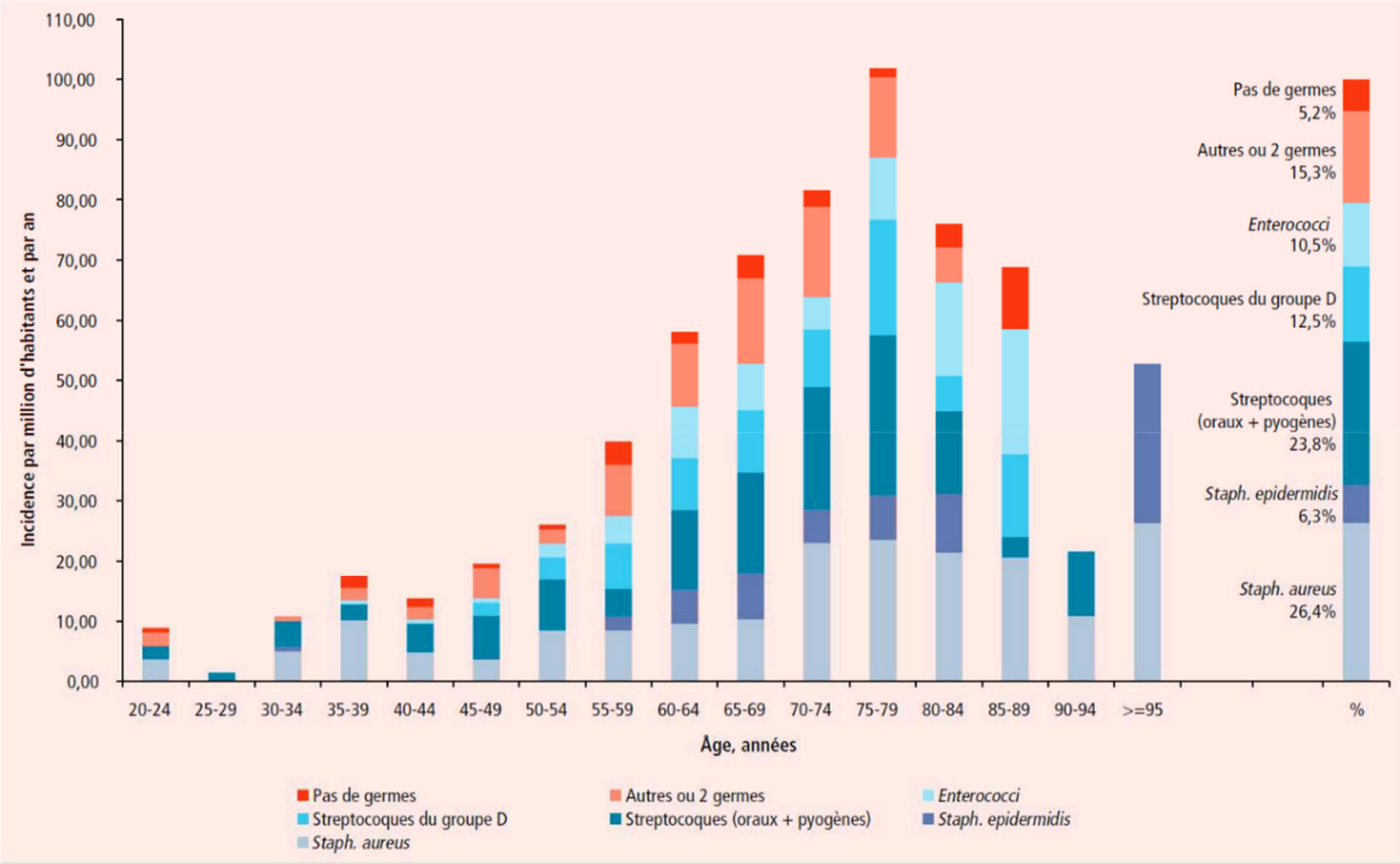


Physiopathologie de l'atteinte valvulaire (3)

Localisation pluri-valvulaire

- Endocardite aortique initiale
- Localisation secondaire au niveau de la lésion du jet régurgitant sur la valve mitrale antérieure





Revest M et al. Bull Epidémiologique Hebdomadaire 2013

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

2015 ESC Guidelines for the management of infective endocarditis

Diagnostic positif

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°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.

Definite IE

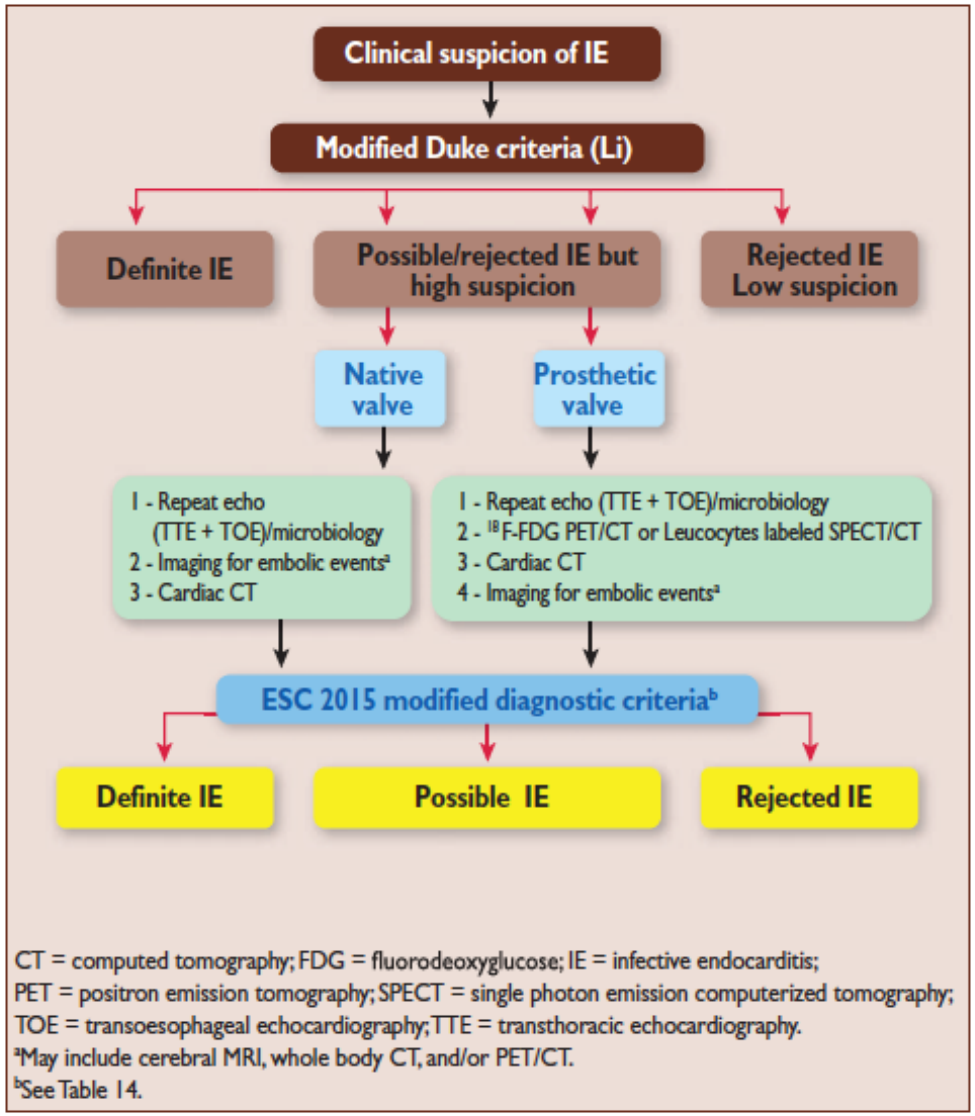
Pathological criteria
- Microorganisms demonstrated by culture or on histological examination of a vegetation, a vegetation that has embolized, or an intracardiac abscess specimen; or
- Pathological lesions; vegetation or intracardiac abscess confirmed by histological examination showing active endocarditis

Clinical criteria
- 2 major criteria; or
- 1 major criterion and 3 minor criteria; or
- 5 minor criteria

Possible IE
- 1 major criterion and 1 minor criterion; or
- 3 minor criteria

Rejected IE
- Firm alternate diagnosis; or
- Resolution of symptoms suggesting IE with antibiotic therapy for ≤4 days; or
- No pathological evidence of IE at surgery or autopsy, with antibiotic therapy for ≤4 days; or
- Does not meet criteria for possible IE, as above

ESC 2015 Algorithm for Diagnosis of Infective Endocarditis

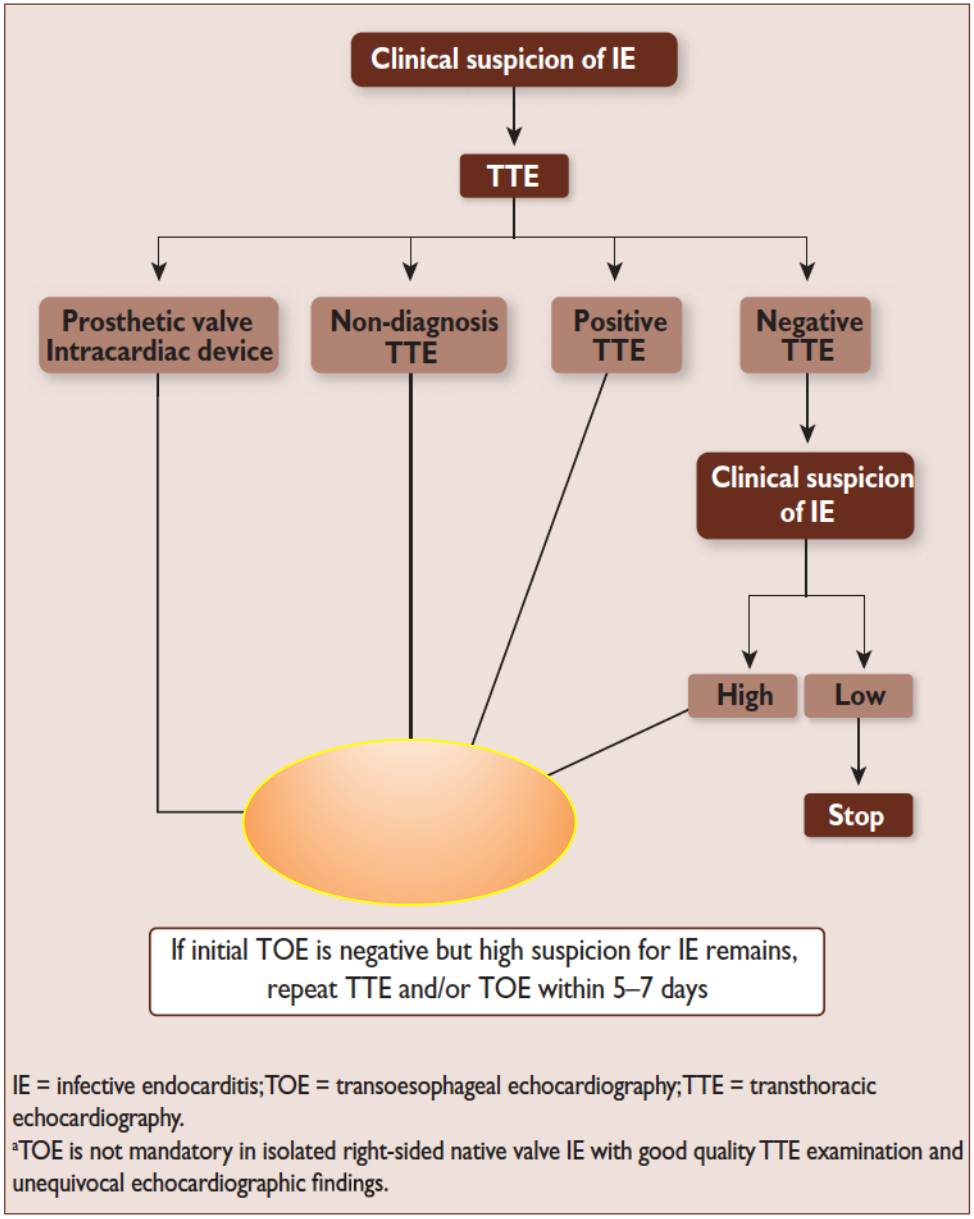


CT = computed tomography; FDG = fluorodeoxyglucose; IE = infective endocarditis; PET = positron emission tomography; SPECT = single photon emission computerized tomography; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.

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

[b]See Table 14.

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



IE = infective endocarditis; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.
[a]TOE is not mandatory in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.

6 types de lésions

ETT et ETO +++ apport diagnostic majeur

Difficulté d'interprétation si valve prothétique mécanique

Diagnostic systématiquement évoqué devant une régurgitation para-prothétique à fortiori devant une désinsertion prothétique

En l'absence de diagnostic, savoir répéter l'examen +++

	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.

Végétation

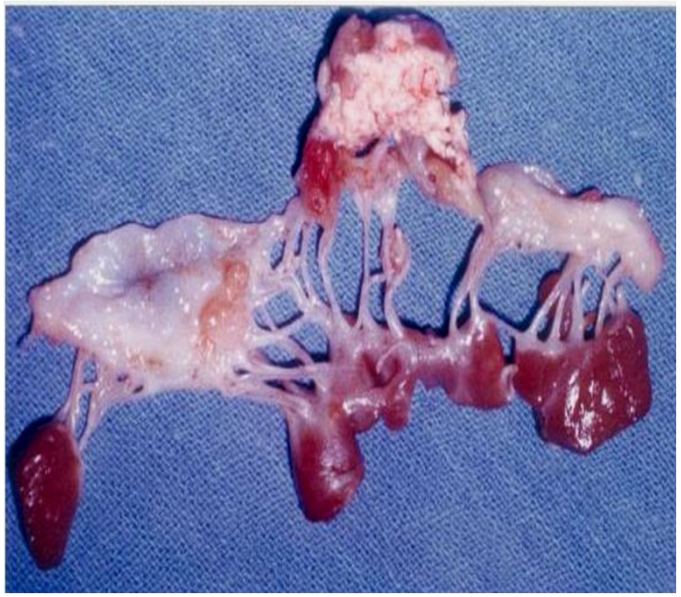
Masse adhérente **pédiculées** ou **sessile** (voire simple épaississement valvulaire localisé)

N'entrave pas le jeu valvulaire (rarement obstructive)

Aspect **hyper-échogène** en 2D

Aspect cheveu finement vibratile en mode TM

Taille variable 3 à 30 mm (emboligène si > 10 mm)

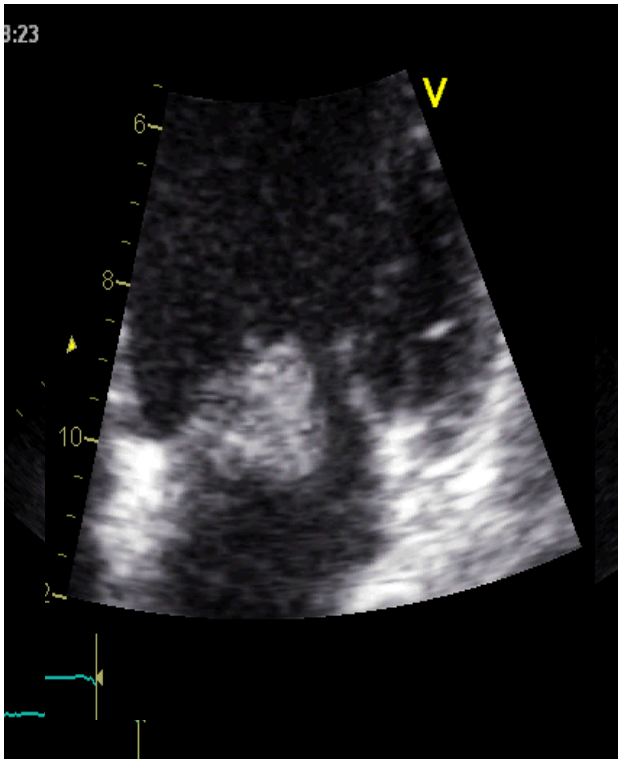


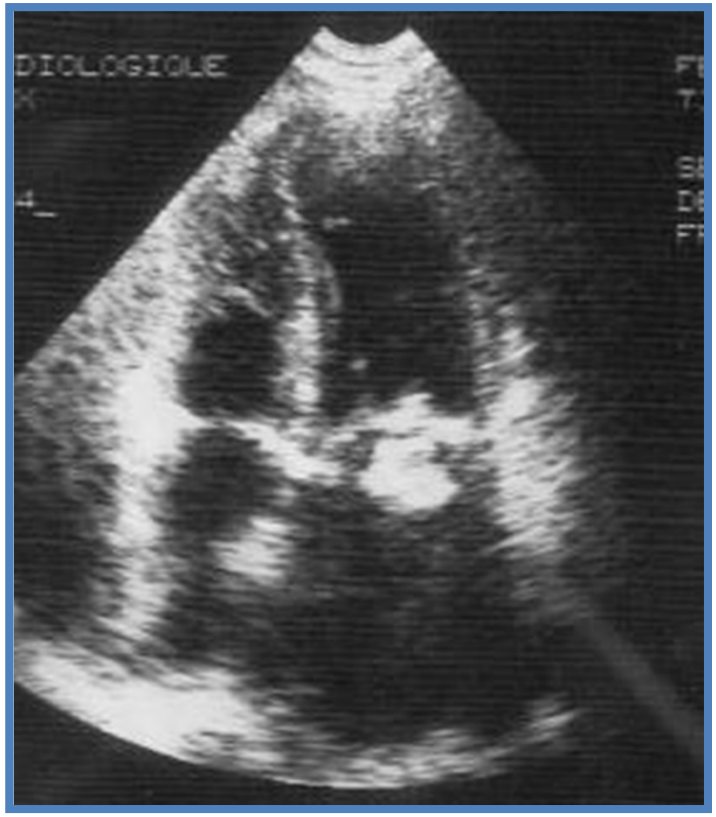
	ETT	ETO
Sensibilité (VN)	70%	96%
Sensibilité (VP)	50%	92%
Spécificité	90%	90%

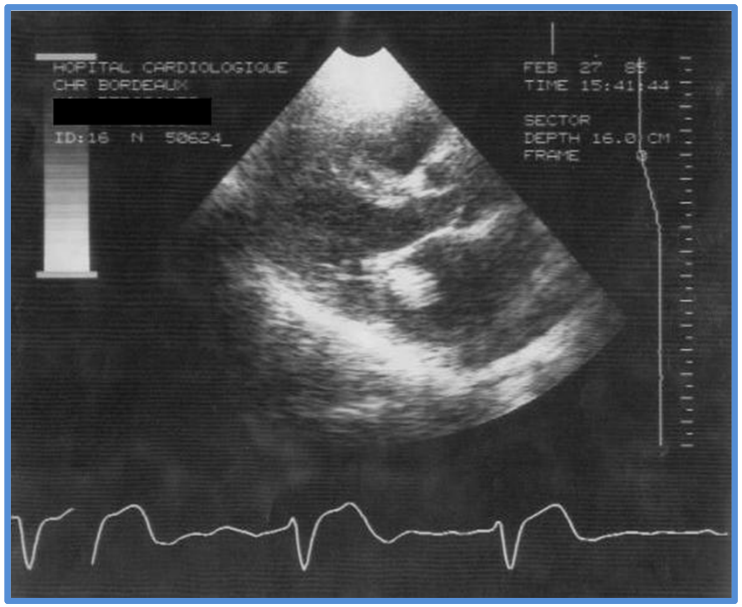
Végétation

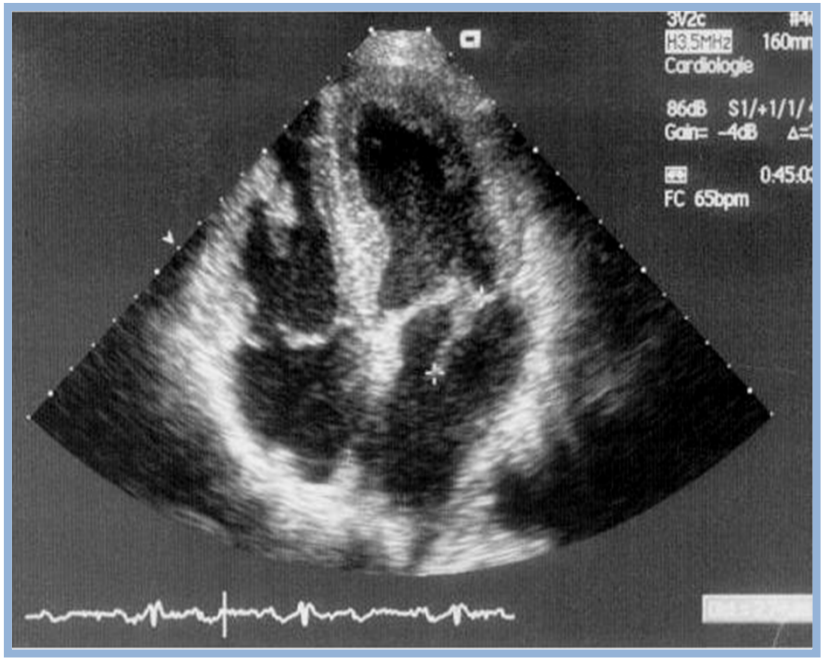
Difficulté de diagnostic si taille < 3 mm, si valve prothétique, si lésion valvulaire préexistante, si embolisation récente et si device intracardiaque (sondes de pace-maker)

Faux positifs: thrombus, prolapsus, rupture de cordage, fibroélastome, valve myxoïde (épaissie), calcification valvulaire (gêne ouverture et artéfacts), myxome, strands (filaments de fibrine)

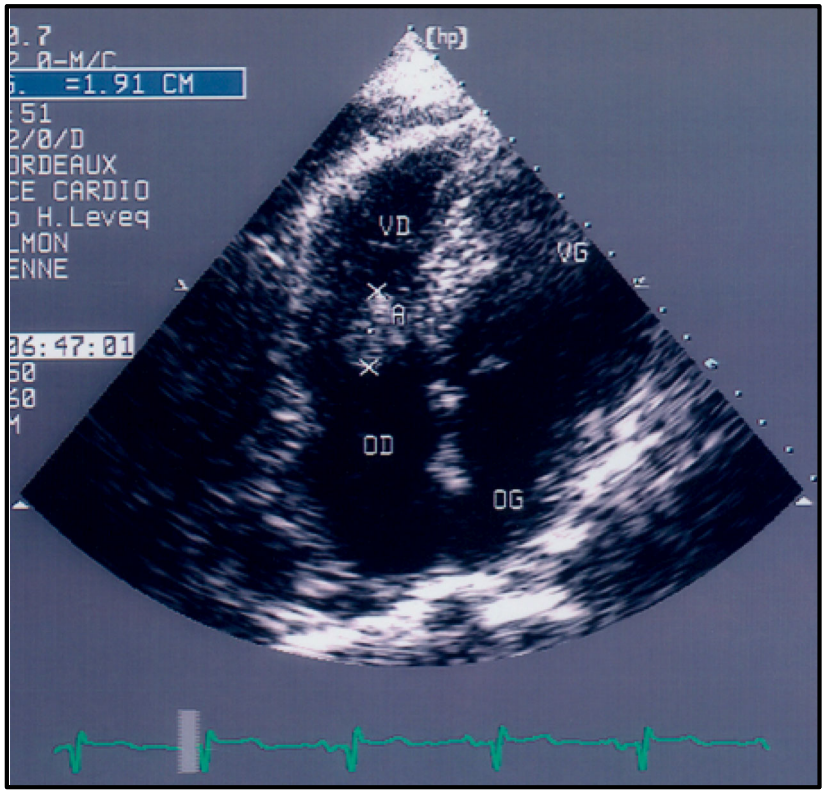


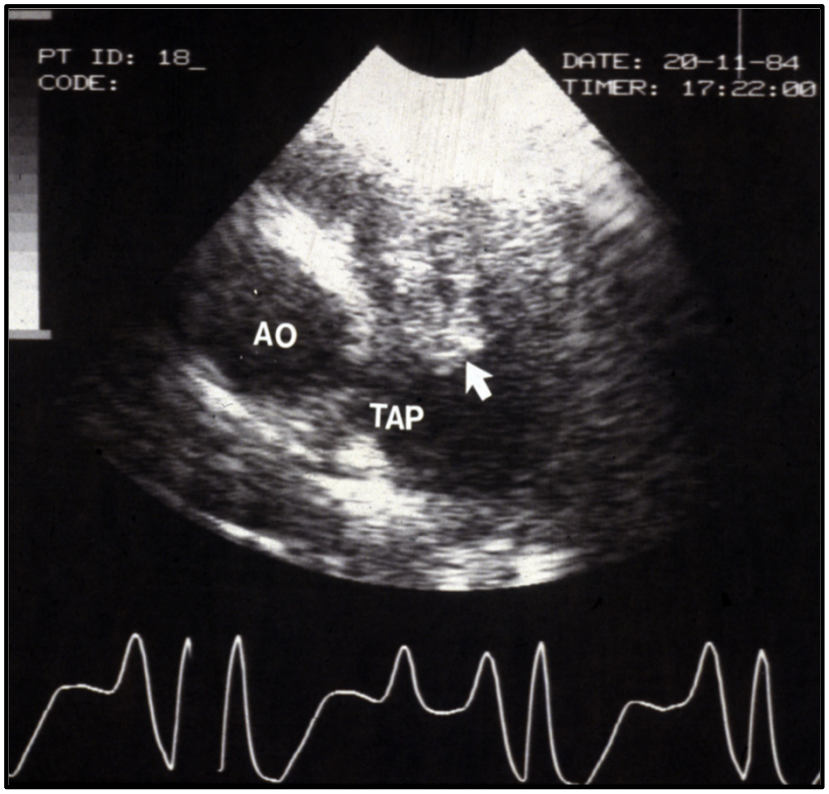

DIOLOGIOLE


HOPITAL CARDIOLOGIQUE
CHR BORDEAUX
ID:16 N 50624_
FEB 27 95
TIME 15:41:44
SECTOR
DEPTH 16.0 CM
FRAME 8

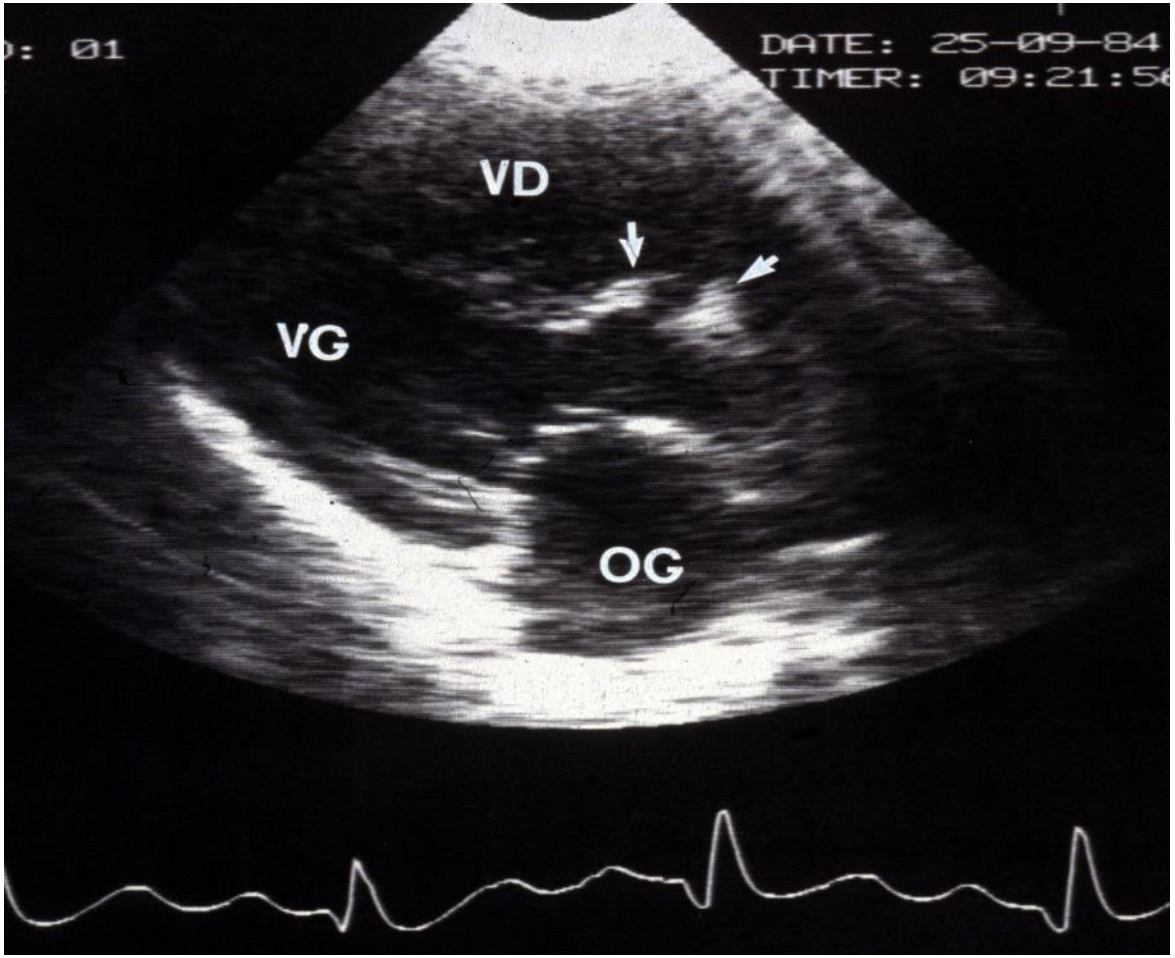

3V2c
H3.5MHz
160mm
Cardiologie
86dB S1/+1/1/
Gain= -4dB
FC 65bpm

Endocardite du cœur droit

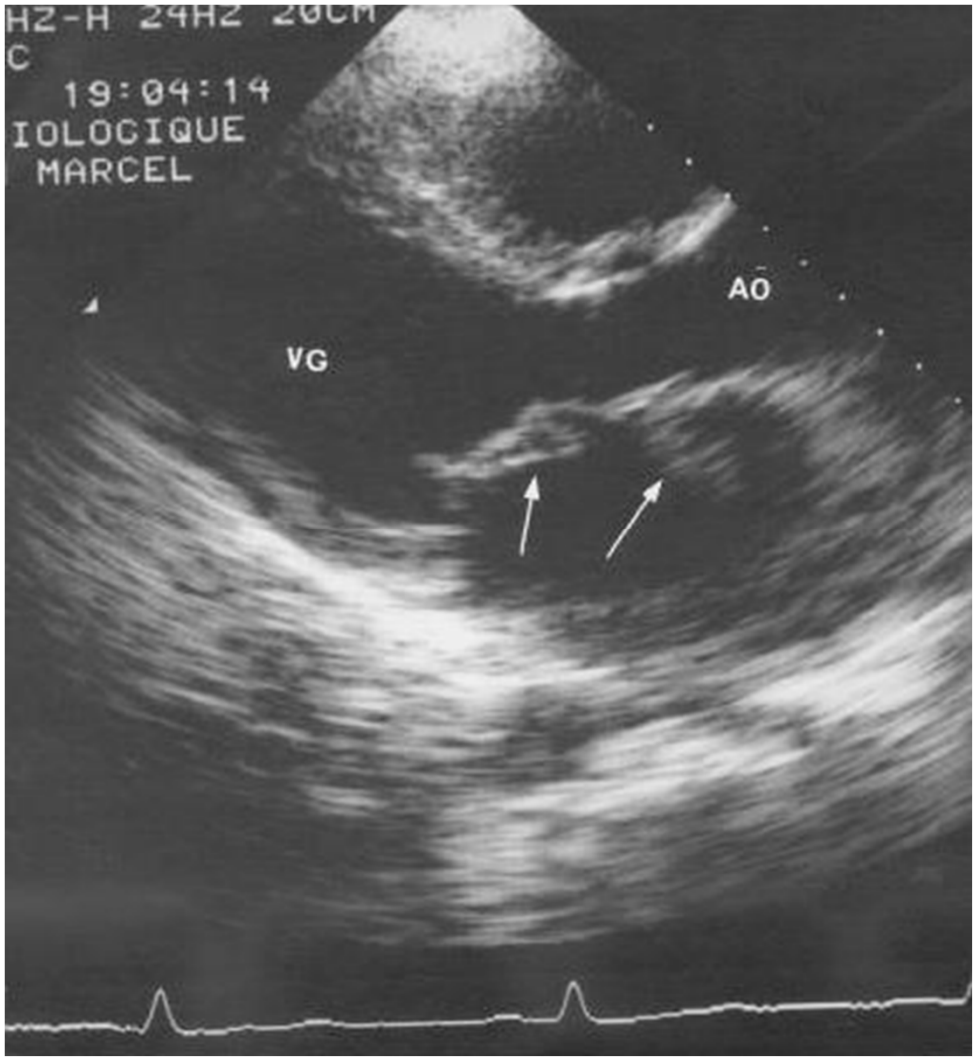




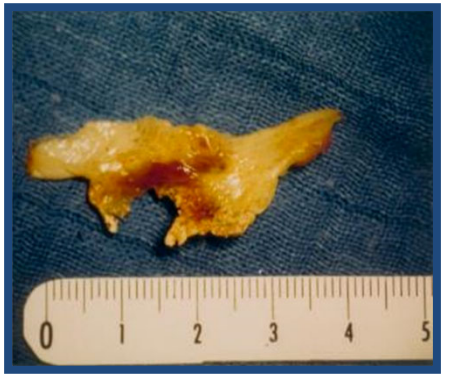
Endocardite sur CIV membraneuse



Végétation murale

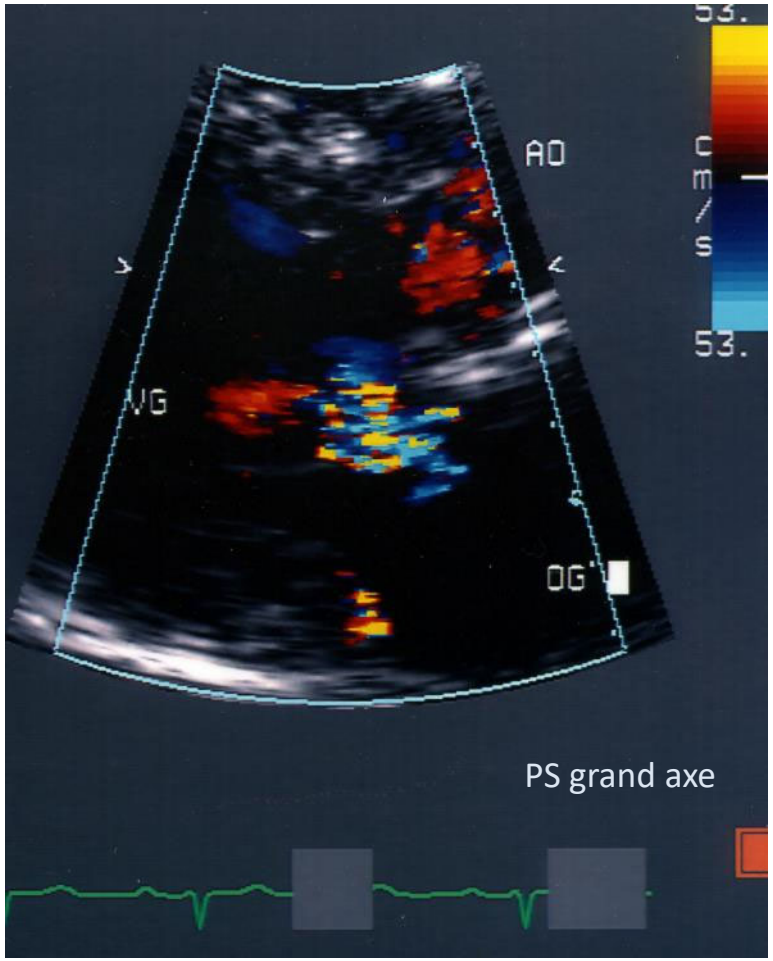


Lésions destructrices (1)



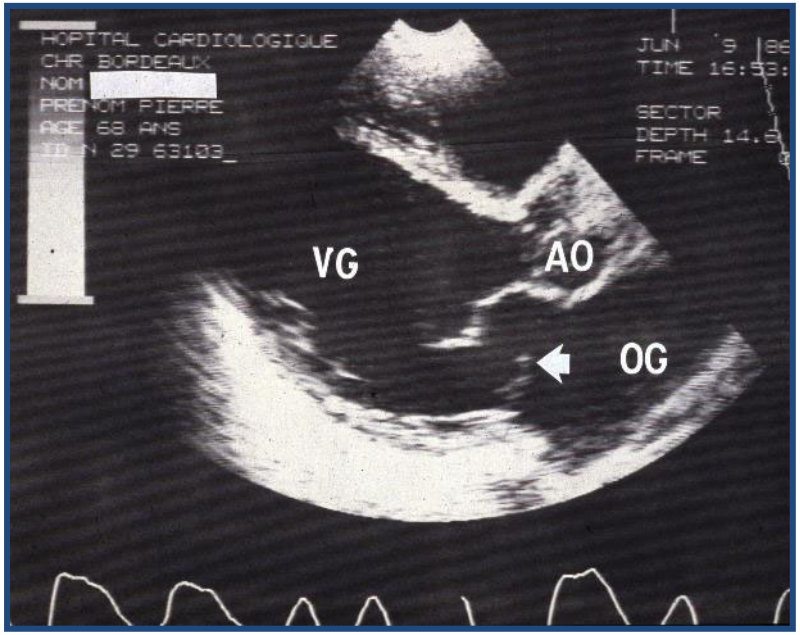
Perforation/déchirures valvulaires

Trou à l'emporte pièce avec jet directionnel excentré dont le point de départ est souvent au centre d'un feuillet et non au point de coaptation des 2 valves



2D

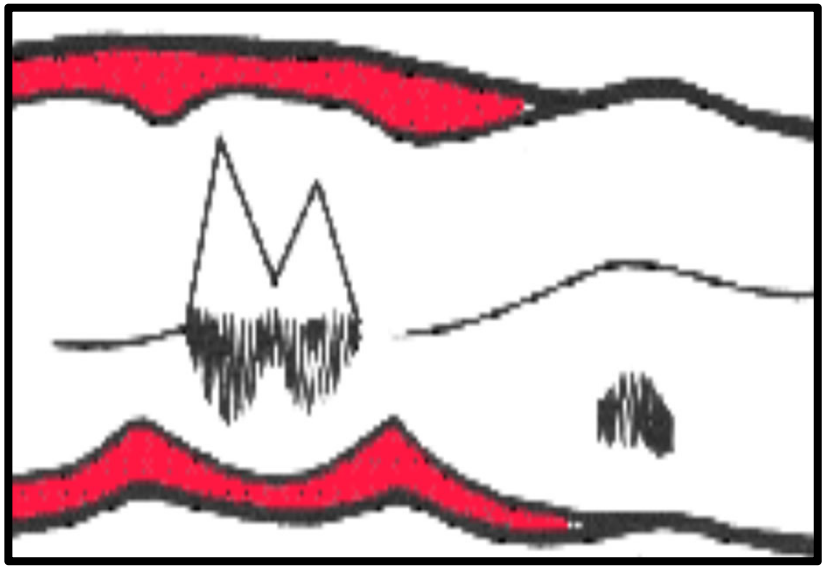
Rupture/déchirure de la valve/capotage



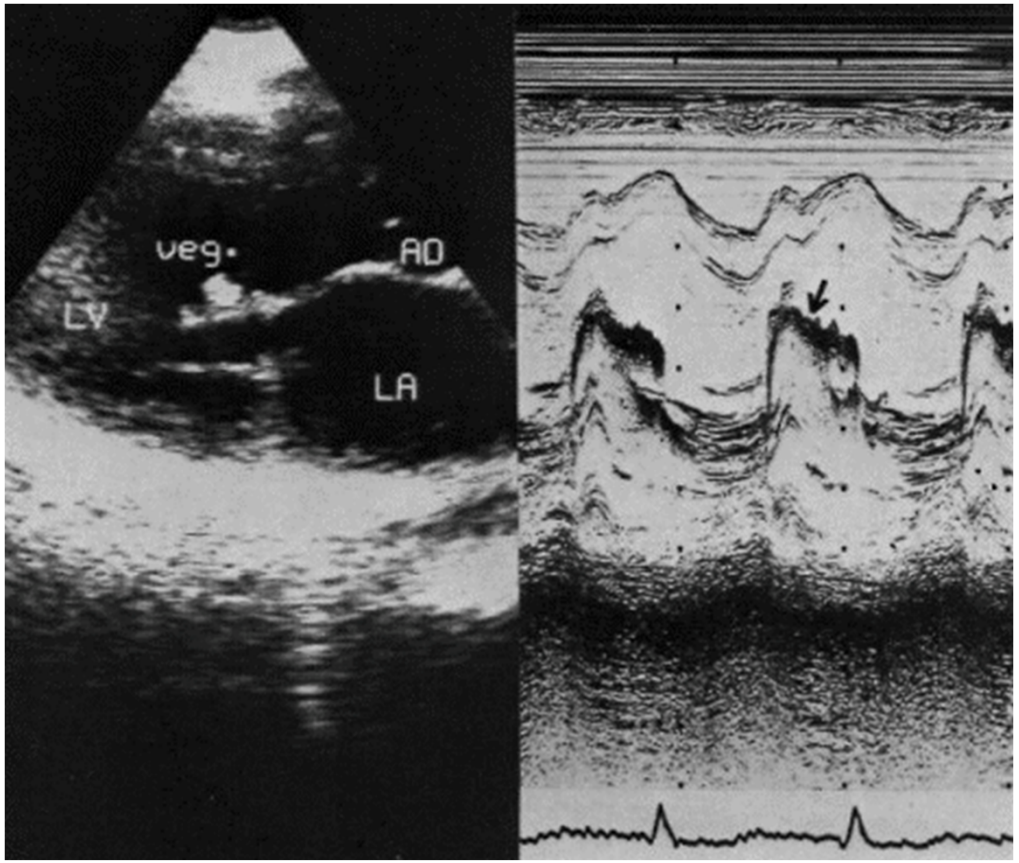
TM

Fluttering chaotique des valves: mouvement paradoxal diastolique de la valve postérieure

Capotage valve dans OG en systole (aspect vibratile: « fluttering »)



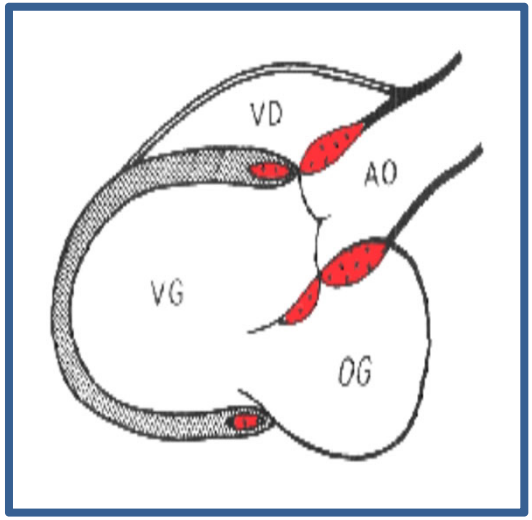
Coupe mode TM
(aspect chevelu et finement vibratile)

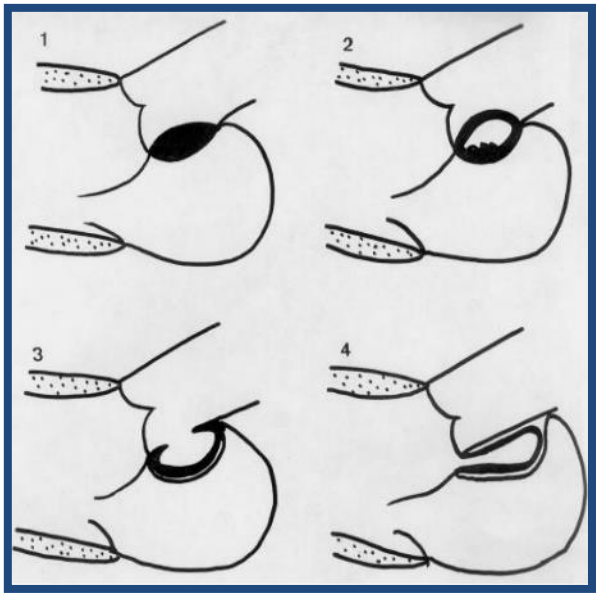


Lésions destructrices (2)

Abcès annulaires ou myocardiques

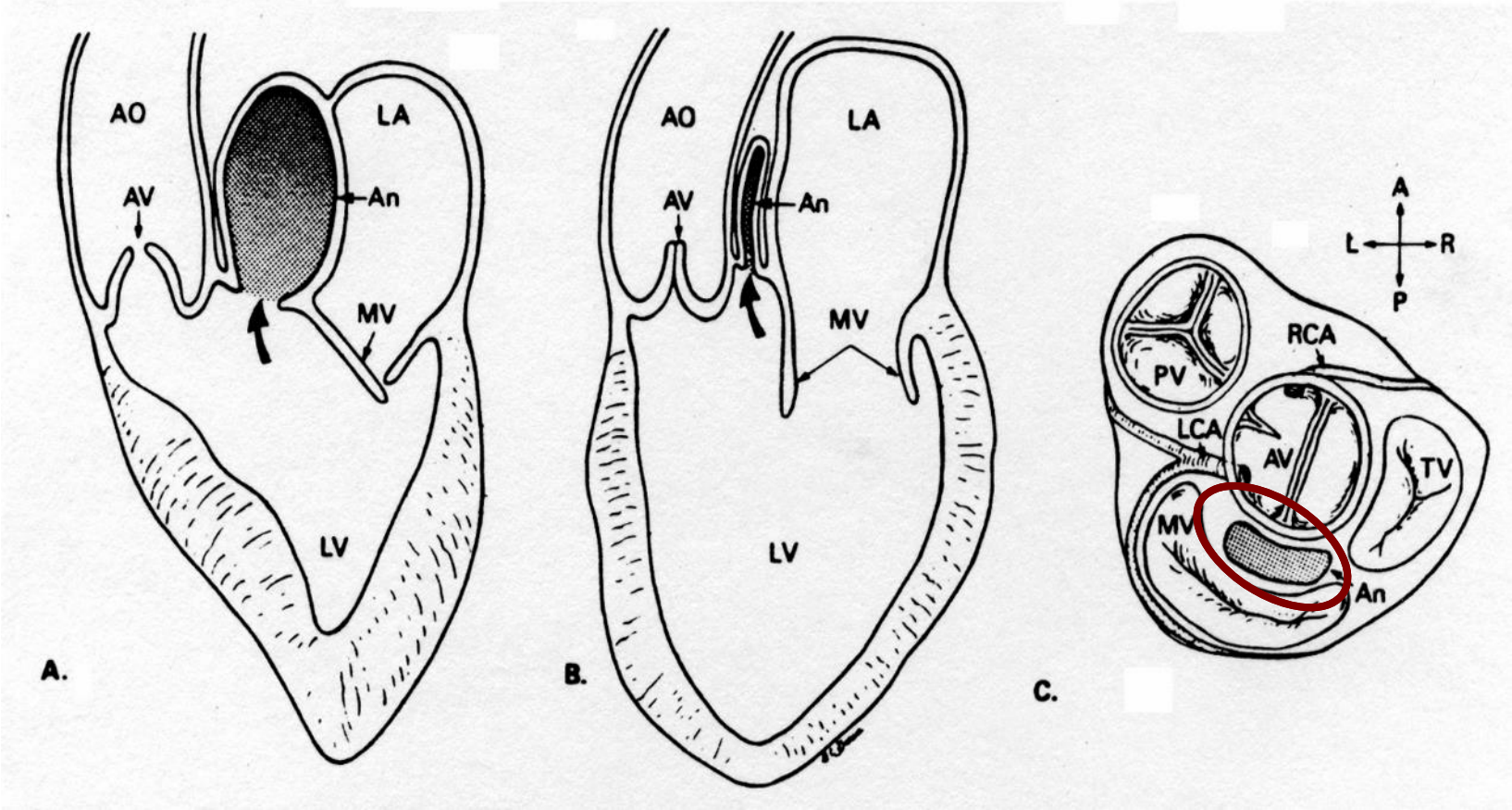
- Epaississement anormal de la paroi (zone hypercéchogène)
- Indice de gravité (risque de fistulisation)
- Chirurgie précoce +++
- Abcès péri- valvulaires : 30-50 %
- Atteinte élective de la racine aortique avec localisation antérieure (extension SIV membraneux) et localisation postérieure (extension trigone fibreux aorto-mitral)
- Abcès kystique : épaississement pariétal d'aspect kystique
- Abcès fistulisé « détergé » : poche vide d'écho communicant dans l'aorte ou VG via trigone fibreux aorto-mitral (= pseudo-anévrisme)

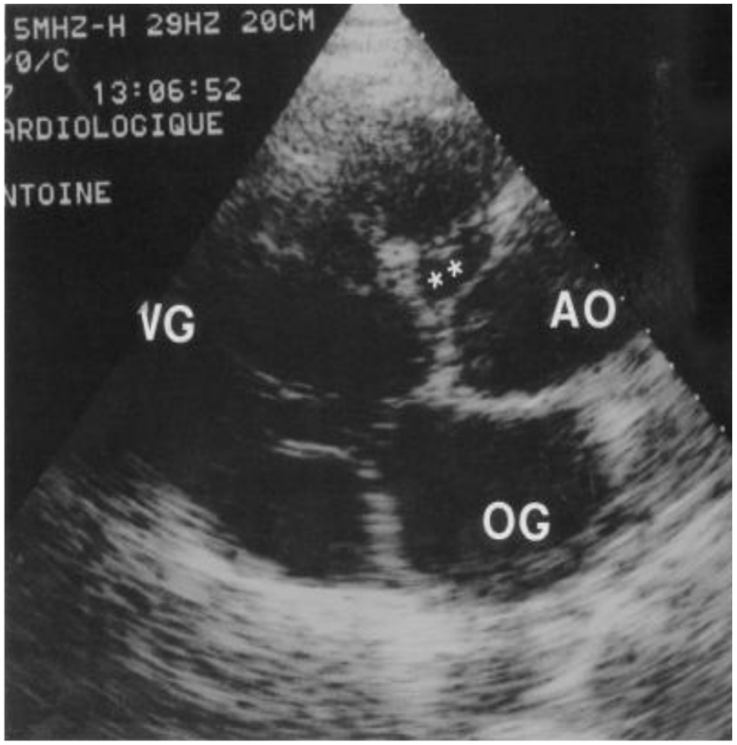


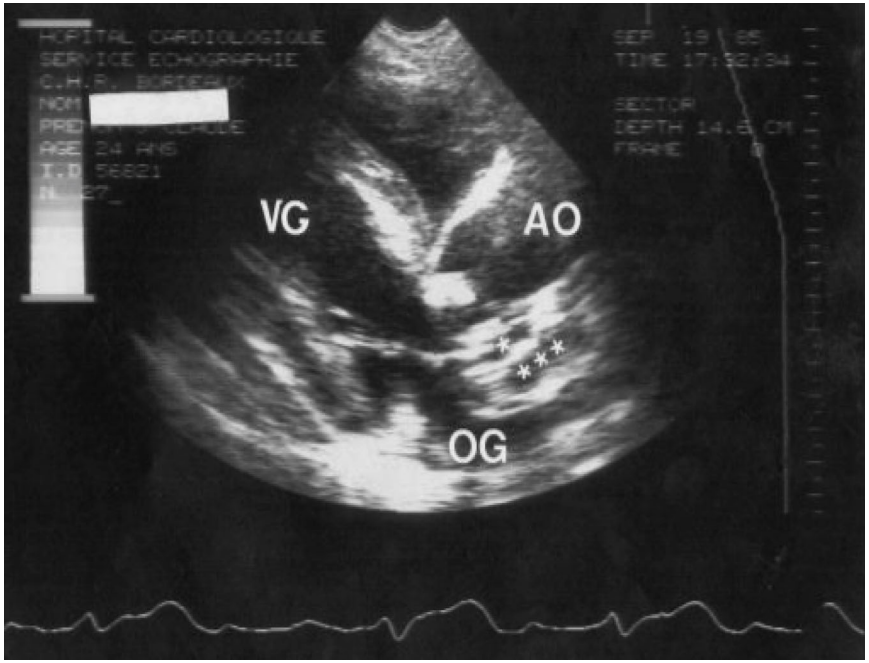


Sensibilité	ETT	ETO
	50%	90%

Abcès du trigone fibreux aorto-mitral



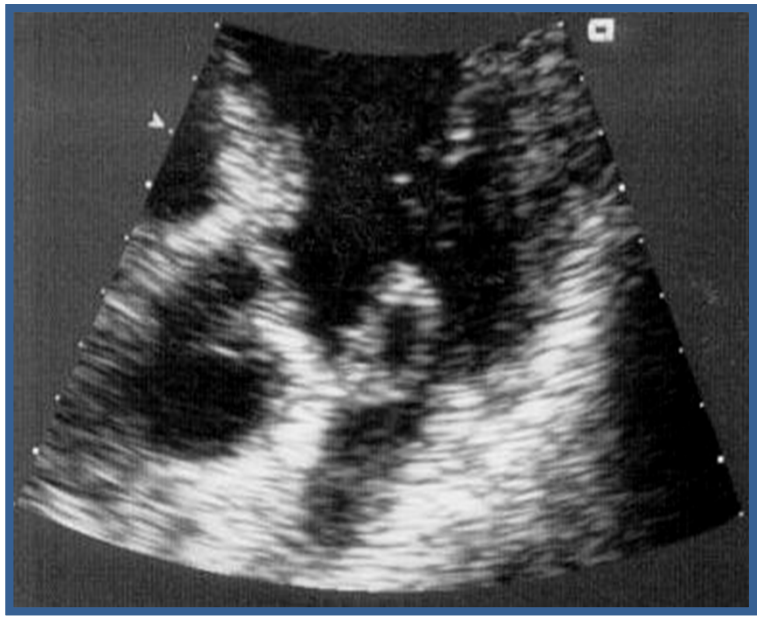

5MHZ-H 29HZ 20CM
13:06:52
ARDIOLOGIQUE
NTOINE
VG
AO
OG


HOPITAL CARDIOLOGIQUE
SERVICE ECHOGRAPHIE
VG
AO
OG

Anévrysme valvulaire sur valve native

- Déformation valvulaire anévrismale
- Evolution vers perforation (shunt)
- Origine primitive (infection focale sur valve)

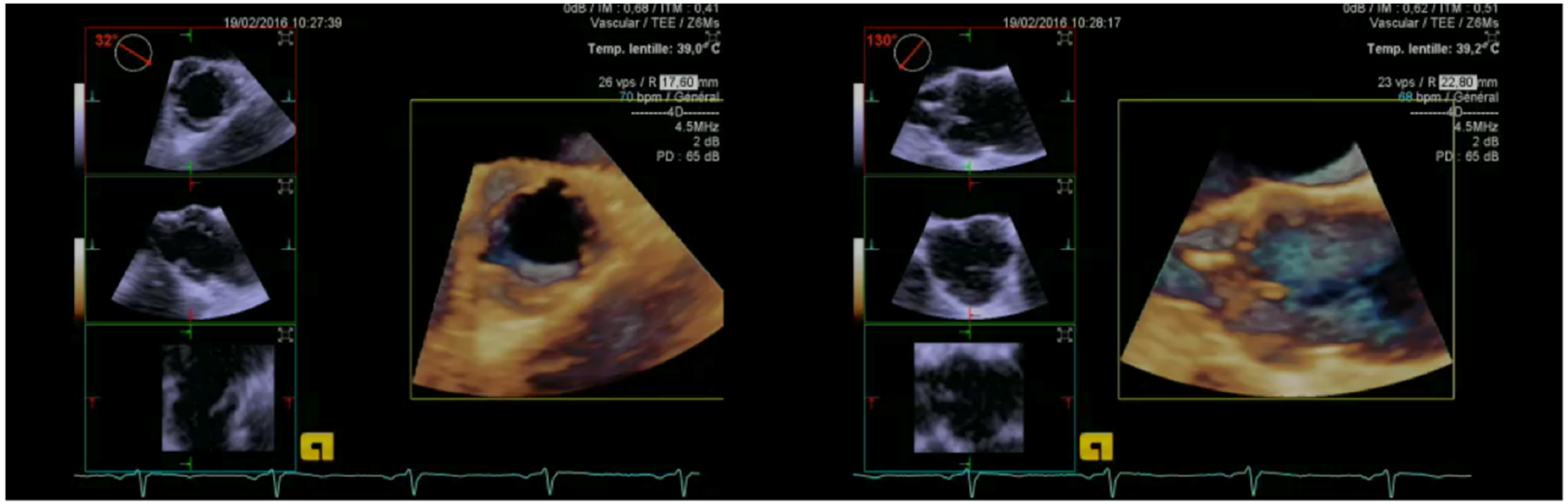
  ou secondaire (impact du jet régurgitant



ETO 3 D

Analyse des structures cardiaque en3D

Meilleur analyse des végétations et de leur taille



Liu YW et al. Scand Cardiovasc J 2009; 43:318-23

Tomodensitométrie et IRM cardiaque

TDM

- Détection abcès, pseudo-anévrysme et fistule
- Extension péri-valvulaire
- Morphologie de l'aorte ascendante
- Pour les EI du cœur droit informatif sur la présence d'abcès ou infarctus pulmonaire
- Bilan embols systémiques (cérébraux, spléniques, rénaux…)

IRM

- Intéret pour la recheche des lésions cérébrales avec un rendement plus important

Indications chirurgicales

Indications for surgery	Timing[a]	Class[b]	Level[c]
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[e]	Urgent	IIb	C

Circonstances de survenue

- ✓ Endocardite sur valve native
- ✓ Endocardite sur valve prothétique
- ✓ Endocardite sur sonde de Pace-maker

…sur valve native

- Cœur gauche :
- Plus fréquentes
- Gravité des formes aiguës de l'orifice aortique
- Atteinte pluriorificielle possible voire fréquente…

- E. Tricuspide :
- De plus en plus fréquentes
- Terrain: toxicomanes, patients réanimation, pacemaker++
- Stérilisation longue

- E. Pulmonaire :
- Rares
- Terrain: toxicomanes, patients réanimation, congénitaux

- E. et cardiopathies congénitales :
- Peu fréquentes (CIV, canal artériel...)
- Cardiopathies opérées ou non
- Nombreuses localisations décrites

…sur valve prothétique

Classiquement 10 à 20% des endocardites

Mortalité > 20%

Endocardite précoce (1ère année) grave car germes virulents +++

Diagnostic difficile avec complémentarité ETT/ETO

Abcès avec sanction chirurgicale fréquente

Particularité de la prothèse mécanique

Végétations difficile à voir car nombreux artéfacts et échos de réverbération (matériel hyperéchogène) sauf si très volumineuses et pédiculées

Désinsertion possible (doppler couleur à la recherche d'une fuite para-prothétique)

ETO +++ (végétations, abcès péri-prothétique, désinsertions de prothèse et fistules)

TEP scan ou scintigraphie leucocytes marqués (si chirurgie > 3 mois)

Particularités de la bioprothèse

Diagnostic plus aisé avec désinsertion possible

Dépistage flux anormaux

Diagnostic différentiel : lésions de dégénérescence tissulaire

Endocardites sur pacemaker

- Complication rare (Incidence 0,1 à 7%)

mais de plus en plus fréquente

mortalité +++: 10 à 30% !

- Formes précoces (< 6 sem. après implantation) vs formes chroniques

- Diagnostic

- Clinique : fièvre, signes locaux (loge PM), pneumopathie

- Bactériologique

- Echocardiographique

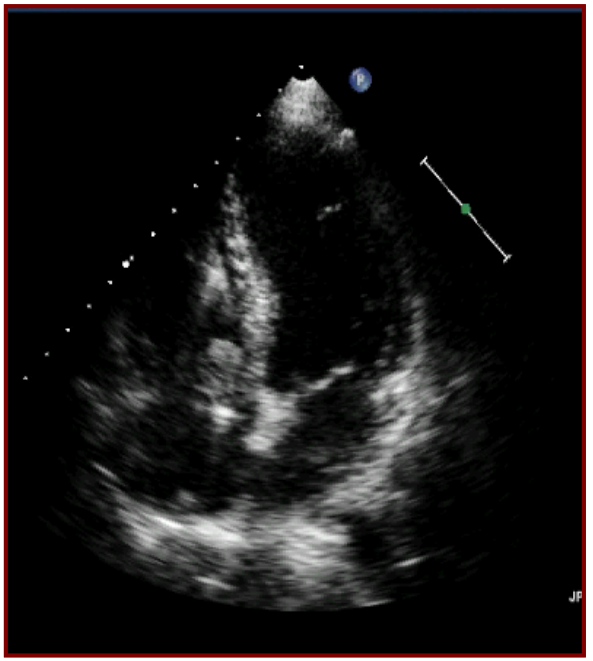
Endocardites sur pacemaker

Diagnostic difficile, rôle essentiel ETO ++

Végétations :

Arrondie, mobile, attenante aux sondes ou à la tricuspide

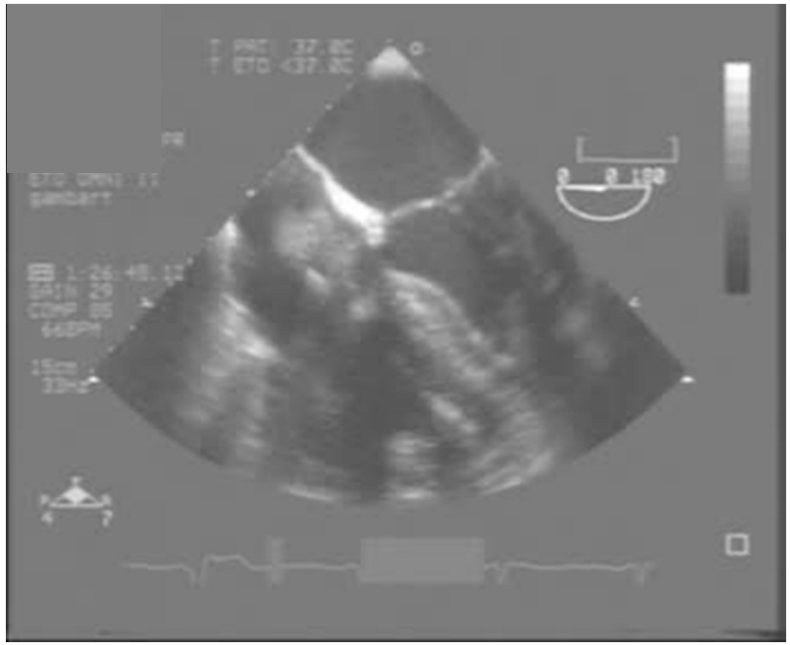
Murales ou manchon autour de la sonde moins typique

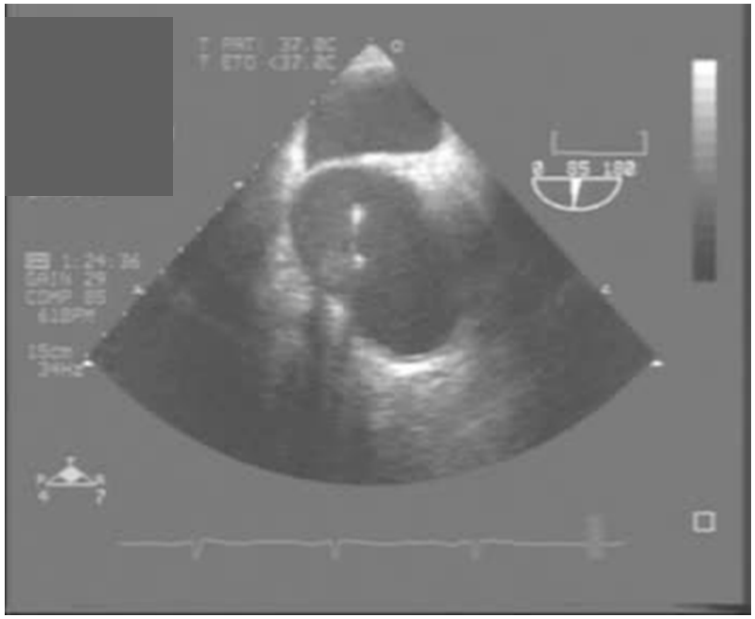


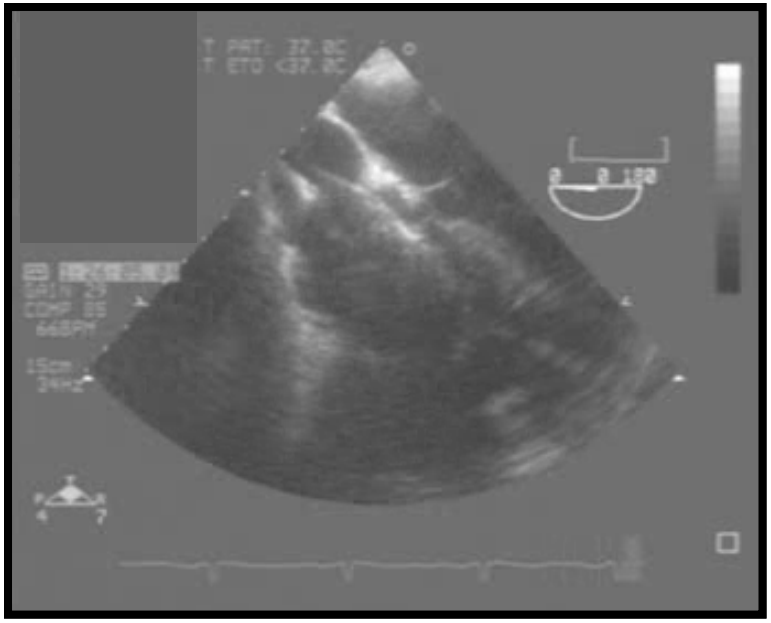
Délabrement tricuspidien avec IT possible

Abcès rare

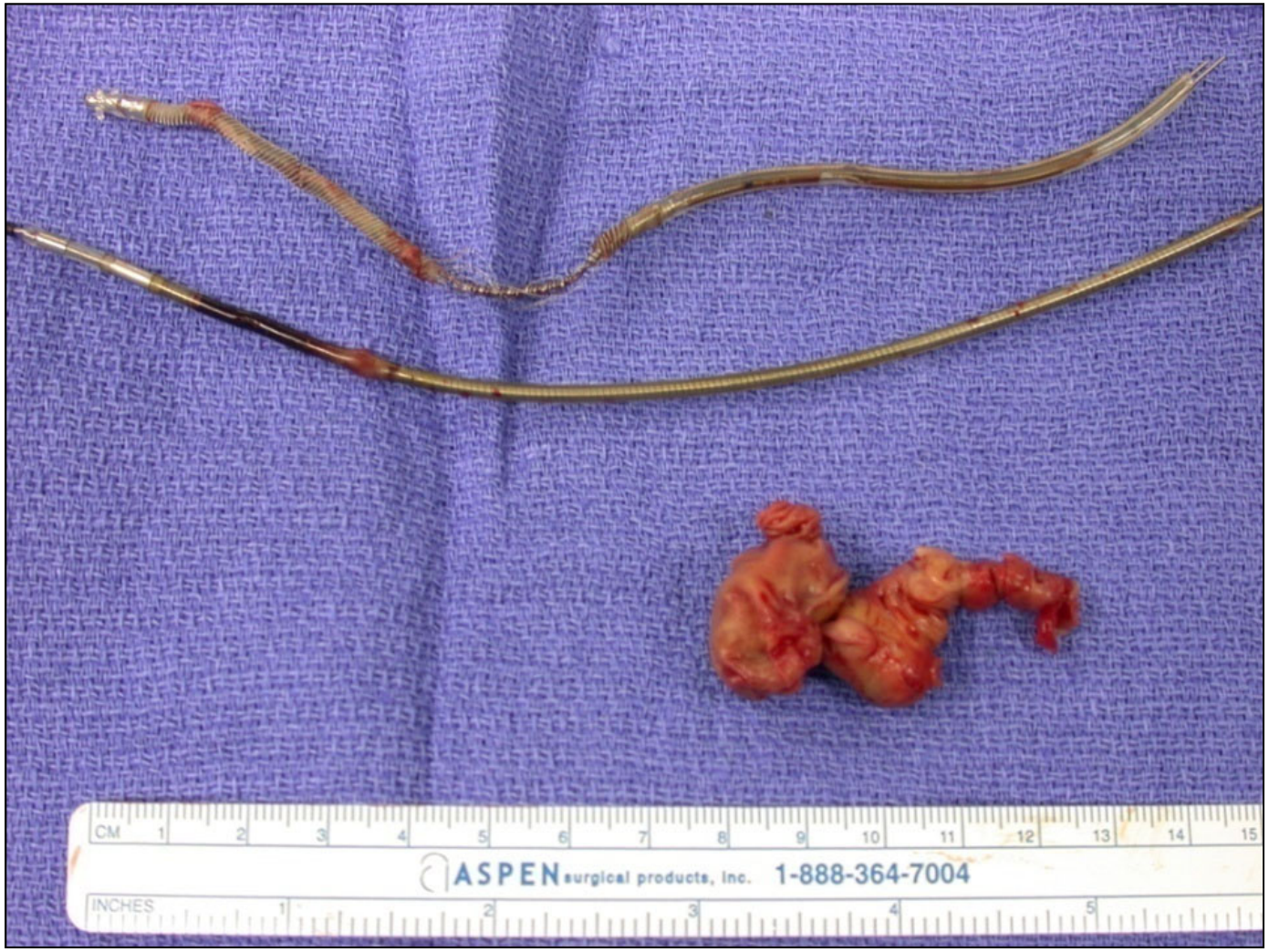
Cas clinique #1







Cas clinique #1



Endocardites sur pacemaker
Conduite à tenir

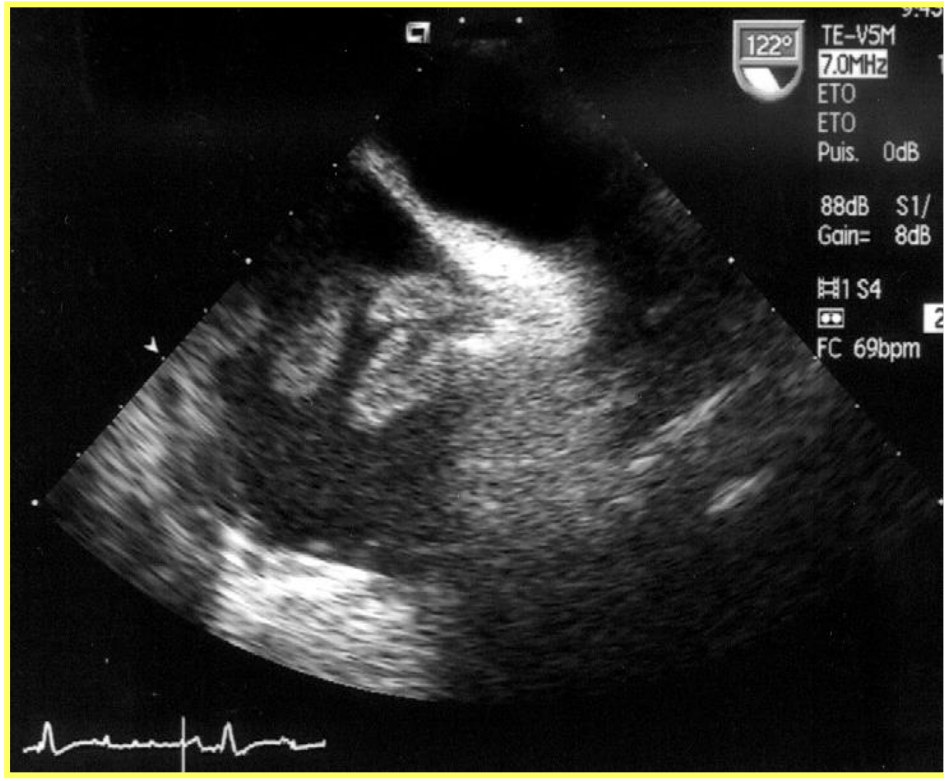
→ **En règle : exérèse du matériel**

- Végétation < 10 – 15 mm

→extraction percutanée

- Végétation > 15 mm

→extraction chirurgicale



ETO OM Bicave

Critères de gravité

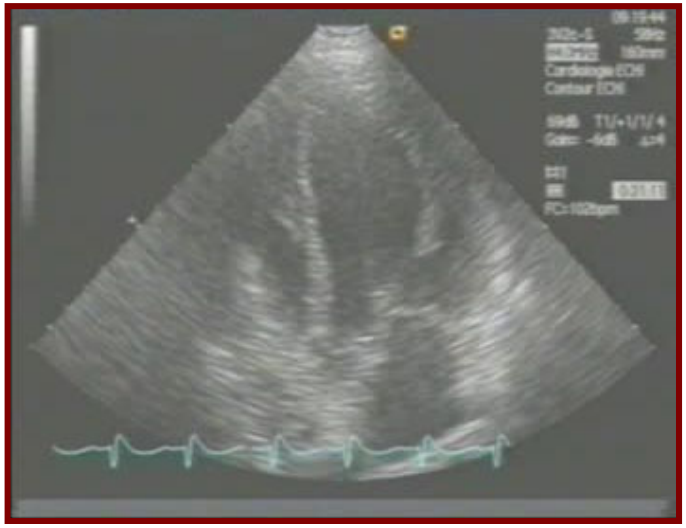
Patient characteristics
- Older age
- Prosthetic valve IE
- Diabetes mellitus
- Comorbidity (e.g., frailty, immunosuppression, renal or pulmonary disease)

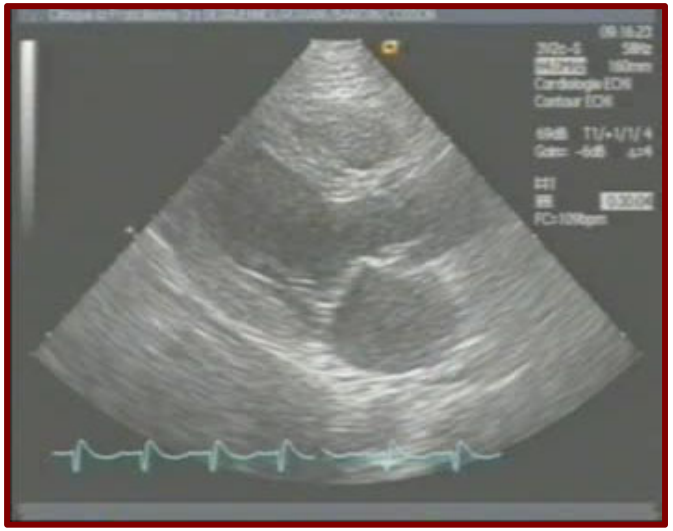
Clinical complications of IE
- Heart failure
- Renal failure
- >Moderate area of ischaemic stroke
- Brain haemorrhage
- Septic shock

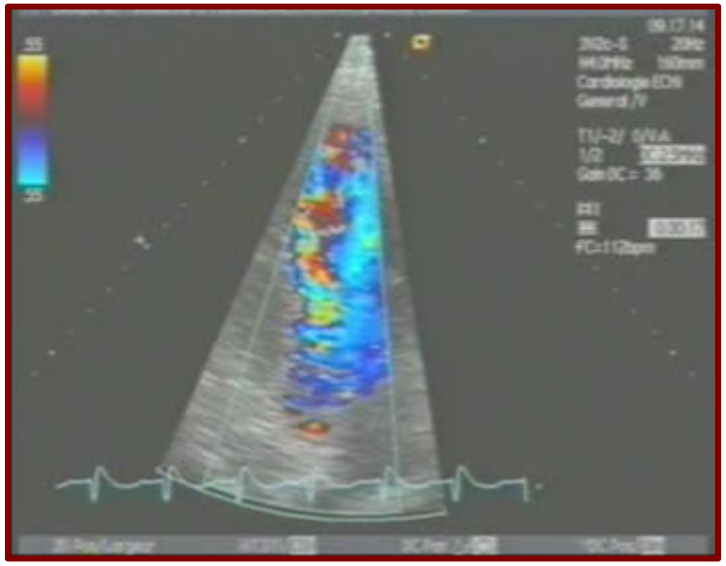
Microorganism
- *Staphylococcus aureus*
- Fungi
- Non-HACEK Gram-negative bacilli

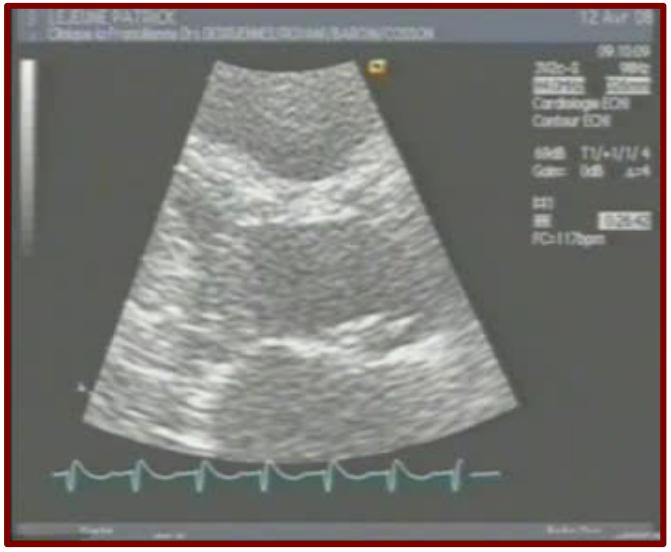
Echocardiographic findings
- Periannular complications
- Severe left-sided valve regurgitation
- Low left ventricular ejection fraction
- Pulmonary hypertension
- Large vegetations
- Severe prosthetic valve dysfunction
- Premature mitral valve closure and other signs of elevated diastolic pressures

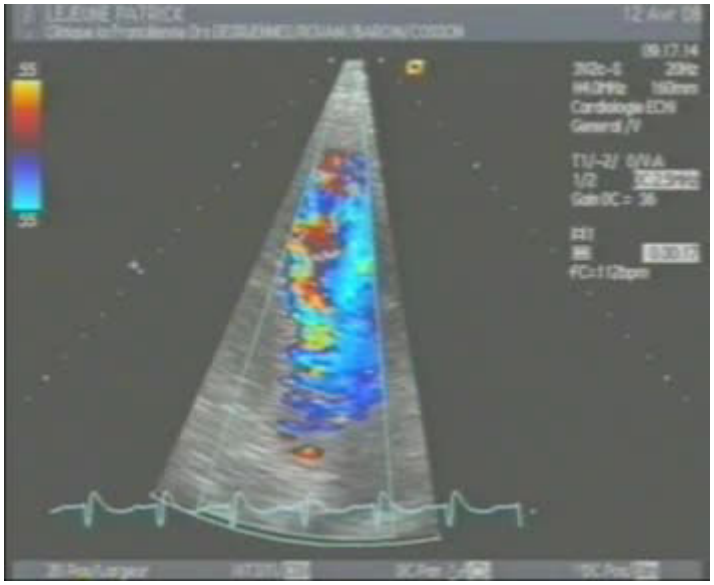
Cas clinique #2

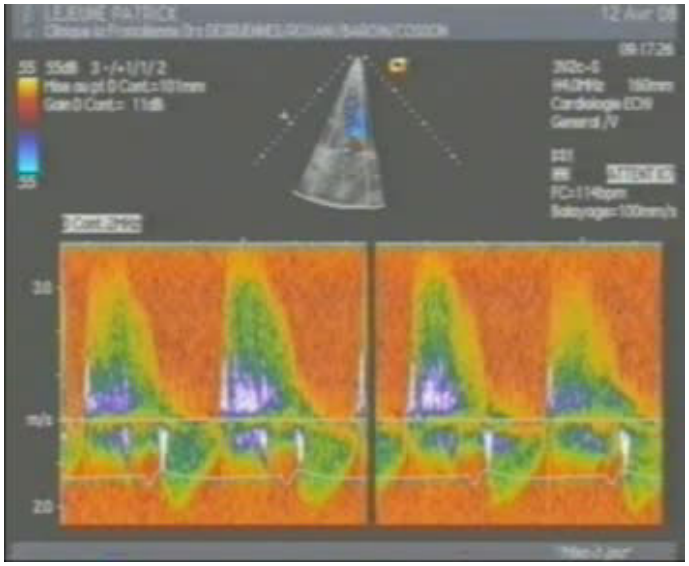


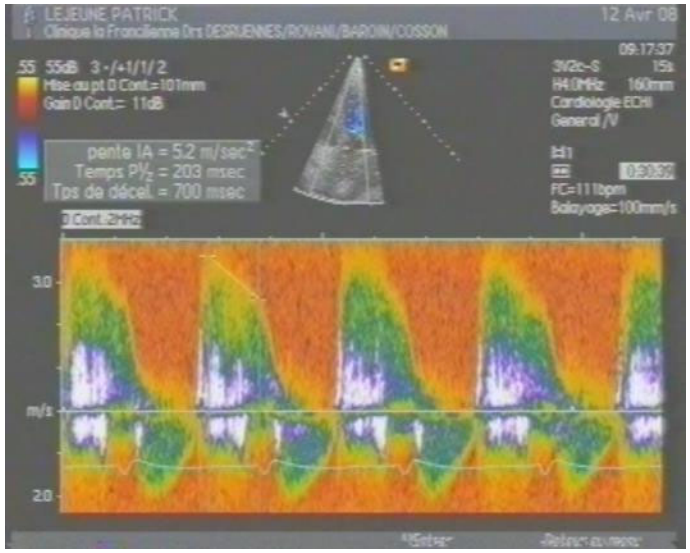






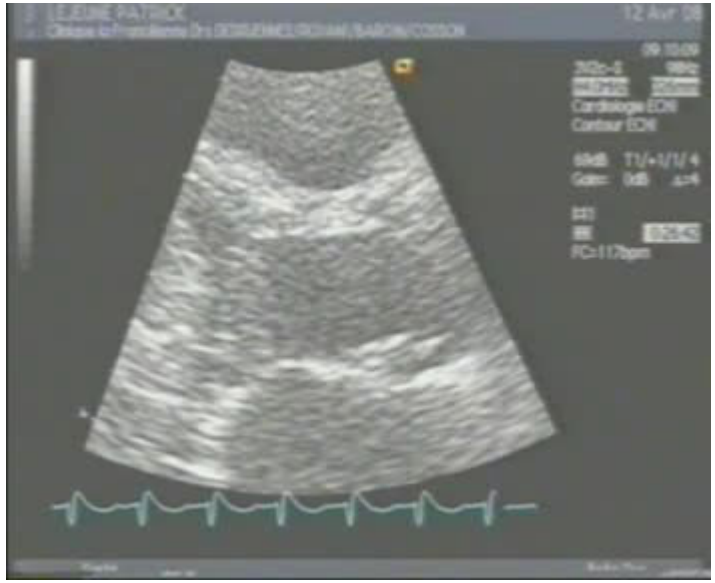


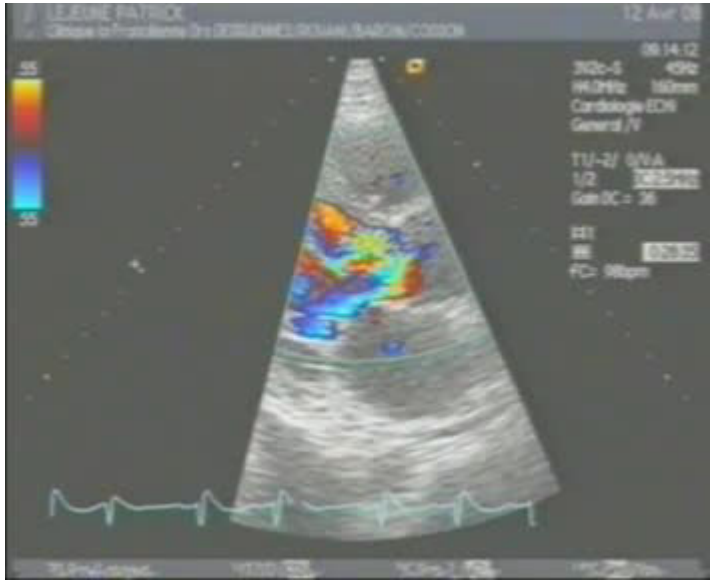




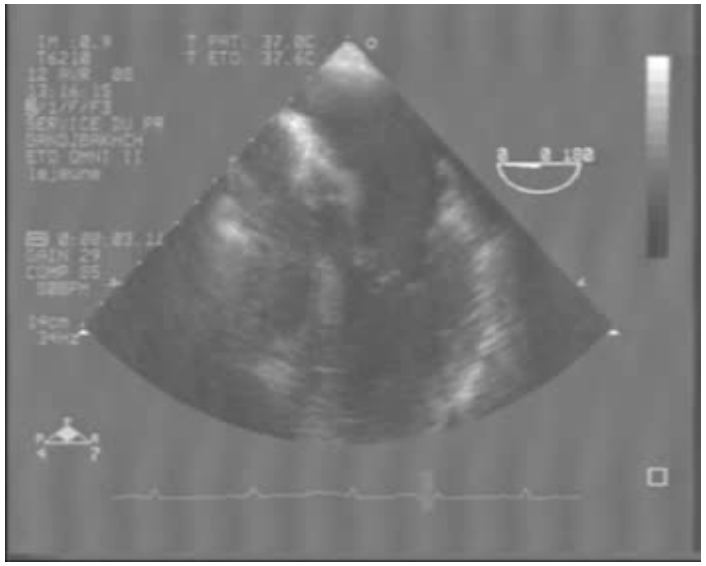
Pente d' IA =5.2 $m.sec^{-1}$

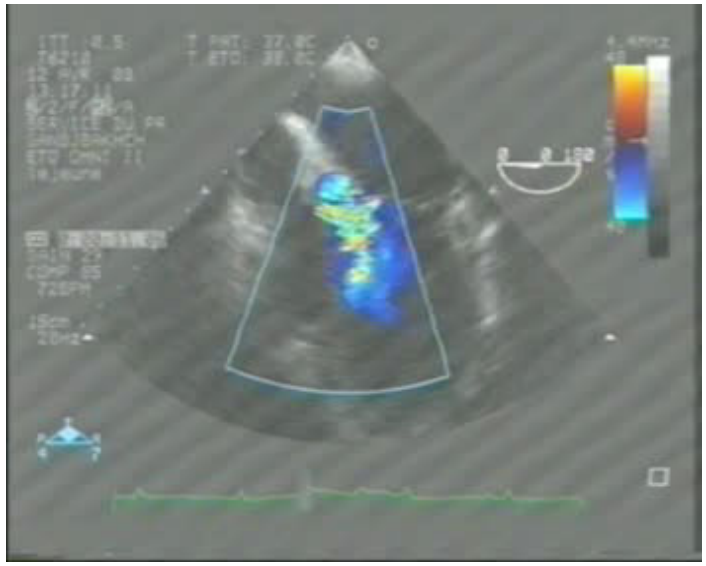
T1/2P= 203 ms

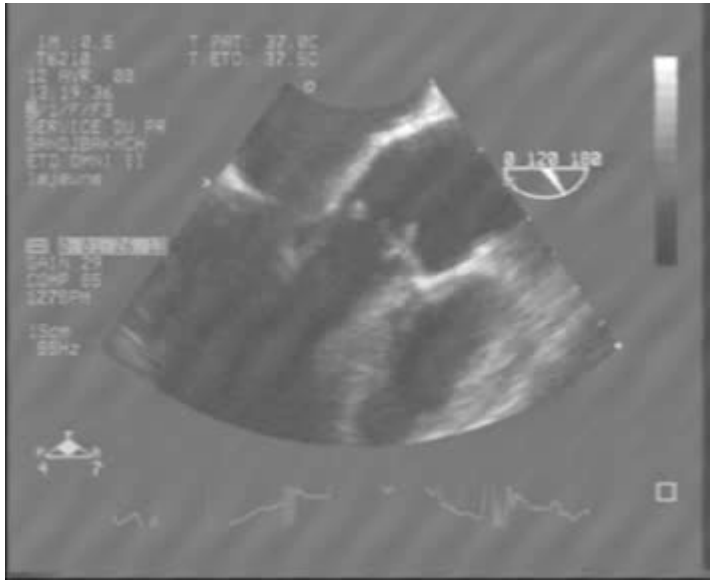


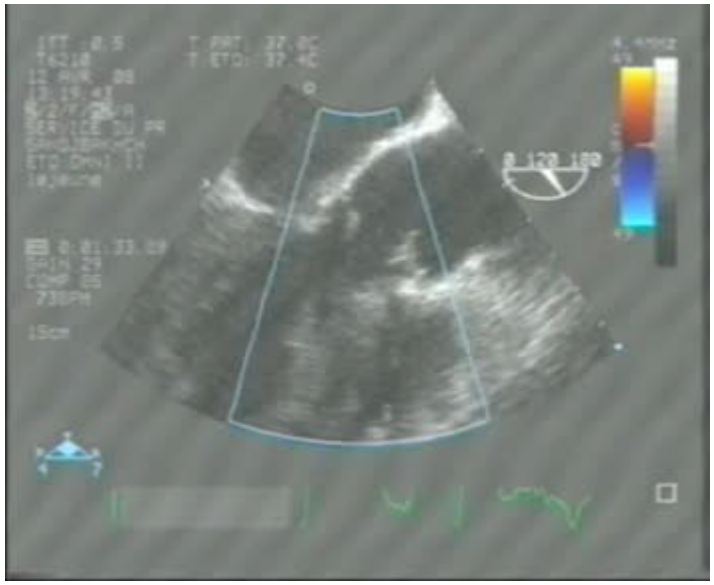


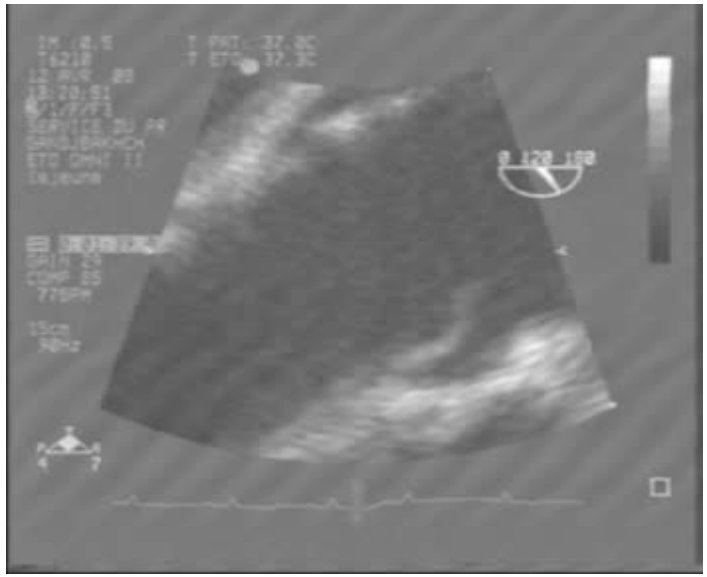
ETO complémentaire

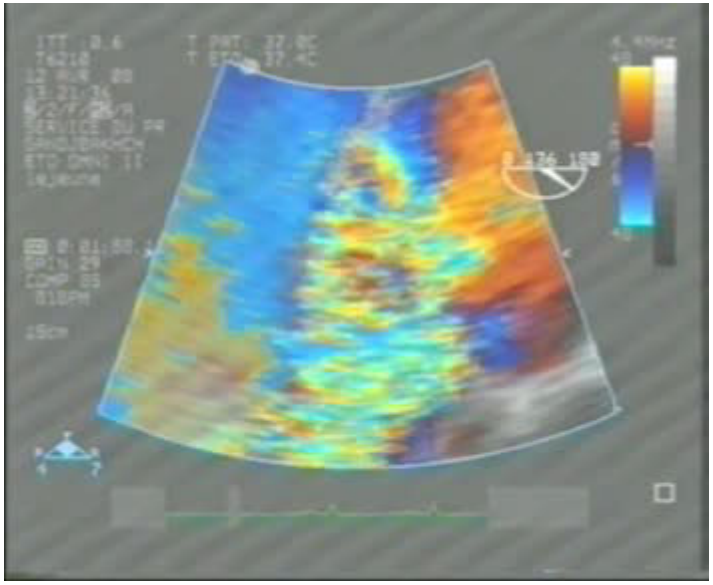


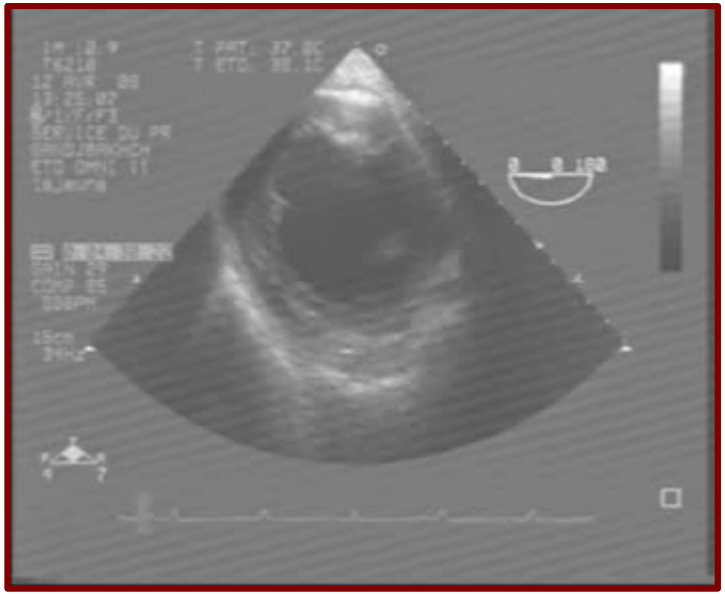


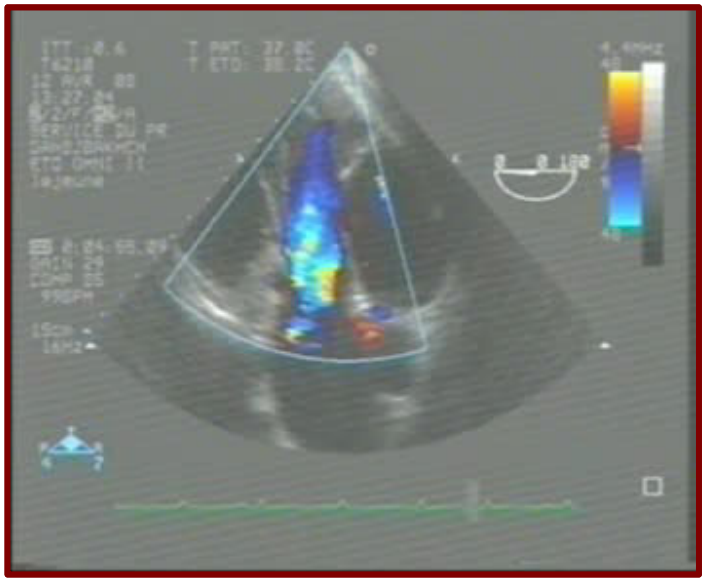


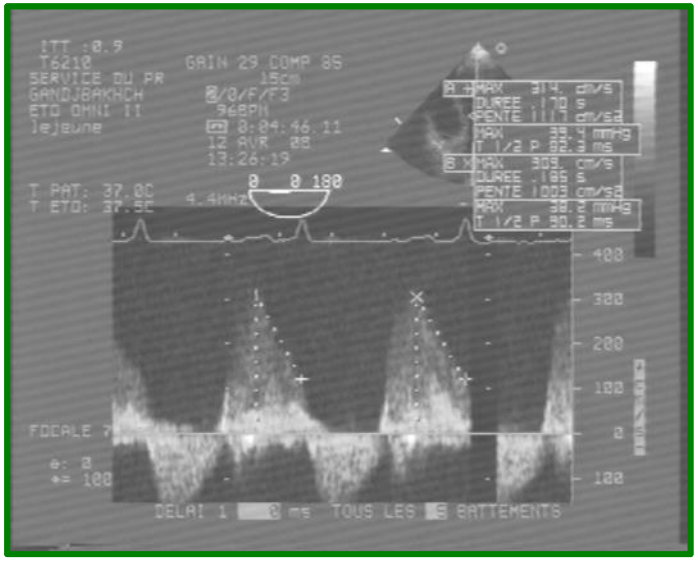


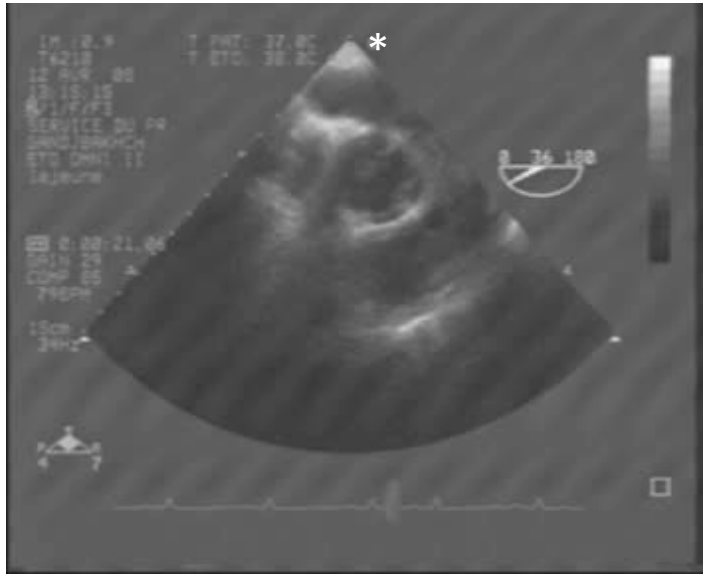


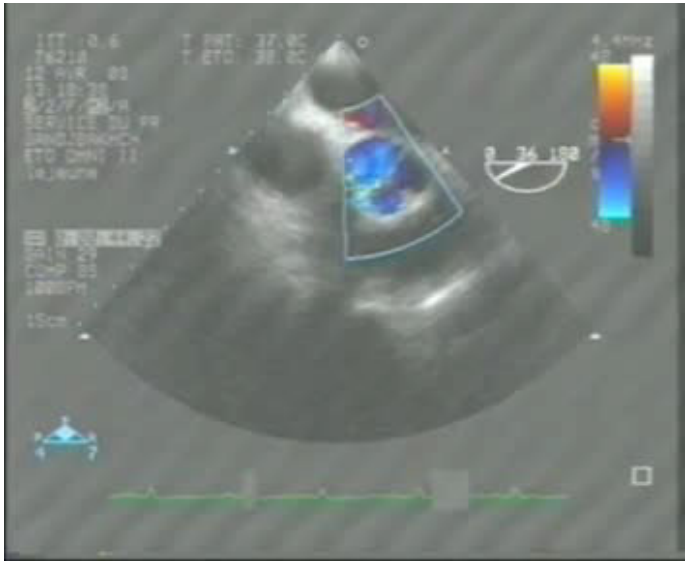


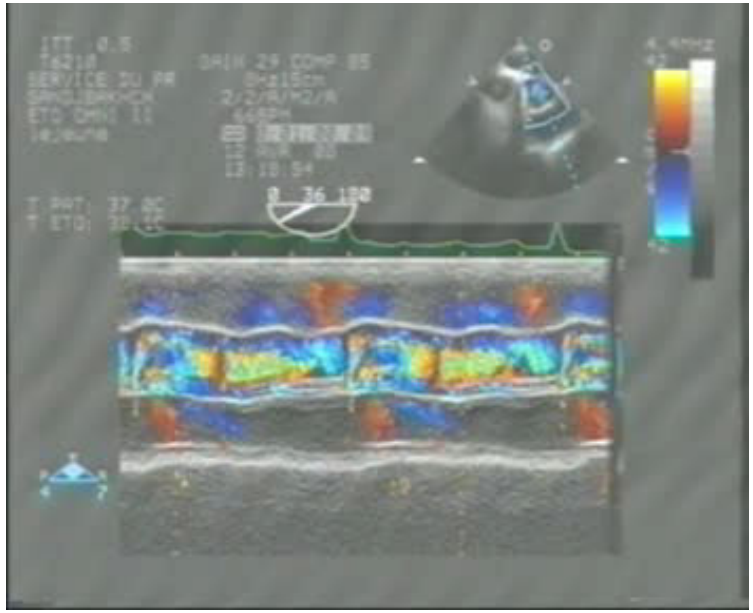





ITT :0.9
T6210
SERVICE DU PR
GANDJBAKHCH
ETO OMNI II
jejeune
GAIN 29 COMP 85
15cm
B/0/F/F3
96BPH
0:04:46.11
12 AVR 08
13:26:19
T PAT: 37.0C
T ETO: 37.5C
4.4MHz
0 0 180
FOCALE 7
DELAI 1
ms
TOUS LES
BATTEMENTS



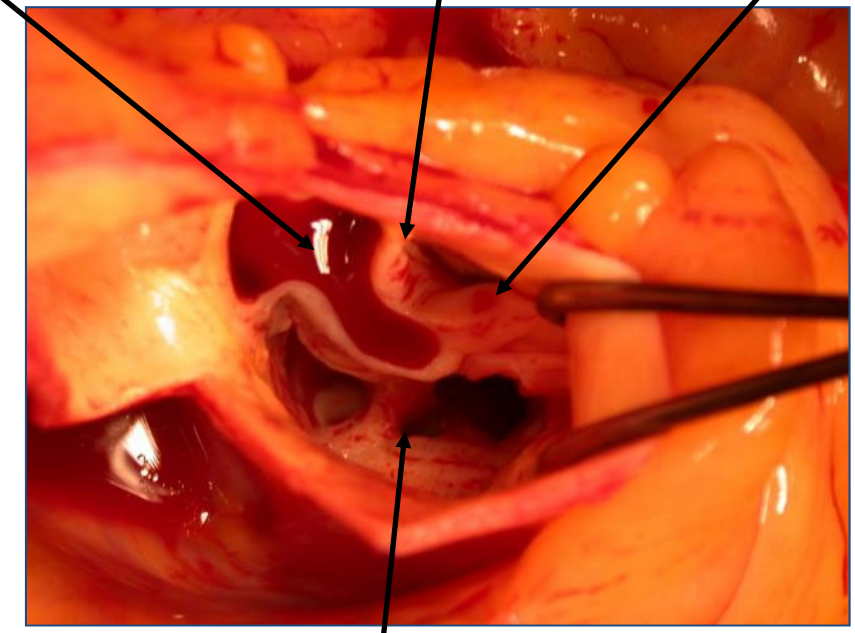




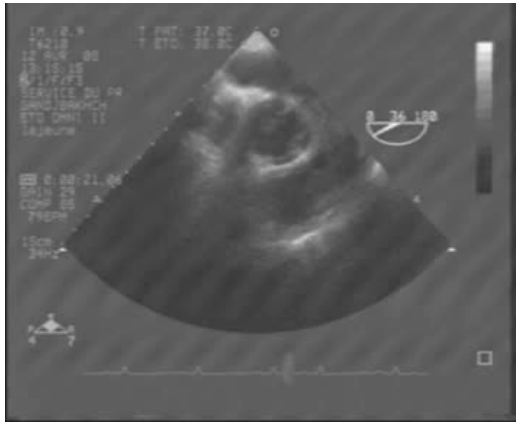
Cusp coronaire gauche

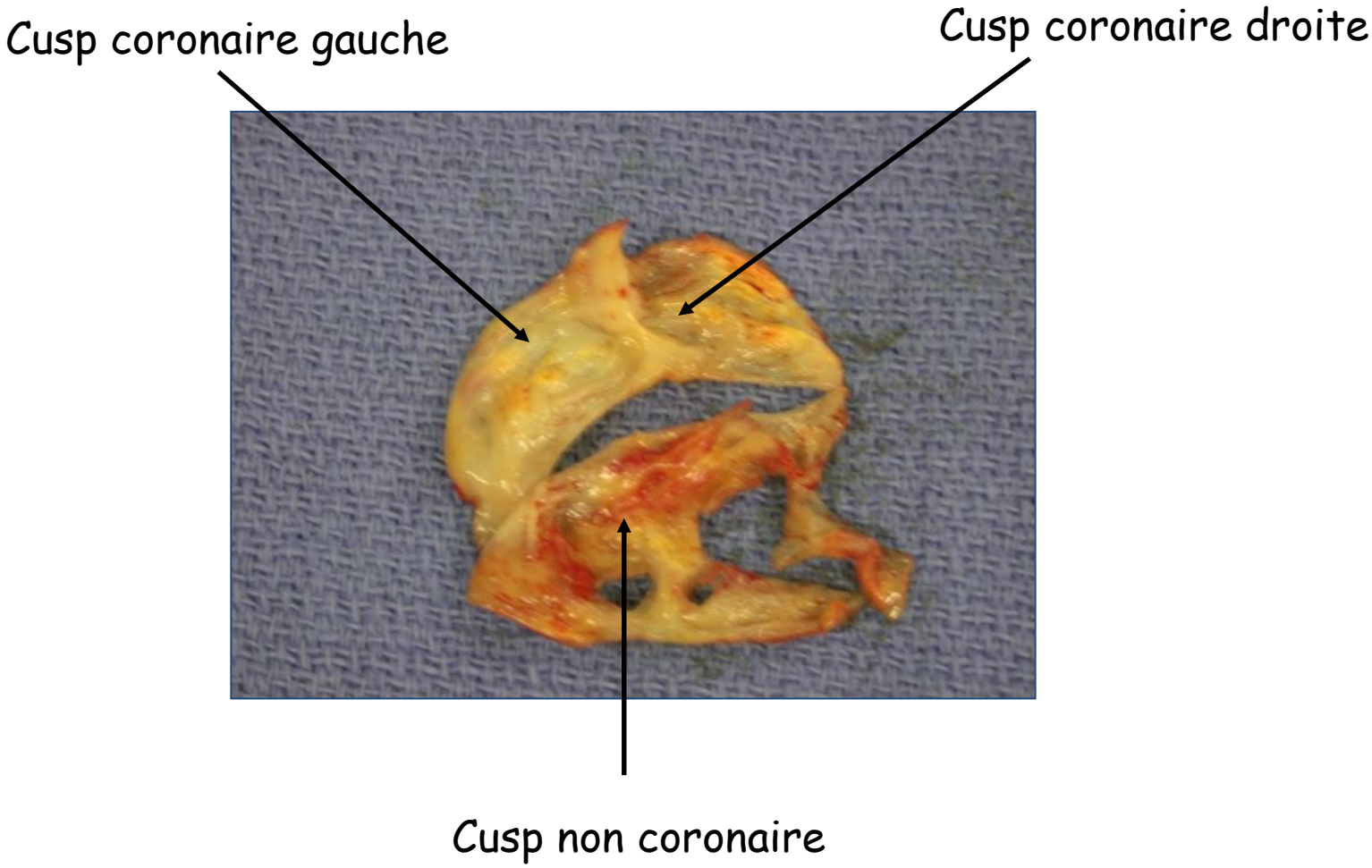
Raphé médian

Cusp coronaire droite



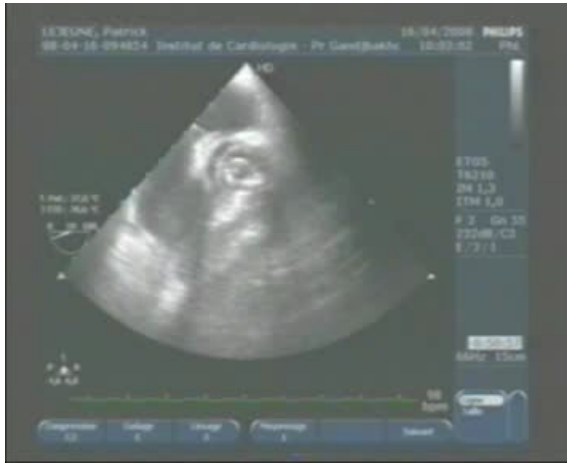
Cusp non coronaire

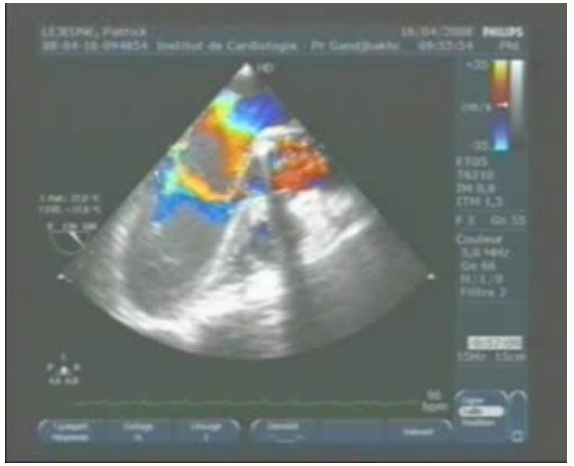


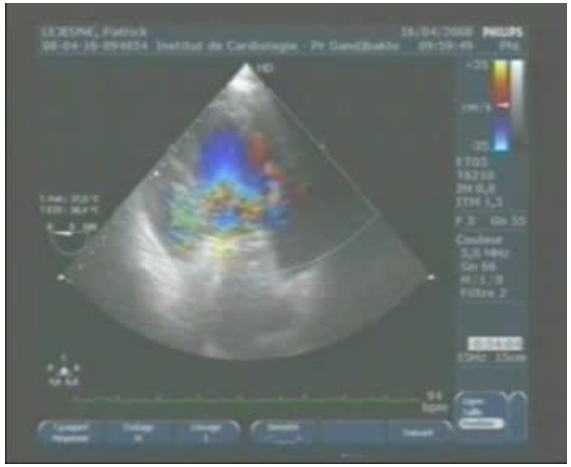


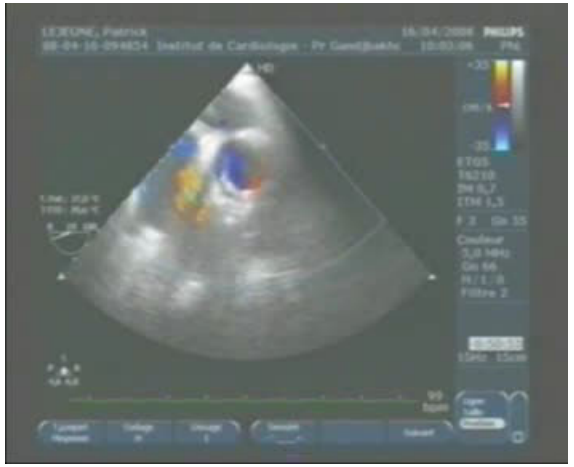
Bicuspidie aortique avec perforation valvulaire

Contrôle postopératoire…

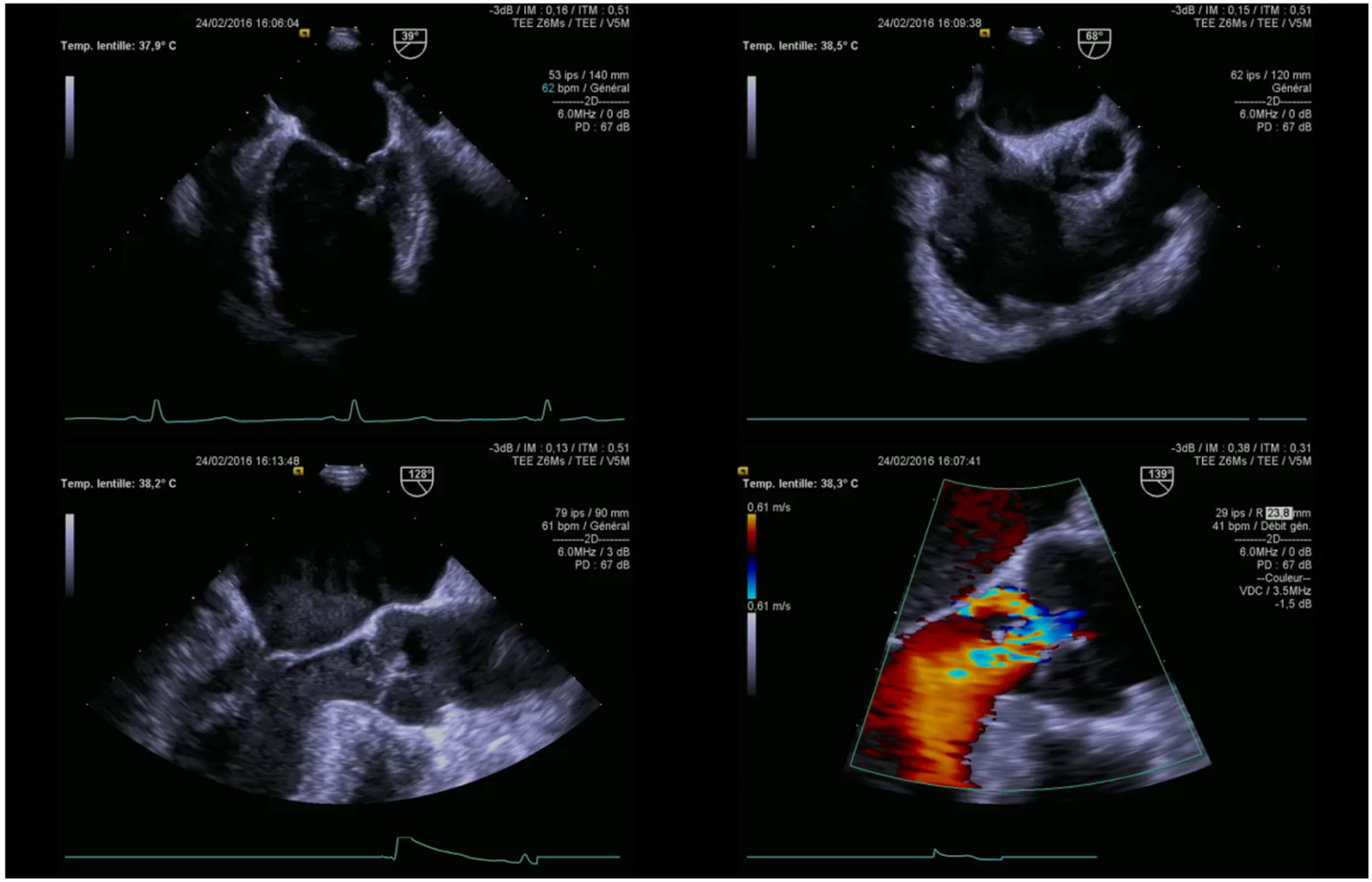




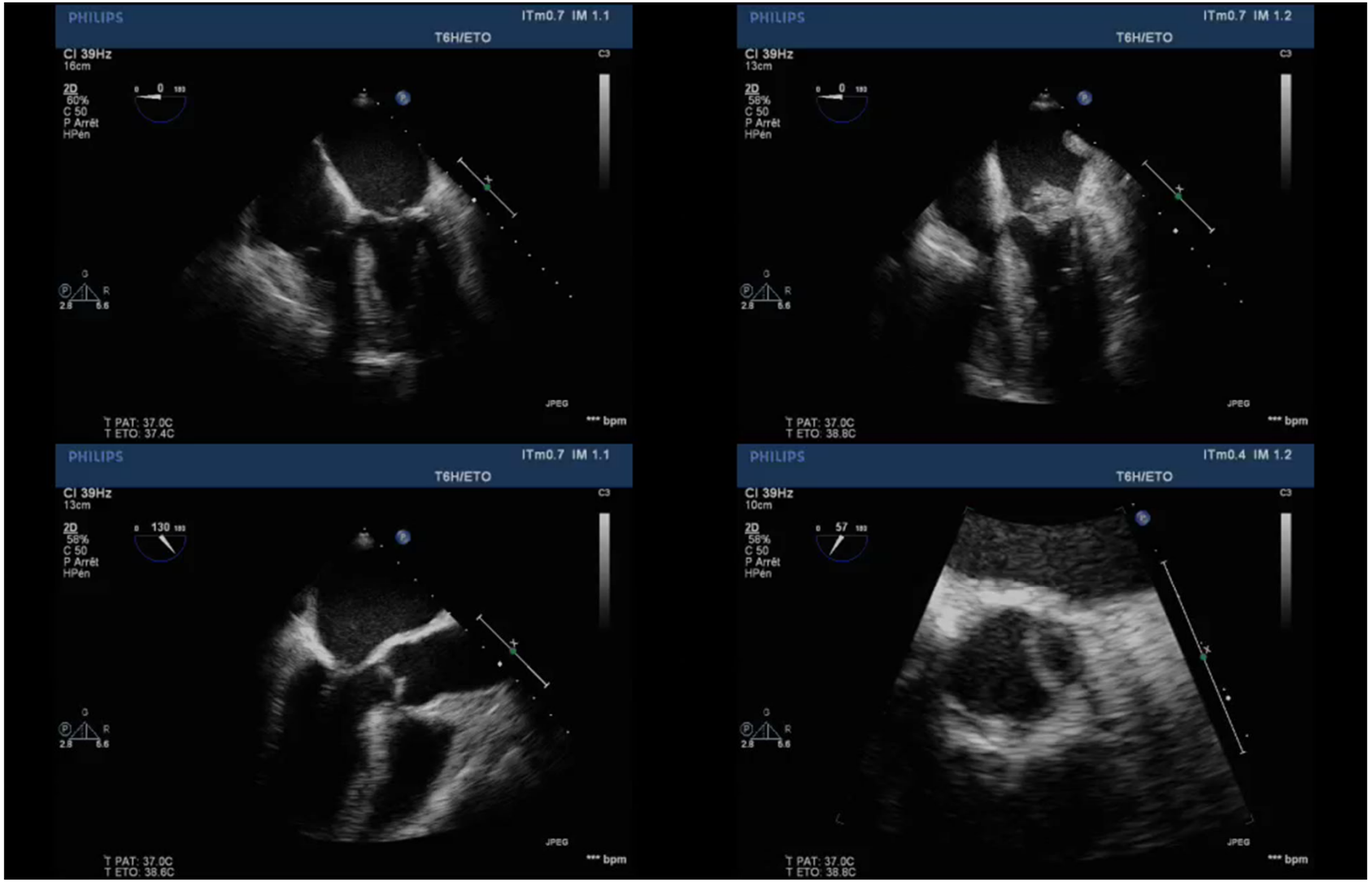




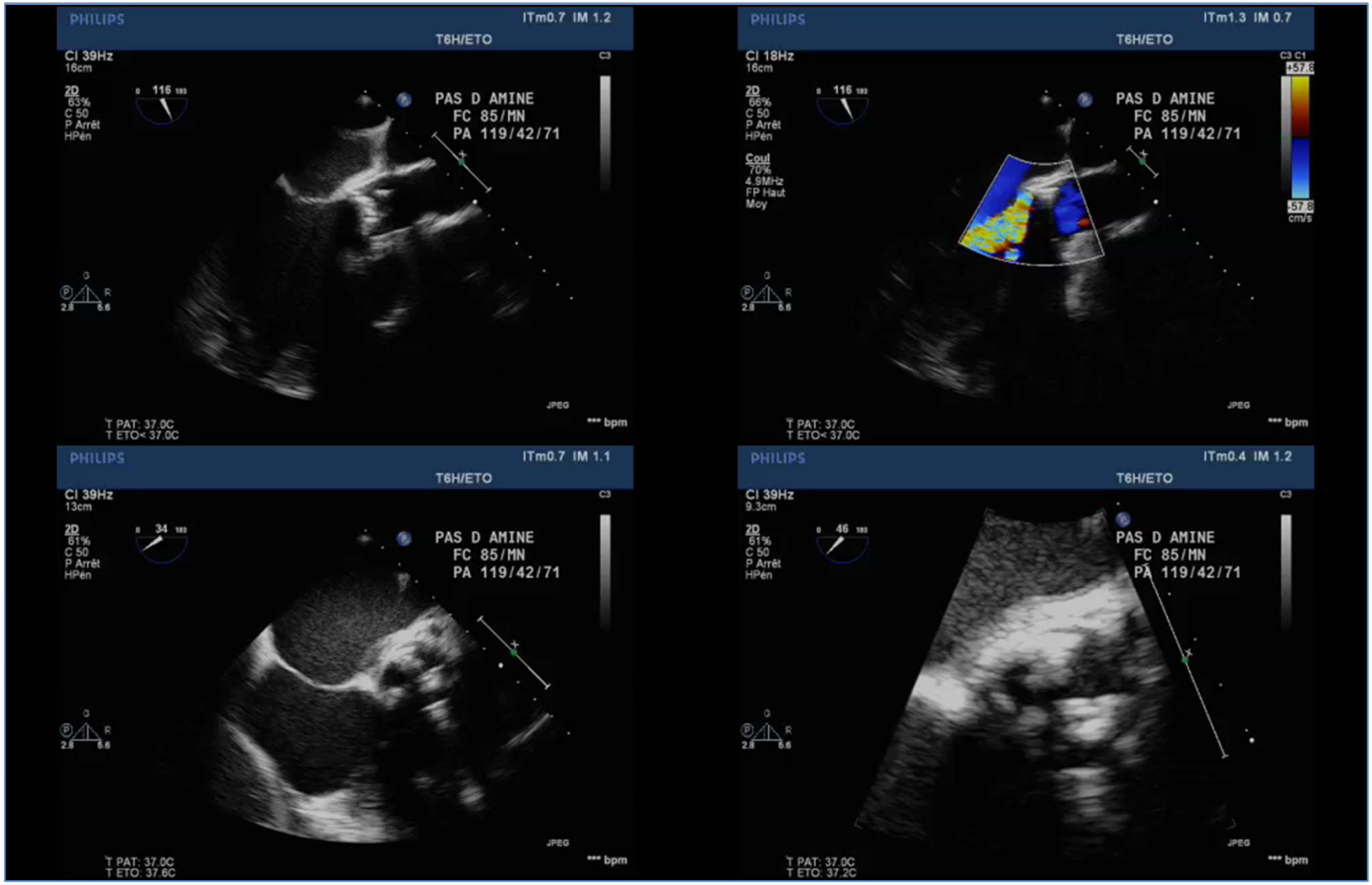
Cas clinique #3



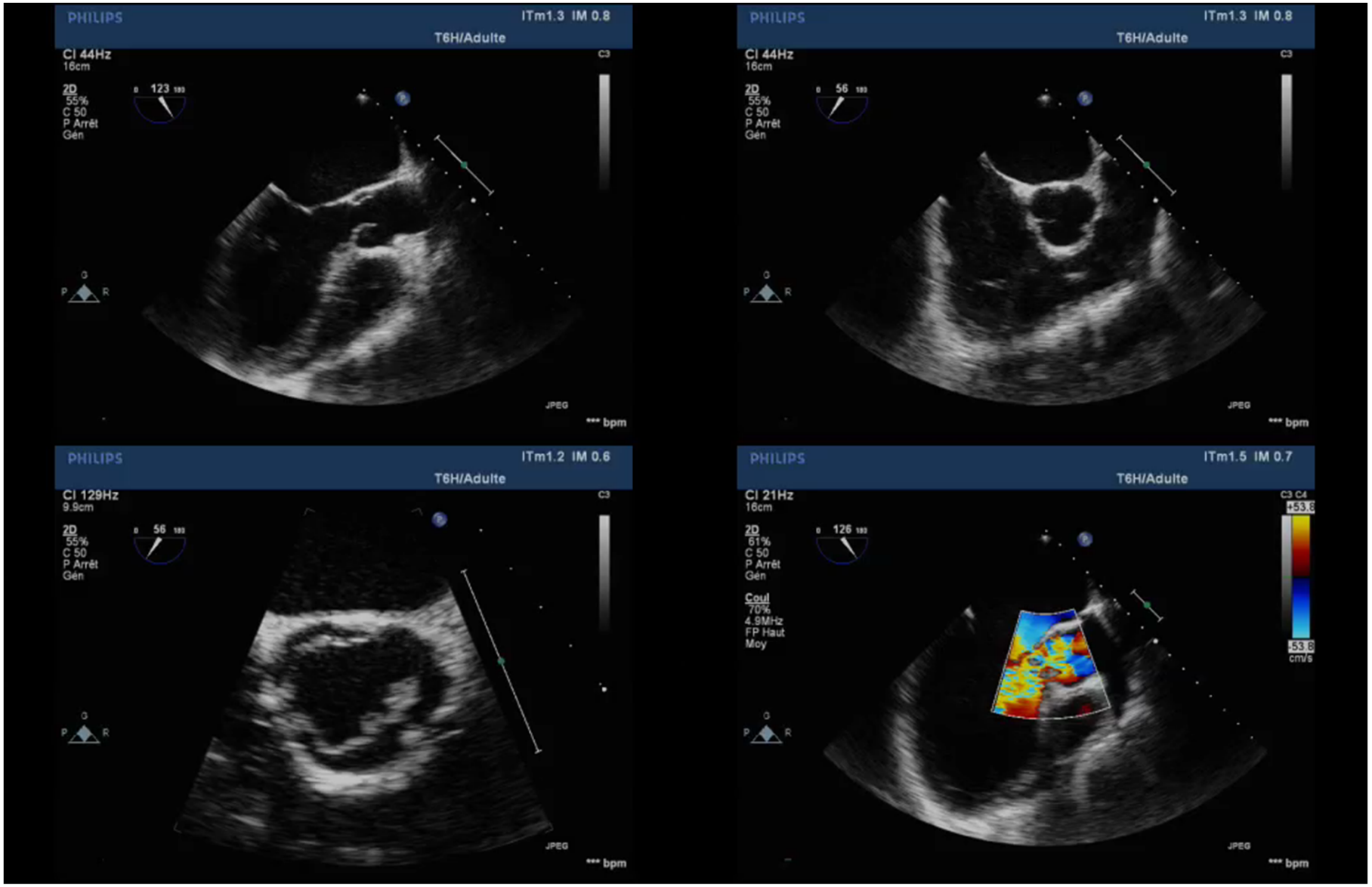
Cas clinique #4



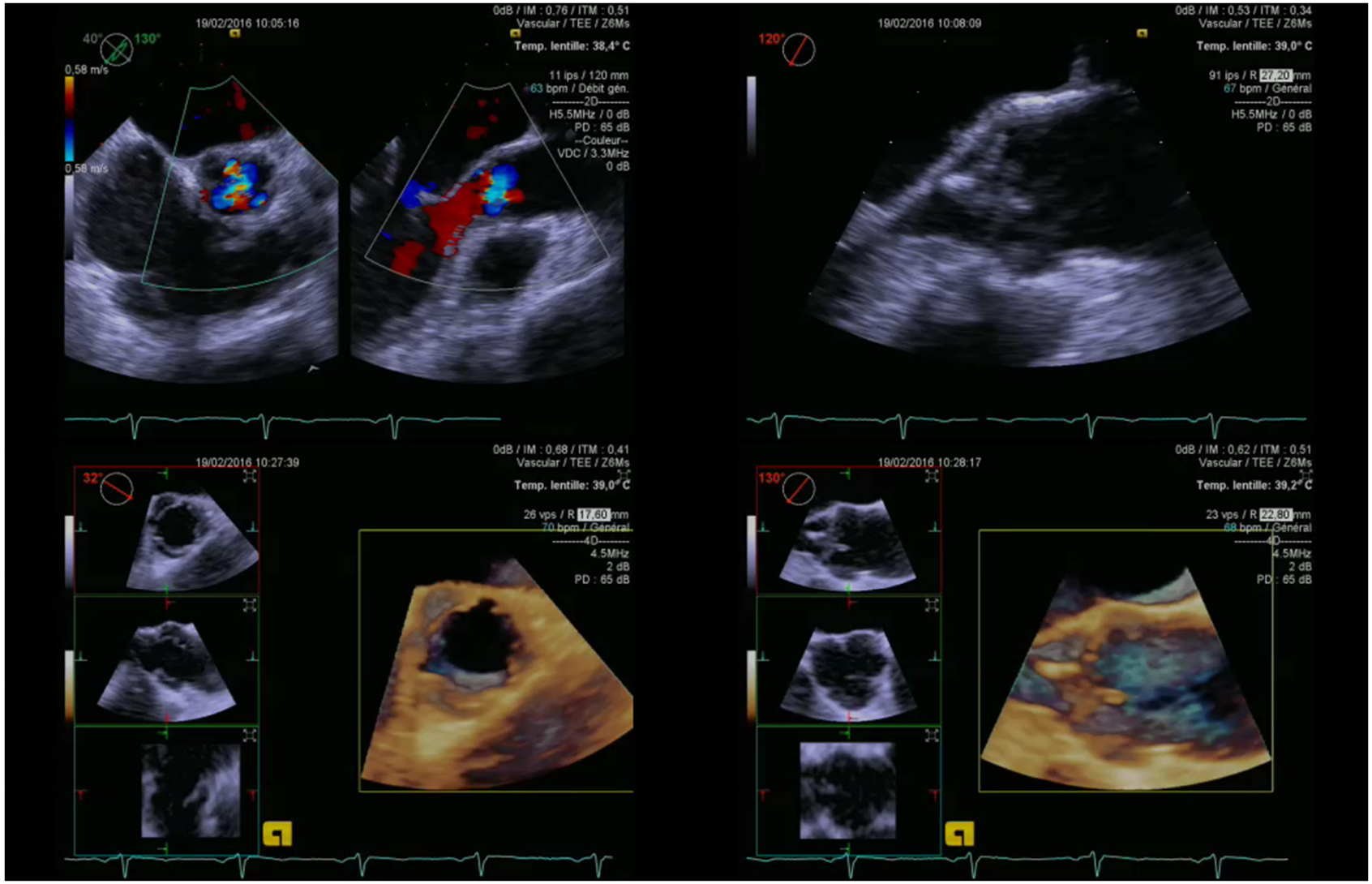
Cas clinique #5

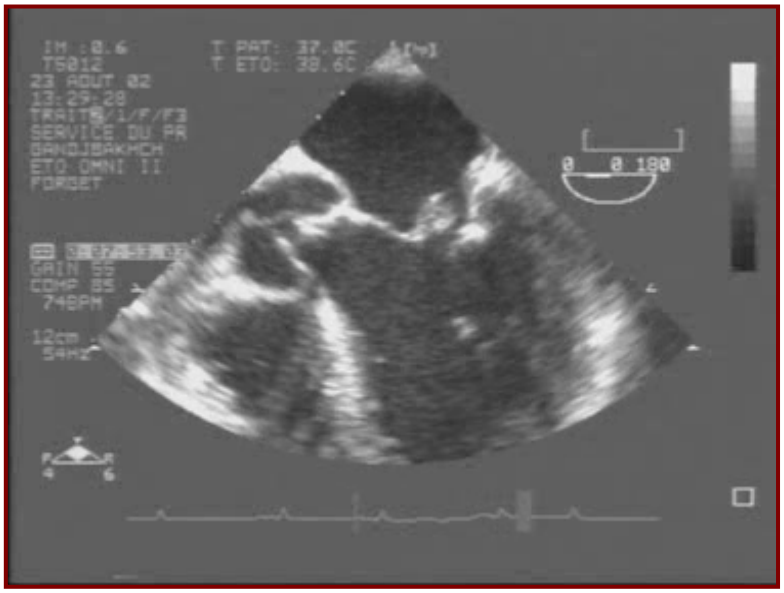


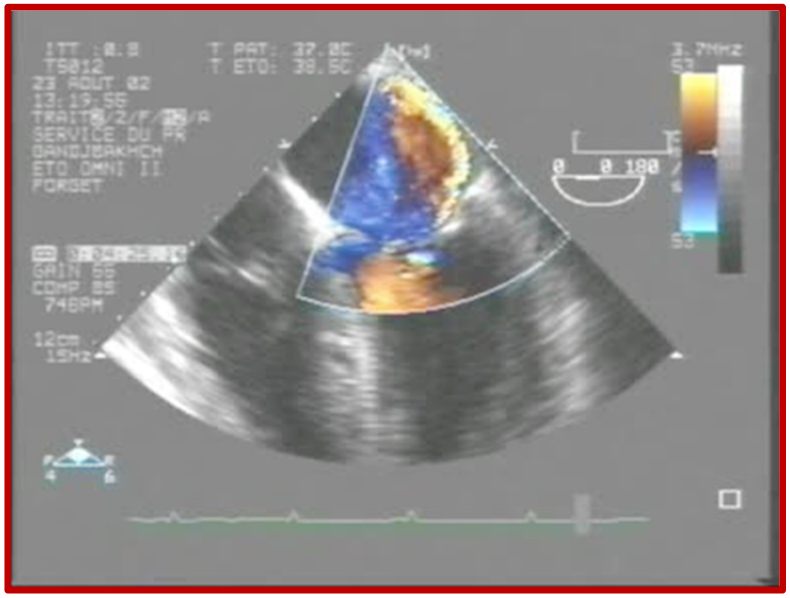
Cas clinique #6

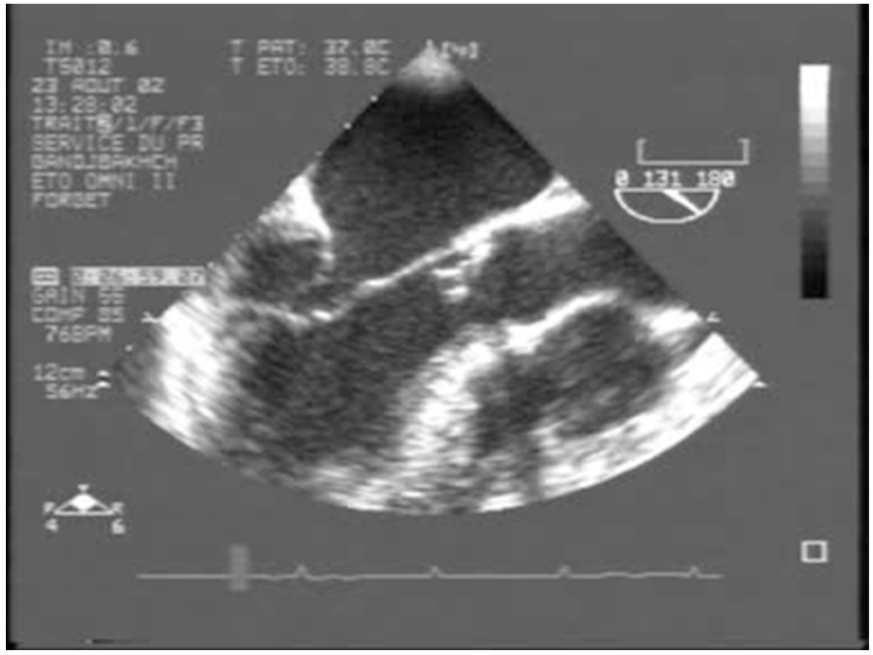


Cas clnique #7



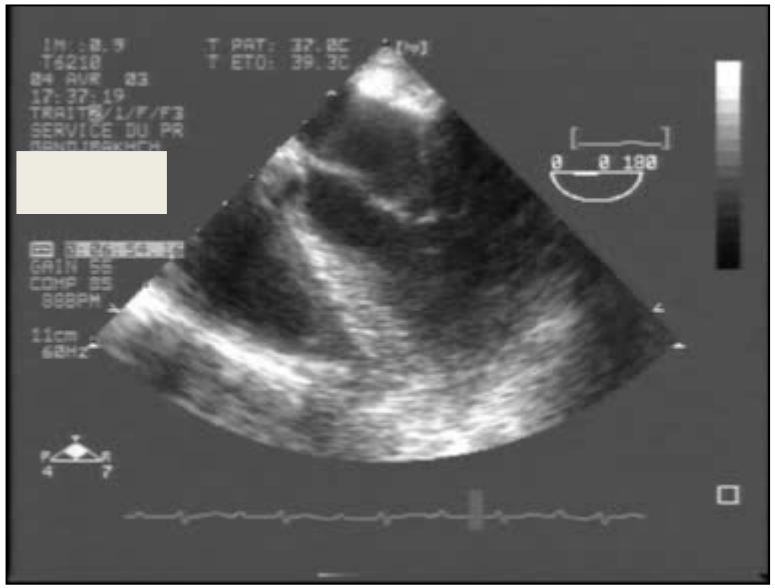


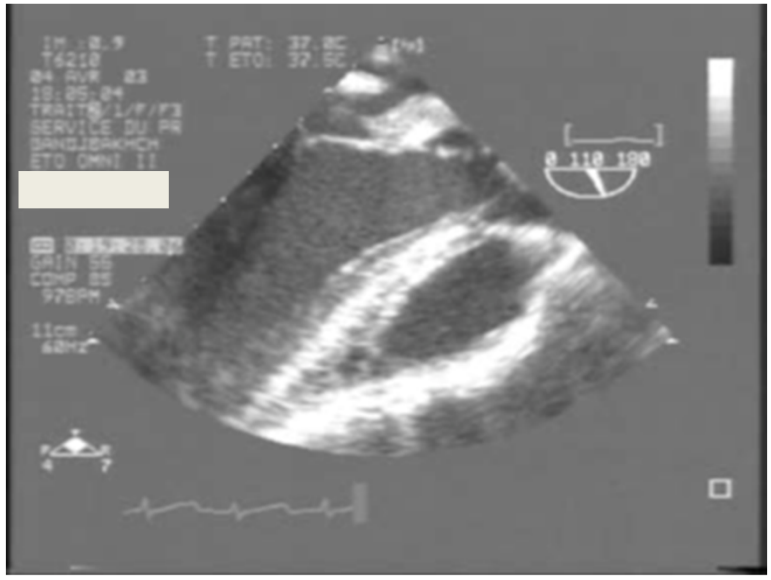


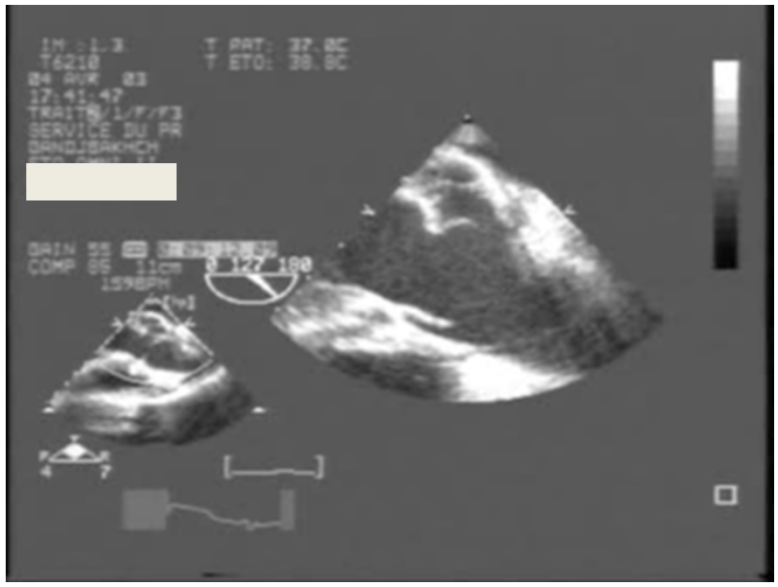


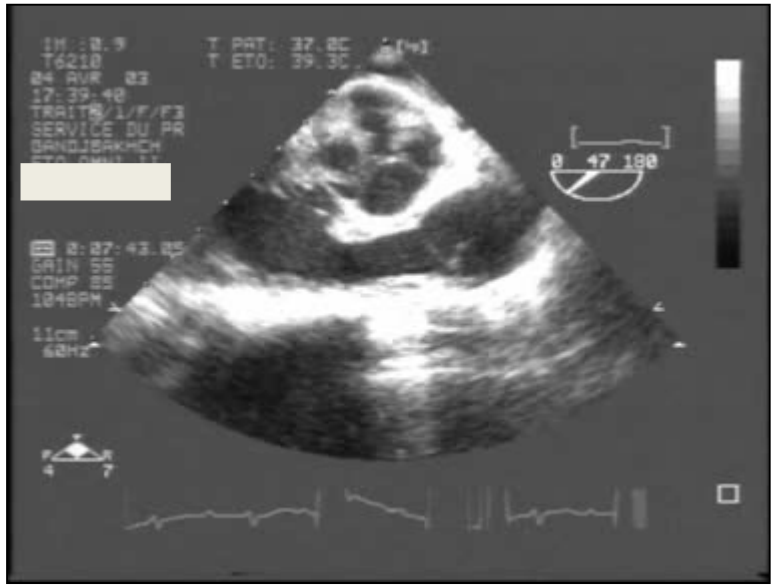
Cas clinique #8

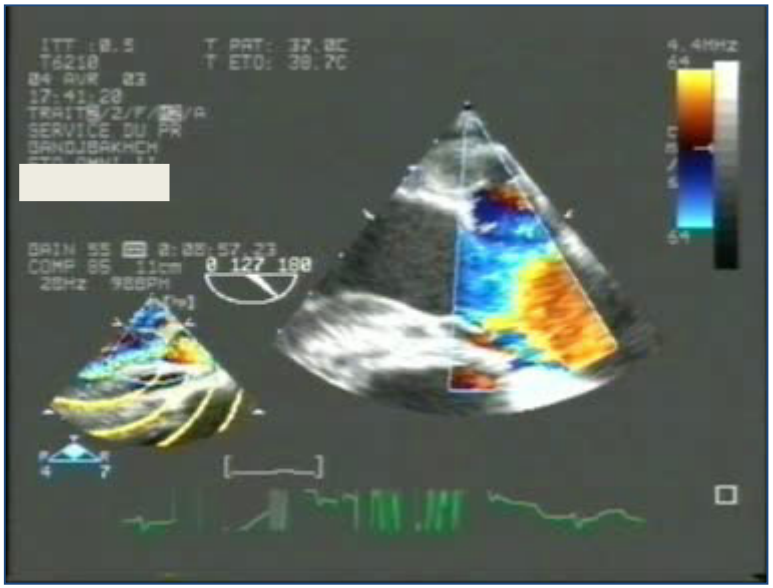
Cas clinique #9

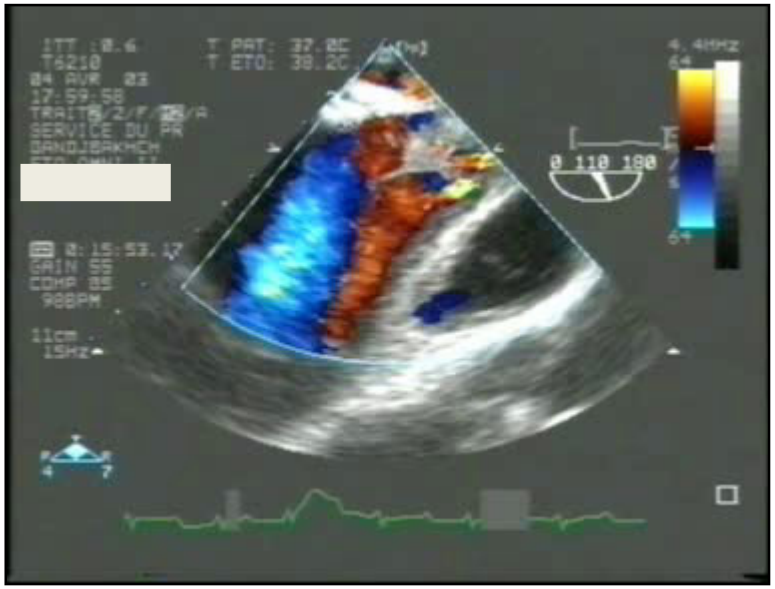


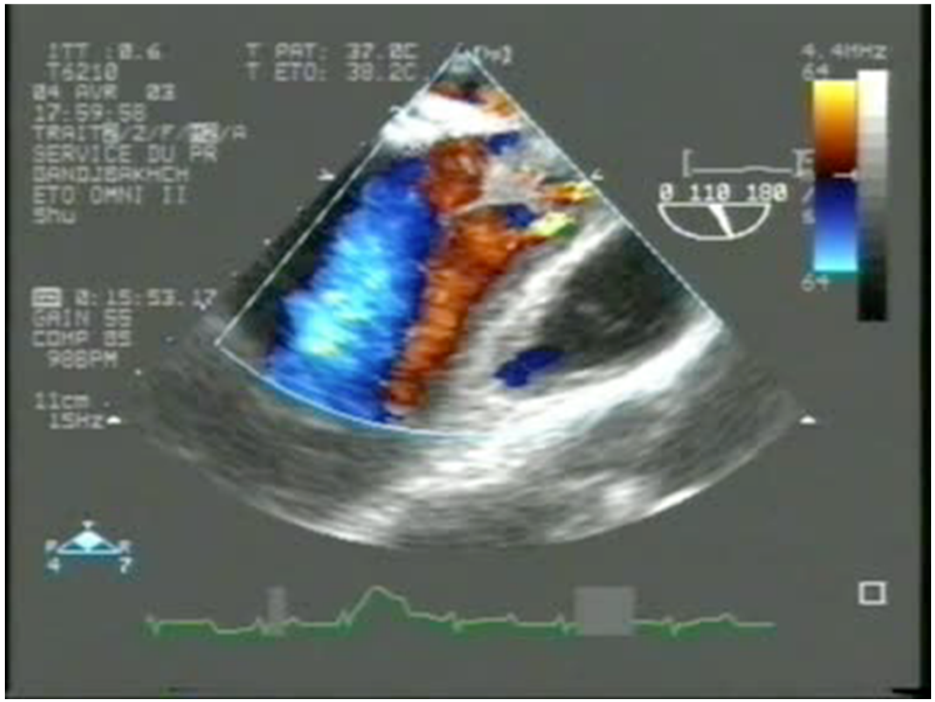







ITT :0.5
T6210
04 AVR 23
17:41:20
SERVICE DU PR
BANDJBAKHCH
T PAT: 37.0C
T ETO: 38.7C
4.4MHz
GAIN 55
COMP 65
11cm
20Hz 90BPM
0 127 180


ITT :0.6
T6210
04 AVR 23
17:59:58
SERVICE DU PR
BANDJBAKHCH
T PAT: 37.0C
T ETO: 38.2C
4.4MHz
0 110 180
GAIN 55
COMP 65
90BPM
11cm
15Hz


ITT :0.6
T6210
04 AVR 23
17:59:58
SERVICE DU PR
BANDJBAKHCH
ETO OMNI II
Shu
T PAT: 37.0C
T ETO: 38.2C
4.4MHz
0 110 180
GAIN 55
COMP 65
90BPM
11cm
15Hz