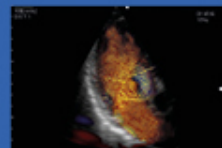
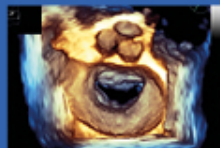


EuroValve

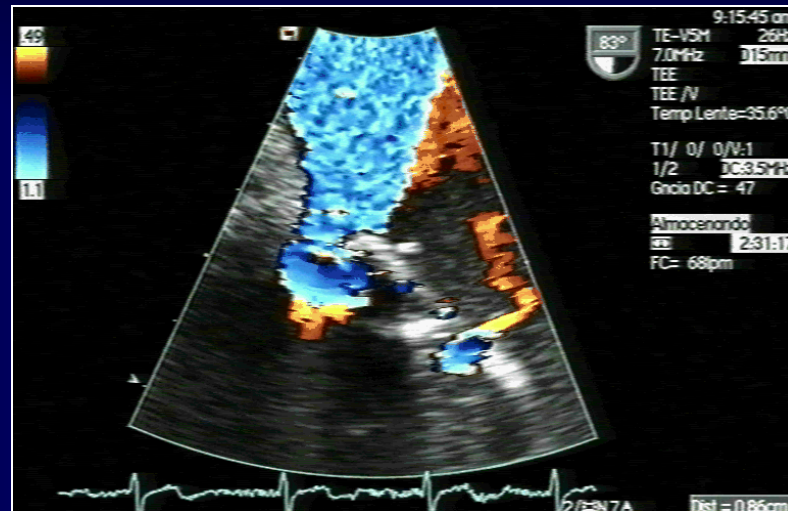
March 27 - 28, 2015

“PERCUTANEOUS CLOSURE OF PERIVALVULAR LEAKS”

Prof. J Zamorano
Head of Cardiology
University Hospital Ramon y Cajal.
Madrid



Percutaneous Periprosthetic Leaks Closure



- In 12.5% of Prosthetic Mitral Valve cases
- Surgical intervention : 6%-22% Mortality

The clinical problem

- **Surgery may be indicated in case of:**
 - **Heart failure**
 - **Periodic blood transfusion needed**
 - **Severe valvular regurgitation**
 - **Poor prognosis with conservative medical treatment**

GUIDELINES AND STANDARDS

Recommendations for Evaluation of Prosthetic Valves With Echocardiography and Doppler Ultrasound

A Report From the American Society of Echocardiography's Guidelines and Standards Committee and the Task Force on Prosthetic Valves, Developed in Conjunction With the American College of Cardiology Cardiovascular Imaging Committee, Cardiac Imaging Committee of the American Heart Association, the European Association of Echocardiography, a registered branch of the European Society of Cardiology, the Japanese Society of Echocardiography and the Canadian Society of Echocardiography, Endorsed by the American College of Cardiology Foundation, American Heart Association, European Association of Echocardiography, a registered branch of the European Society of Cardiology, the Japanese Society of Echocardiography, and Canadian Society of Echocardiography

William A. Zoghbi, MD, FASE, Chair, John B. Chambers, MD,* Jean G. Dumesnil, MD,[†] Elyse Foster, MD,[‡] John S. Gottdiener, MD, FASE, Paul A. Grayburn, MD, Bijoy K. Khandheria, MBBS, FASE, Robert A. Levine, MD, Gerald Ross Marx, MD, FASE, Fletcher A. Miller, Jr., MD, FASE, Satoshi Nakatani, MD, PhD,[§] Miguel A. Quiñones, MD, Harry Rakowski, MD, FASE, L. Leonardo Rodriguez, MD, Madhav Swaminathan, MD, FASE, Alan D. Waggoner, MHS, RDCS, Neil J. Weissman, MD, FASE,^{||} and Miguel Zabalgoitia, MD, *Houston and Dallas, Texas; London, United Kingdom; Quebec City, Quebec, Canada; San Francisco, California; Baltimore, Maryland; Scottsdale, Arizona; Boston, Massachusetts; Rochester, Minnesota; Suita, Japan; Toronto, Ontario, Canada; Cleveland, Ohio; Durham, North Carolina; St Louis, Missouri; Washington, DC; Springfield, Illinois*

Zoghbi et al. JASE 2009;22(9);975-1014

Assessing Prosthetic Reg: Caveats

- Assessment of severity of Reg is in general **more difficult** than in native valves because of the high prevalence of **paravalvular regurgitation and eccentric jets**.
- The process of grading AR should be comprehensive and integrative, using a **combination of the qualitative and semi-quantitative parameters**

Post-procedural Assessment: ASE and EAE Guidelines

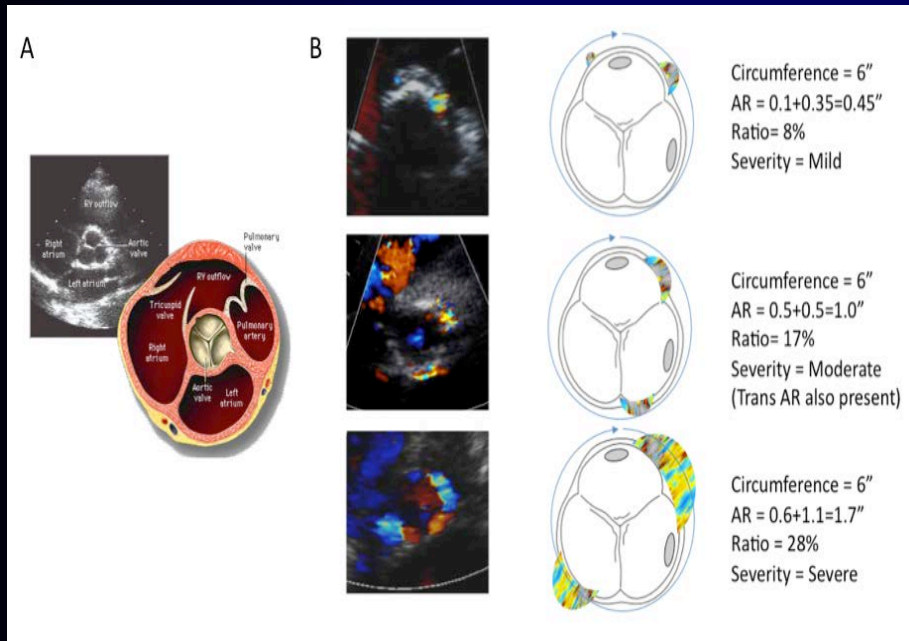
Zoghbi et al J Am Soc Echocardiogr 2003;16:777-802.
Lancellotti et al. Eur J Echocardiogr 2010;11:223-244
Kappetein et al. J Am Coll Cardiol 2012;60:1438-54

Parameter	Mild	Moderate		Severe
Qualitative				
Jet density (CW Doppler)	Incomplete/faint	Dense		Dense
Jet deceleration (PHT by CW))	Slow > 500	Medium 500-200		Steep < 200
Reversal of PW flow in the aorta	Brief, early diastolic reversal	Intermediate		Prominent holodiastolic Rev (>20 cm/s)
Semi-quantitative				
Vena contracta	< 0.3	0.3-0.60		>0.60
Jet width/LVOT Width (%)	<25	25-45	46-64	≥ 65
Jet area/LVOT CSA (%)	<5	5-20	21-59	≥ 60
Circum Extent/LVOT Circum (%)	<10	10-20 (30)		> 20 (30)
Quantitative				
Regurgitant Volume (ml/beat)	<30	30-44	45-59	≥ 60
Regurgitant Fraction (%)	<30	30-39	40-49	≥ 50
EROA (cm ²)	<0.10	0.10-0.19	0.20-0.29	≥ 30

Example of not too validated data. Severity of Prosthetic Aortic Regurgitation

Pitfalls:

1. This parameter is not based on extensive validated data.
2. Evaluation may be limited by acoustic shadowing.
3. Jets may be multiple but non-continuous
4. Different criteria used in PARTNER trial and VARC-2



Leak closure. Echo info

1.- Diagnosis

2.- Monitoring transeptal

3.- Guiding intervention

4.- Assessing results

2. PARAVALVULAR REGURGITATION

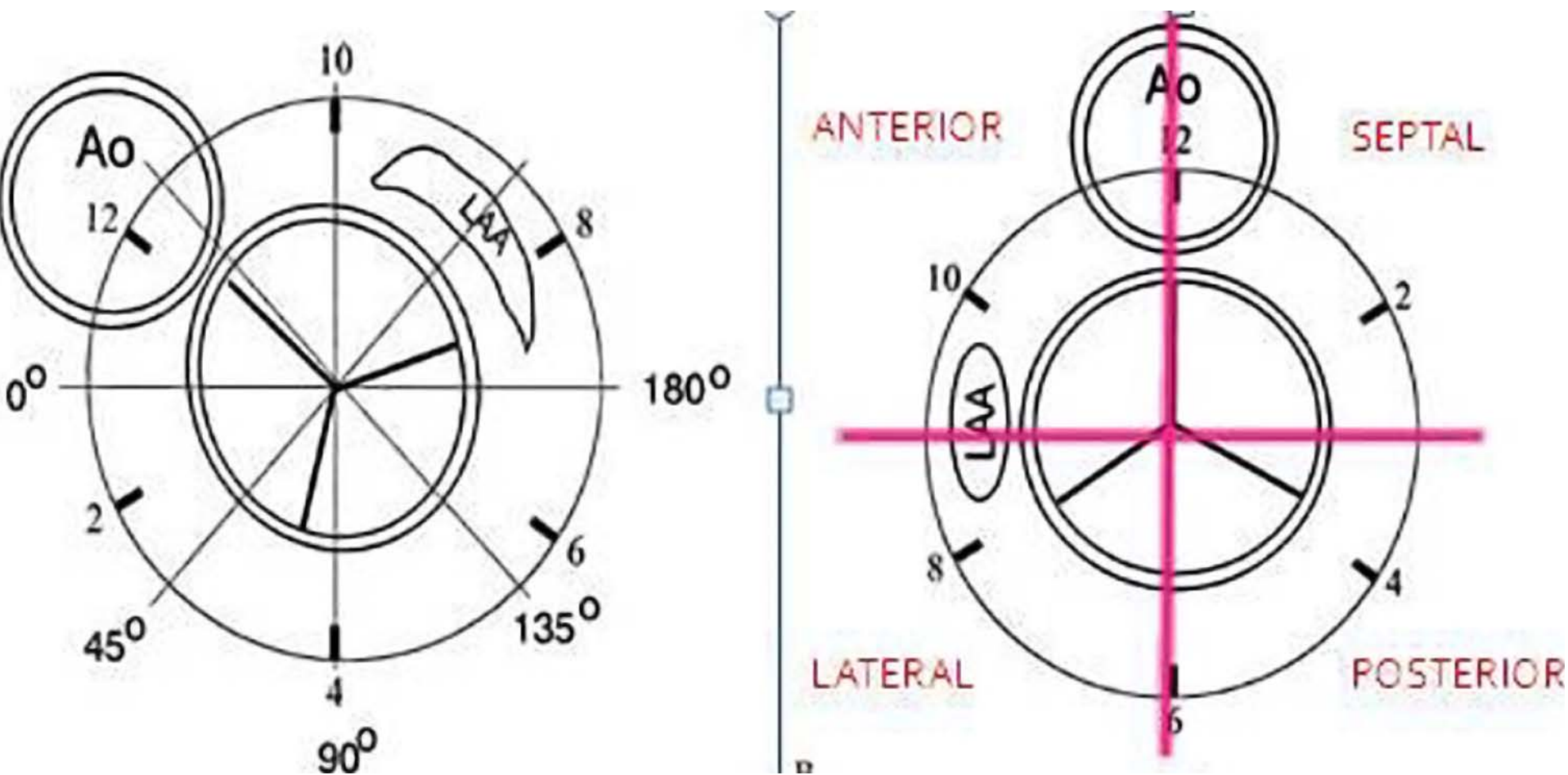
ECHOCARDIOGRAPHIC EVALUATION

- **TTE** for **aortic** prosthetic valves (+/- TEE)
- **TEE** for mechanical **mitral** prostheses
- **Dehiscence**: area of echo drop-out.
Regurgitant jet on color flow image.
- **Severity**:
 - Jet width/jet area
 - Systolic retrograde flow in pulmonary veins
 - Not suitable: PISA and quantitative Doppler

PARAVALVULAR REGURGITATION

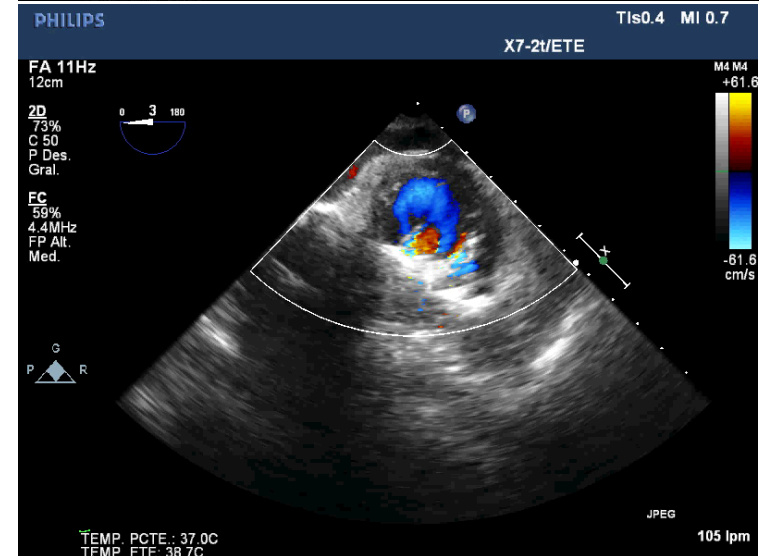
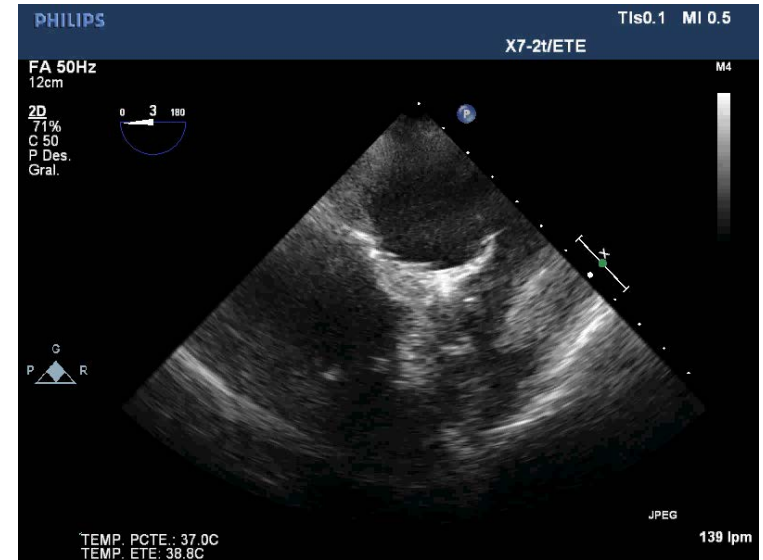
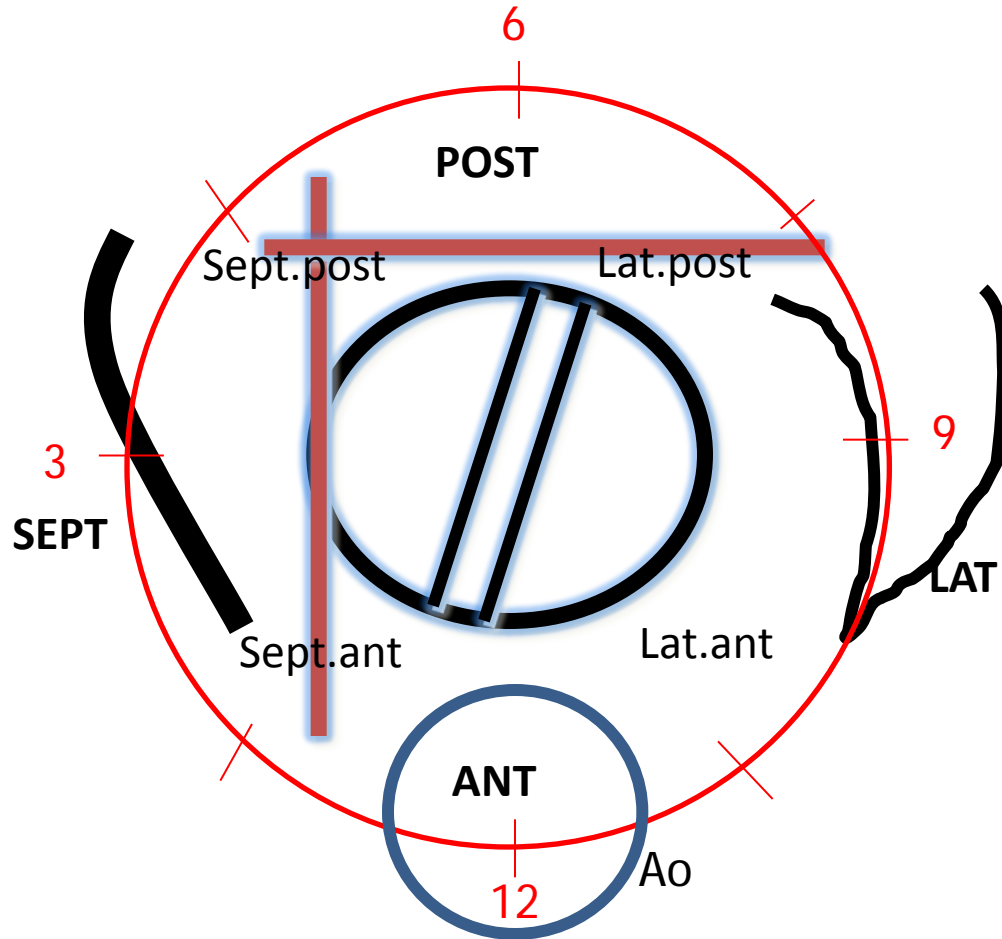
PERI-PROCEDURAL TEE

- Confirm **location(s) and severity** of paravalvular regurgitation.
- Exclude prosthetic and intracardiac **thrombi or vegetations**.
- Facilitate **guidewire and catheter** placement (real-time 3D TEE, injection of contrast).



Location of the dehiscence in relation to internal marks

Localization ii

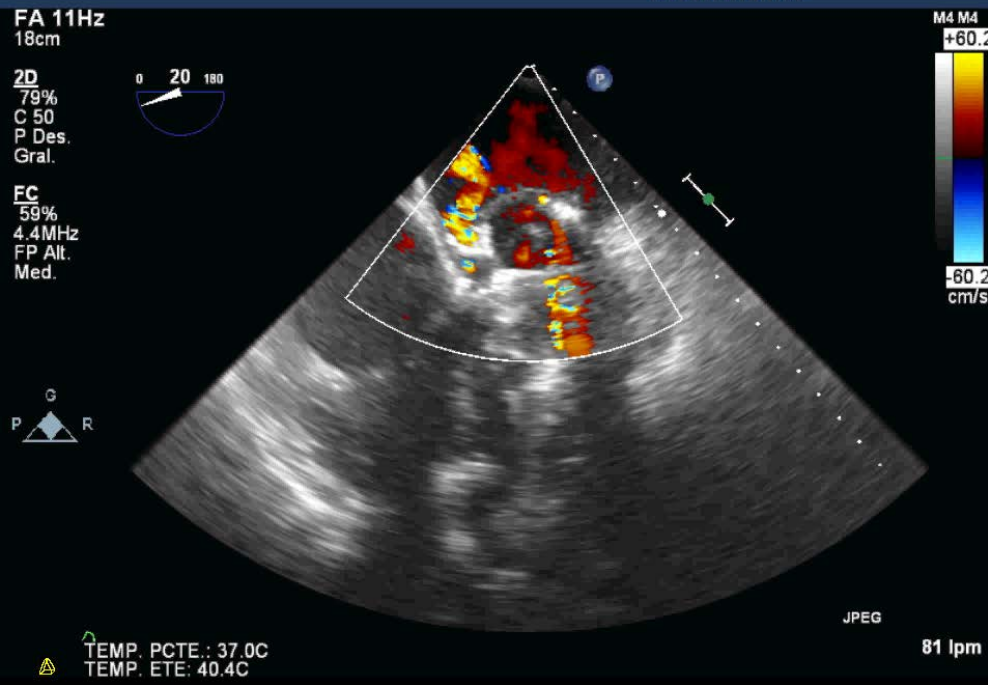


Unión G-esofágica (0-20°):

2. PARAVALVULAR REGURGITATION

MITRAL PROSTHESES

- **Meticulously sweeping** the mitral prosthesis from 0 to 180°. Angle at which the jet is first detected to the point of disappearance.
- **Real-time 3D TEE:** accurate number and location of areas of paravalvular dehiscence

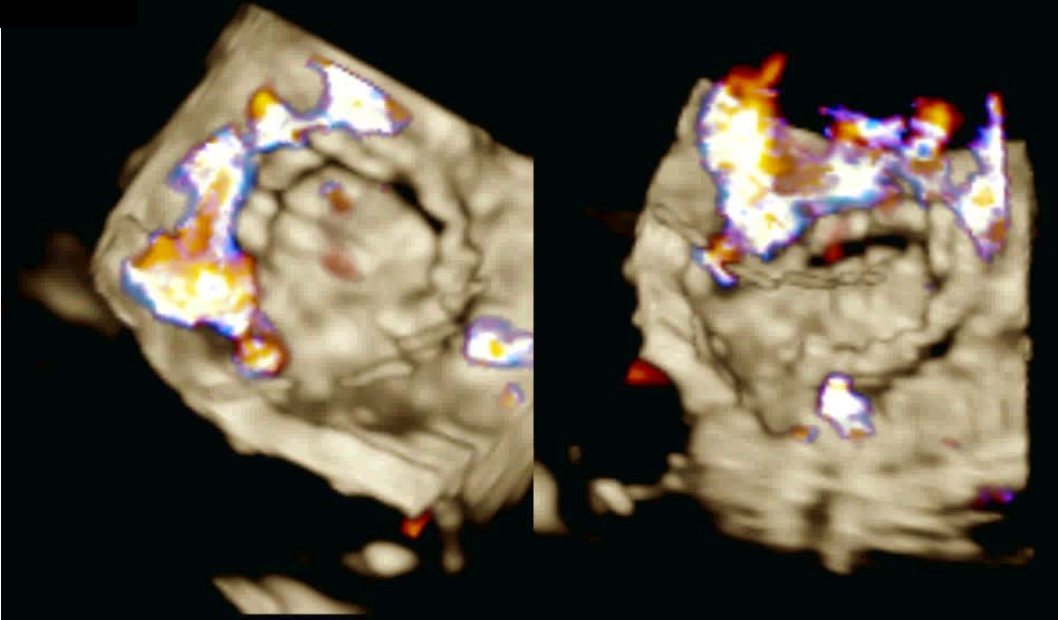


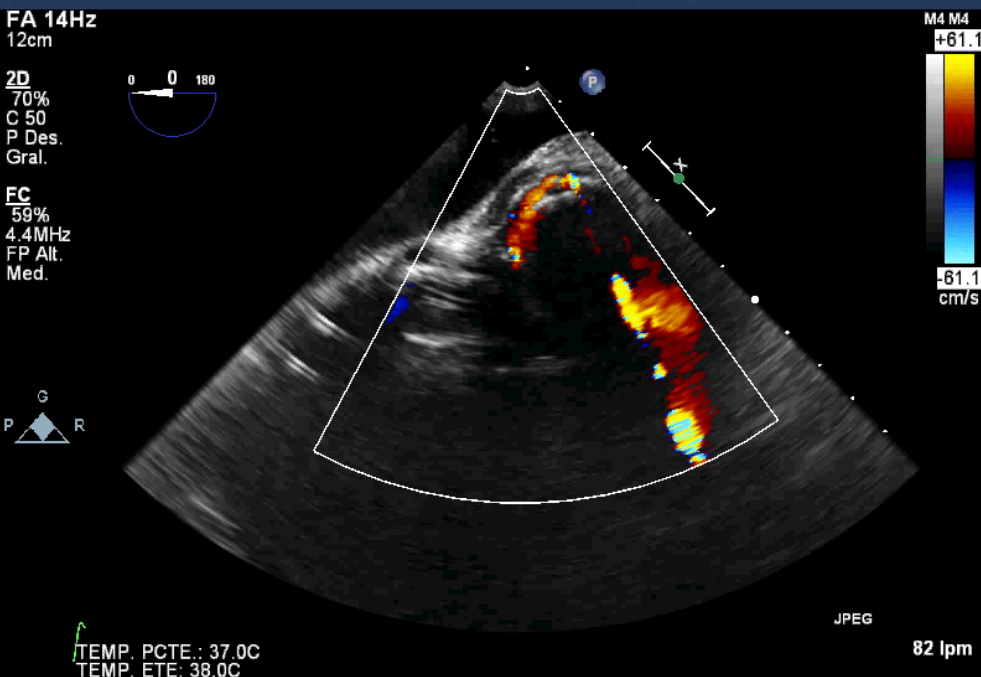
Leaks

Too large ?

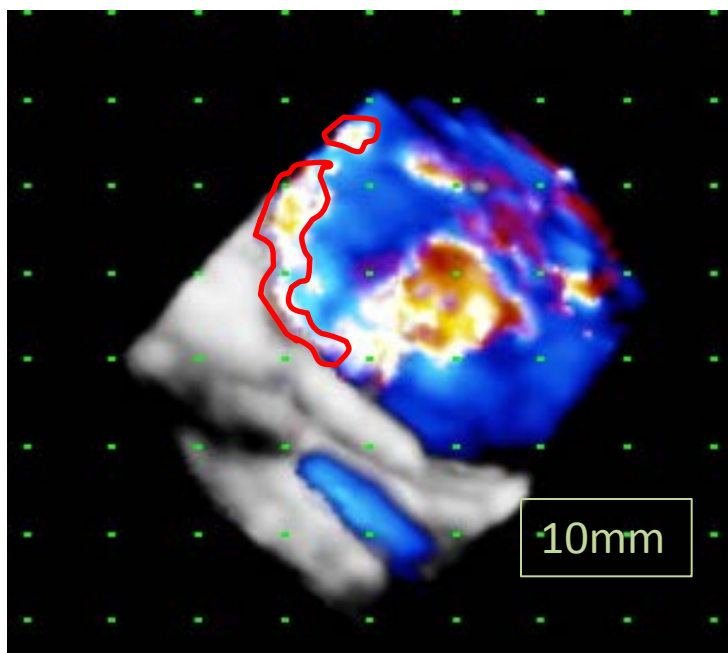
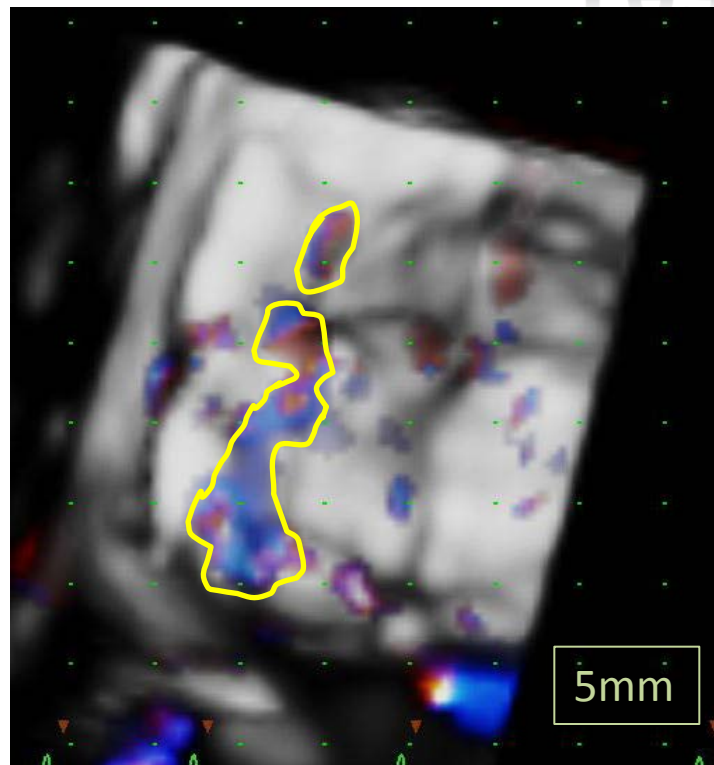
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01/12/2009 12:08: [REDACTED] JPEG CR 15:1 X7-2t/





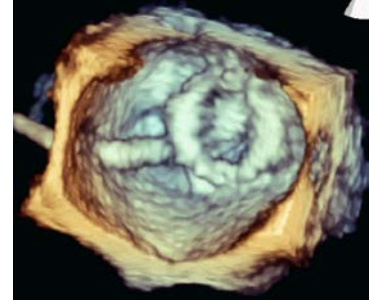
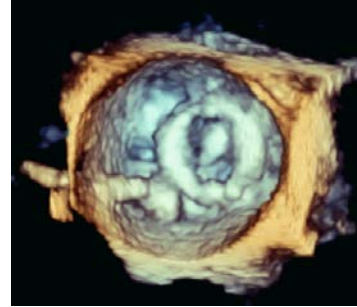
Leaks



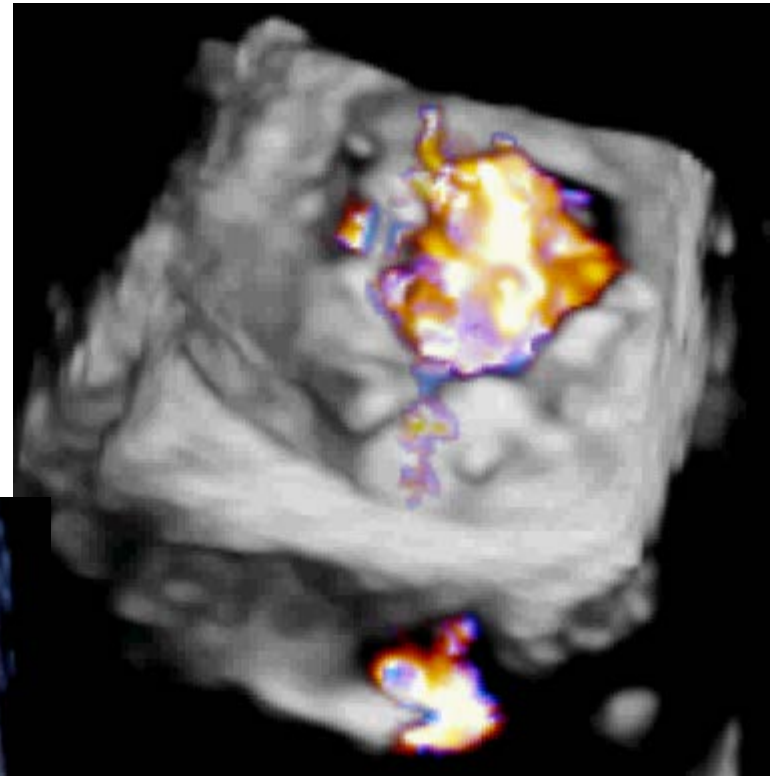
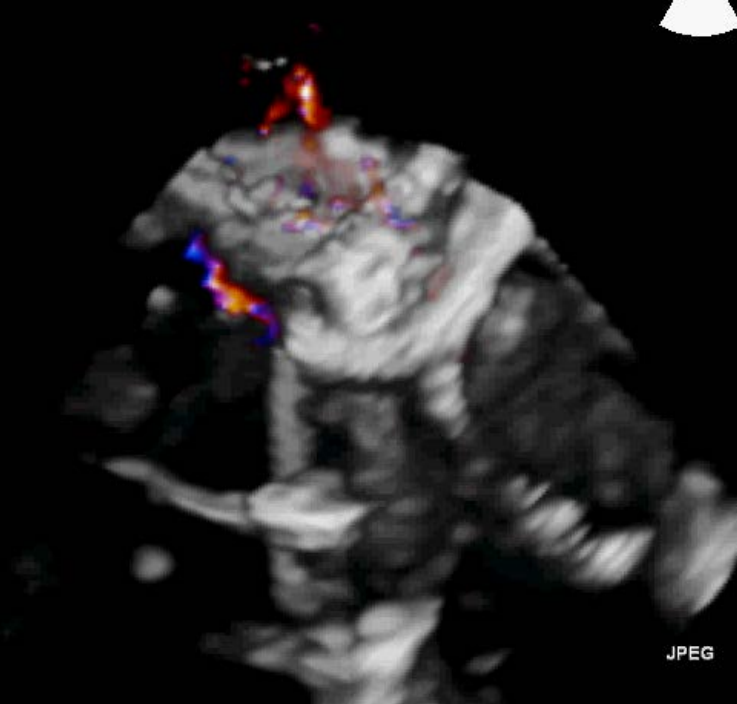
Sizing

Procedure

Leaks



Procedure. Color Doppler



Diagnosis

PHILIPS

01/12/2009

11:44:25

TIs0.8

MI 0.4

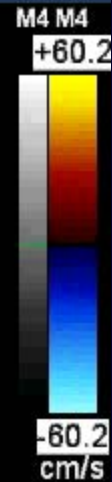
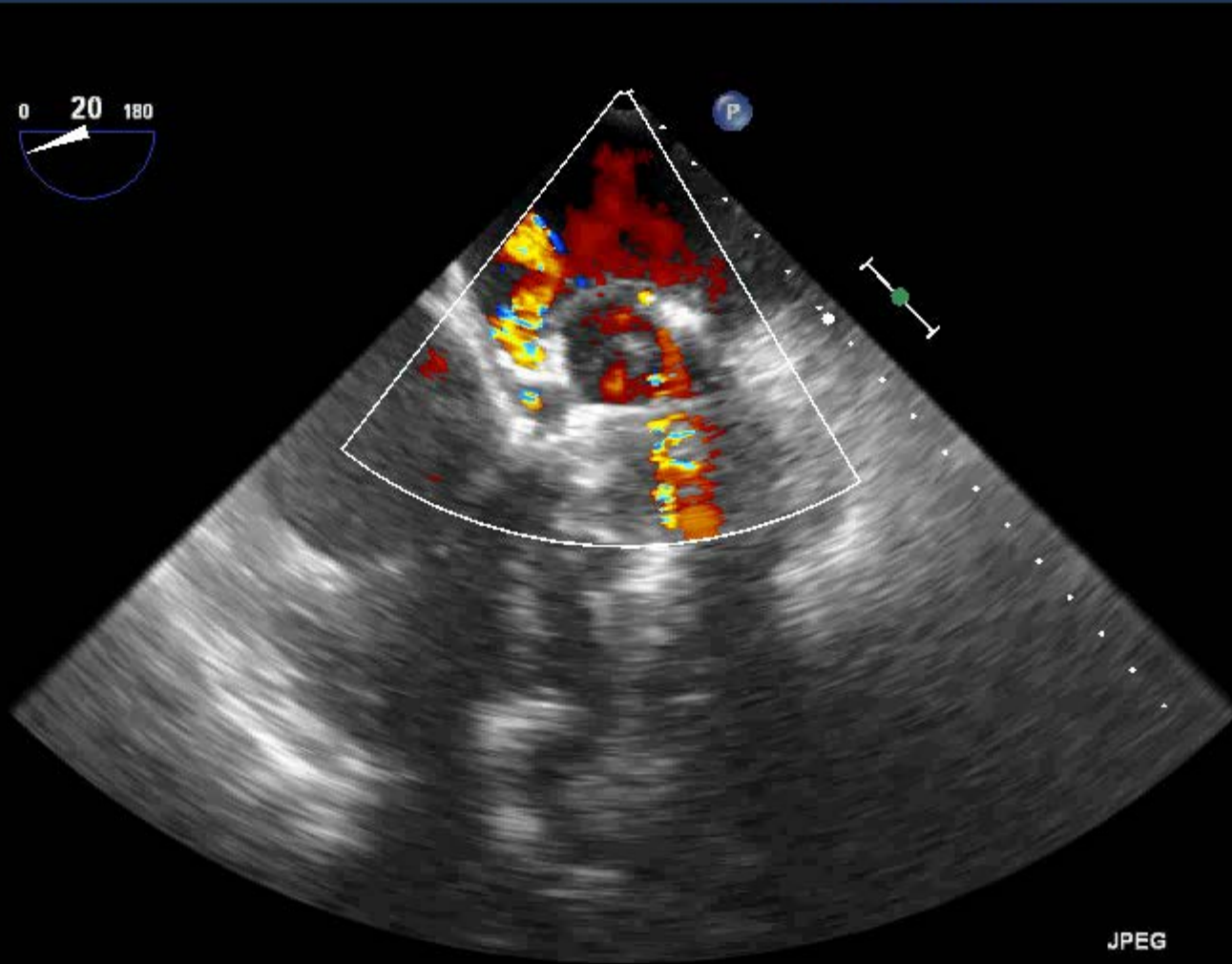
X7-2t/Adultos

FA 11Hz
18cm

2D
79%
C 50
P Des.
Gral.



FC
59%
4.4MHz
FP Alt.
Med.



JPEG

TEMP. PCTE.: 37.0C
TEMP. ETE: 40.4C

81 lpm

Severity of the problem

PHILIPS

01/12/2009 12:09:13 TIs1.0 MI 0.5

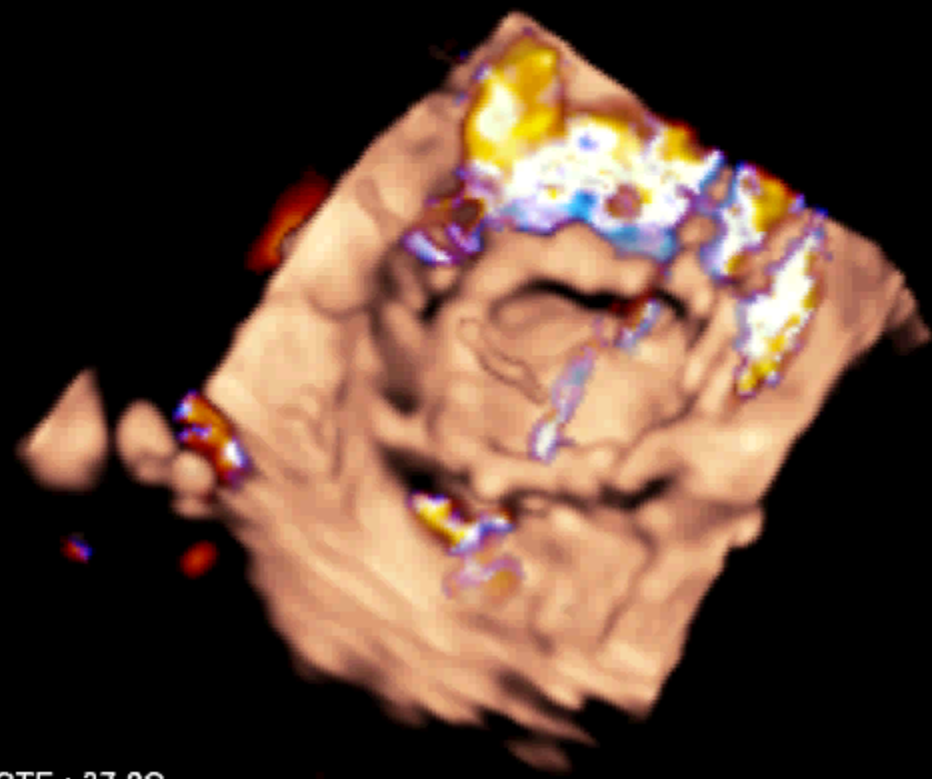
X7-2t/Adultos

FA 15Hz
14cm

Volumen complet 180

3D 1%
3D 0dB

FC
50%
4.4MHz



TEMP. PCTE.: 37.0C
TEMP. ETE: 38.4C

JPEG

70 lpm

Guiding procedure

PHILIPS

SALAS GOMEZ, ROBERTO

01/12/2009

11:53:19

TIs0.4

MI 0.7

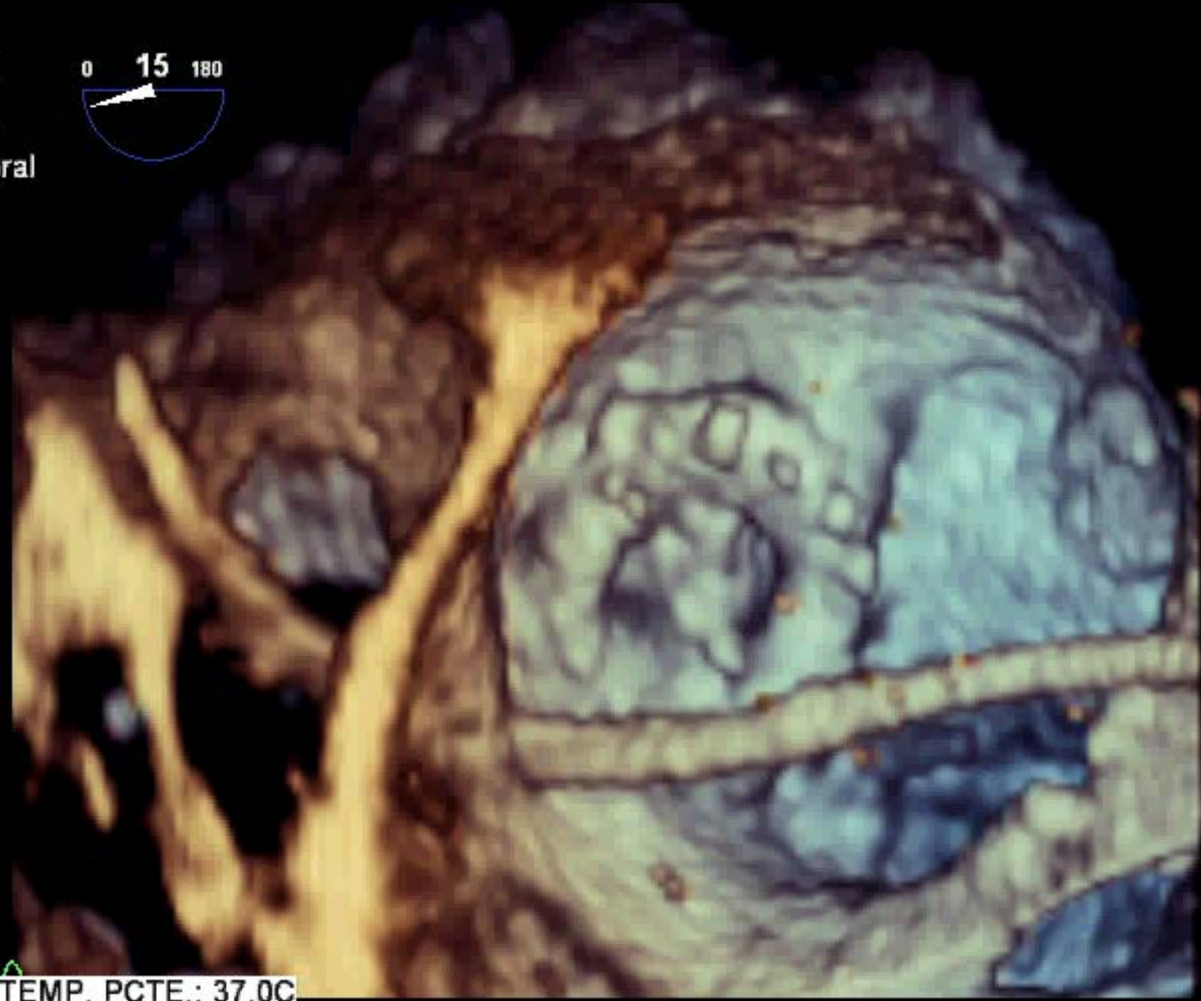
1916815

X7-2t/Adultos

FA 5Hz
14cm

M4

Live 3D
3D 0%
3D 0dB
ArmónGral



JPEG

TEMP. PCTE.: 37.0C
TEMP. ETE: 41.4C

67 lpm

4 hours later ;

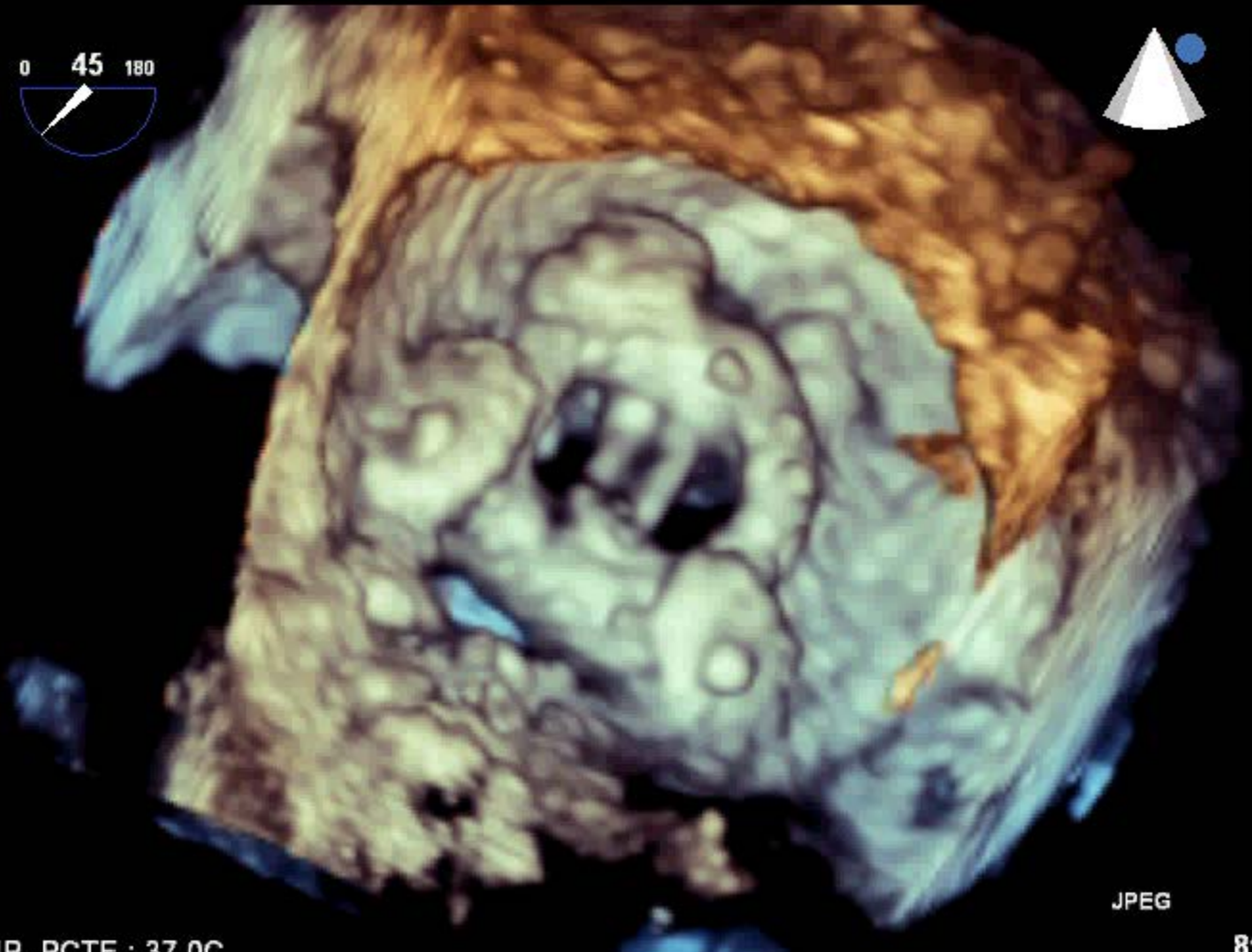
PHILIPS SALAS GOMEZ, ROBERTO 01/12/2009 14:08:06 TIs0.2 MI 0.5
1916815 X7-2t/Adultos

FA 7Hz
13cm

Live 3D
3D 1%
3D 1dB
Res.



M4



JPEG

81 lpm

TEMP. PCTE.: 37.0C
TEMP. ETE: 39.3C

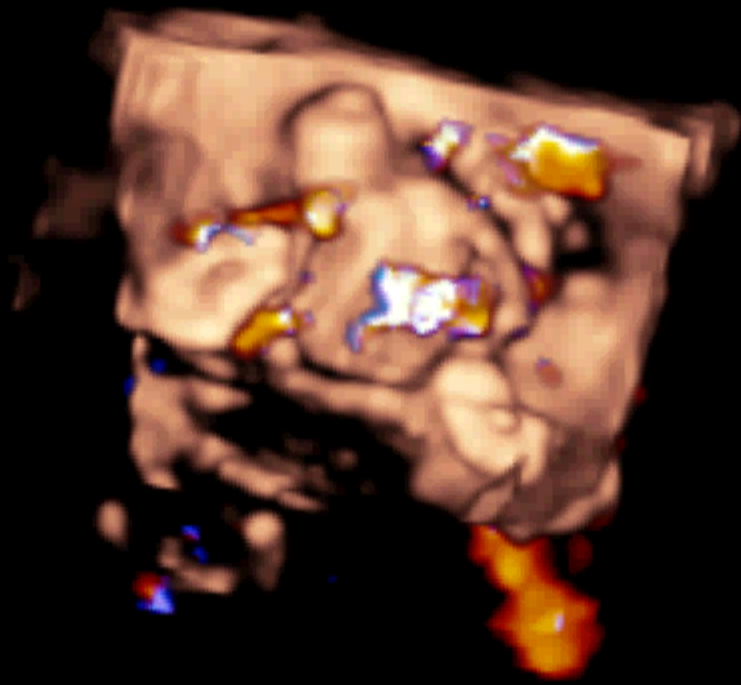
TEAM WORK ;

PHILIPS SALAS GOMEZ, ROBERTO
1916815

01/12/2009 14:07:29 TIs1.0 MI 0.5
X7-2t/Adultos

FA 15Hz
15cm

Volumen complet 180
3D 1%
3D 1dB
FC
50%
4.4MHz



TEMP. PCTE.: 37.0C
TEMP. ETE: 38.2C

JPEG

63 lpm

2. PARAVALVULAR REGURGITATION

PERI-PROCEDURAL TEE

- Assess **seating** of the closure device and **size**.
- Ensure **proper functioning** of the prosthetic valve (+/- fluoroscopy)
- Assess **residual** paravalvular **regurgitation**.
- **Detect complications**

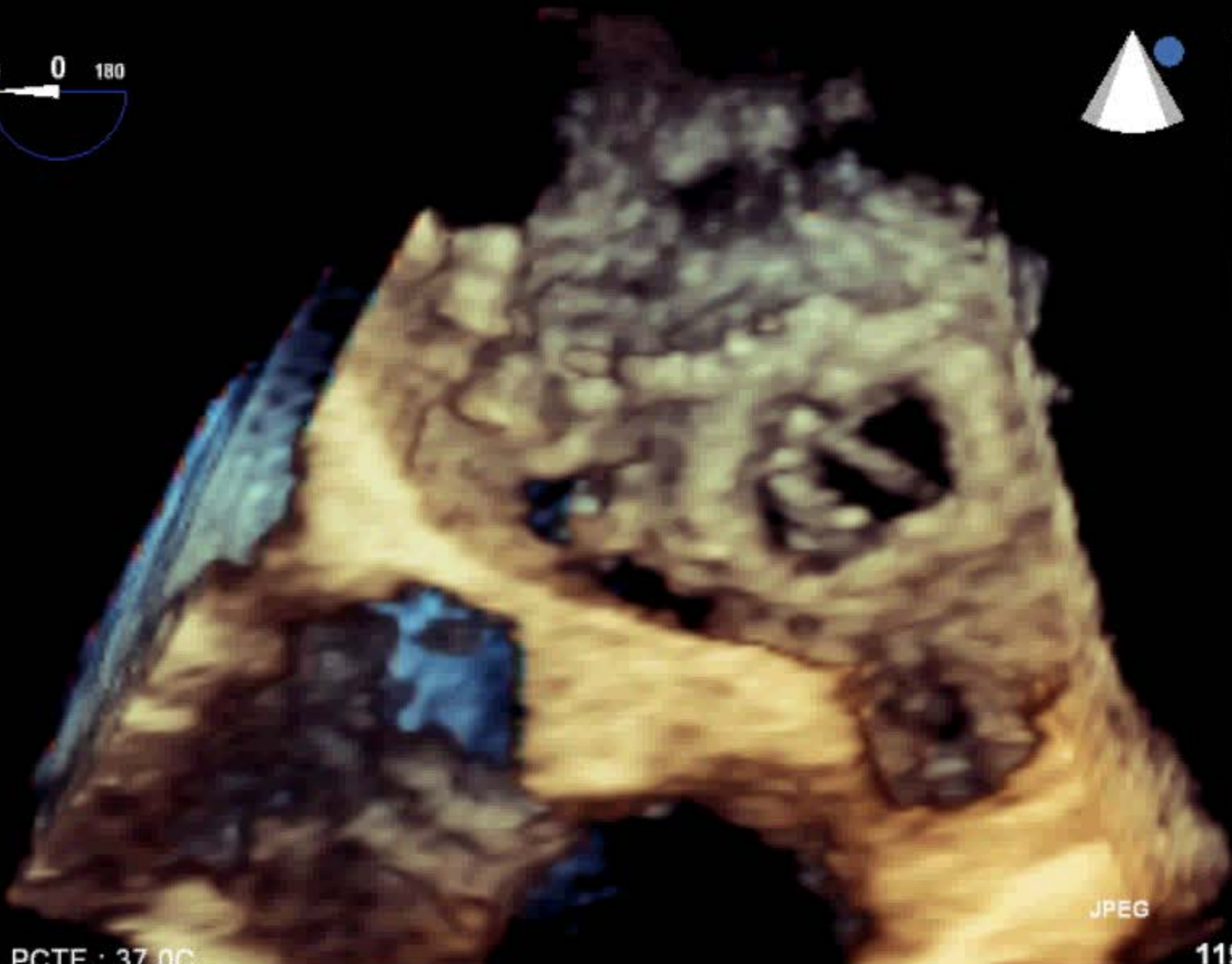
432646

X7-2t/Adultos

FA 8Hz
14cm

M4

Live 3D
3D 3%
3D 1dB
Pen.



JPEG

TEMP. PCTE.: 37.0C
TEMP. FTE: 38.9C

119 lpm

432646

X7-2t/Adultos

M4

FA 9Hz
11cm

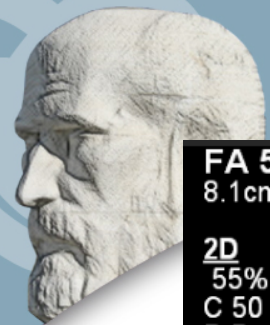
Live 3D
3D 28%
3D 11dB
Pen.



JPEG

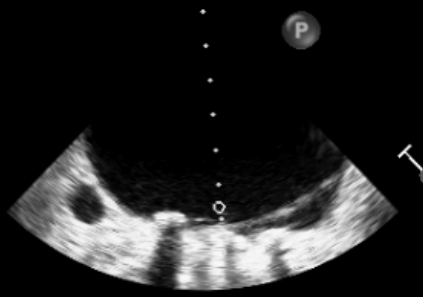
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TEMP. ETE: 39.2C

94 lpm

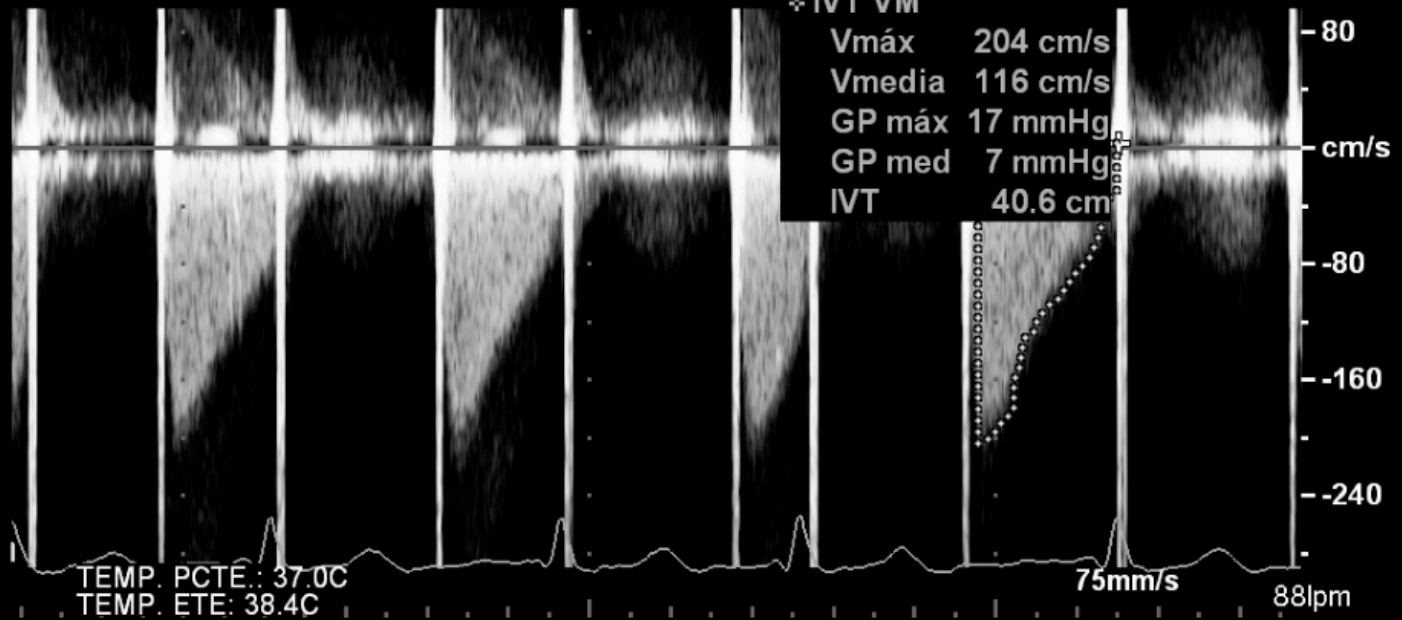


FA 52Hz
8.1cm

2D
55%
C 50
P Des.
Gral.



M4
CW
40%
2.5MHz
FP 225Hz

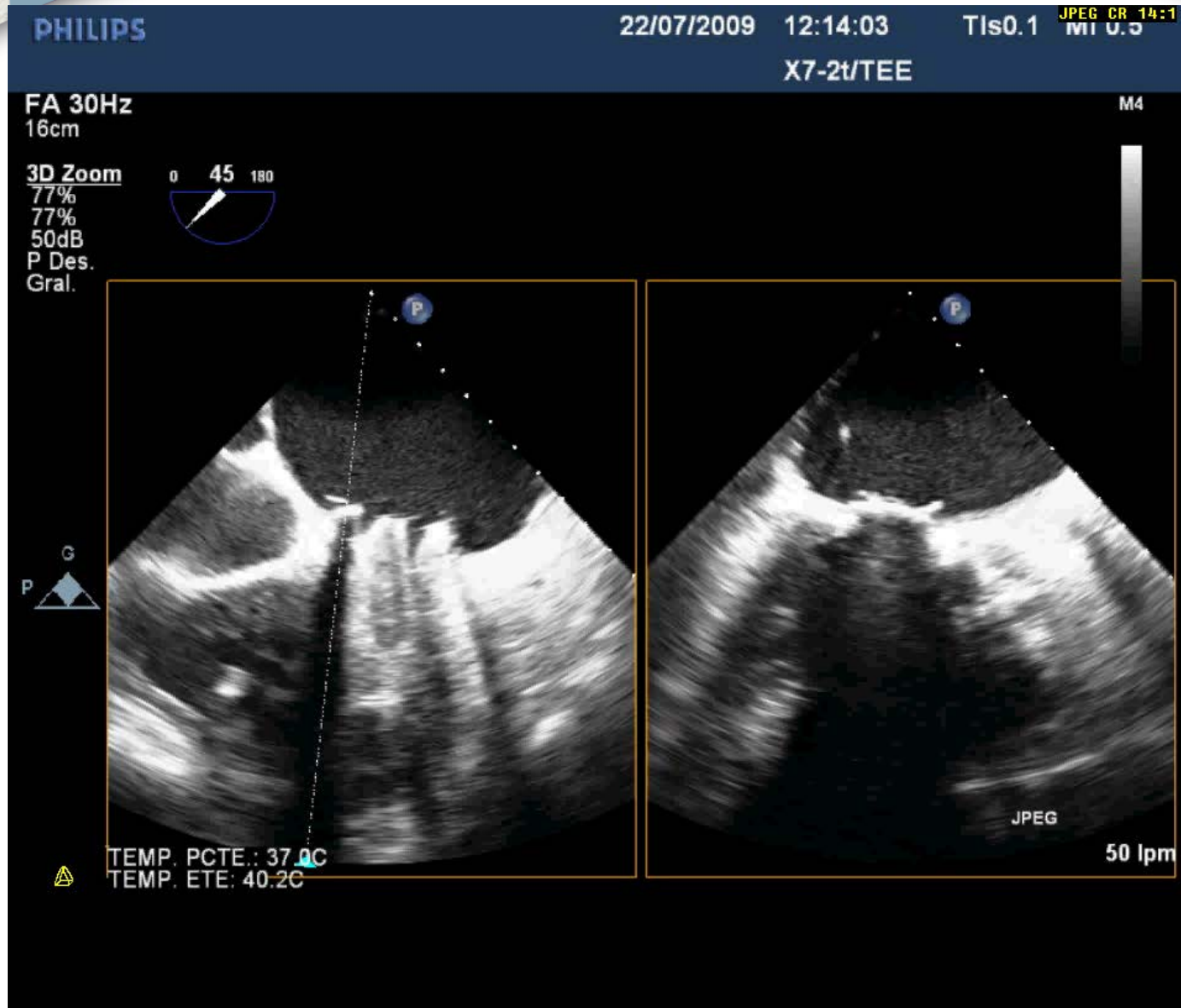


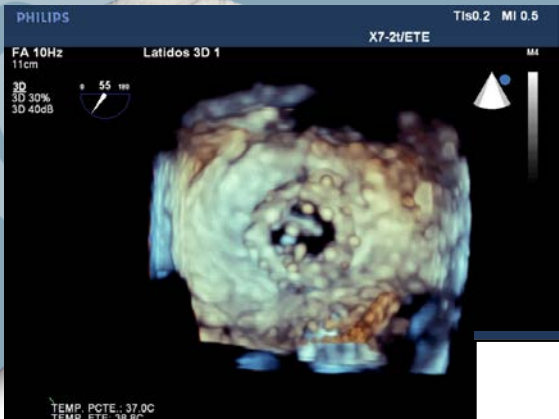
✦ IVT VM
Vmáx 204 cm/s
Vmedia 116 cm/s
GP máx 17 mmHg
GP med 7 mmHg
IVT 40.6 cm

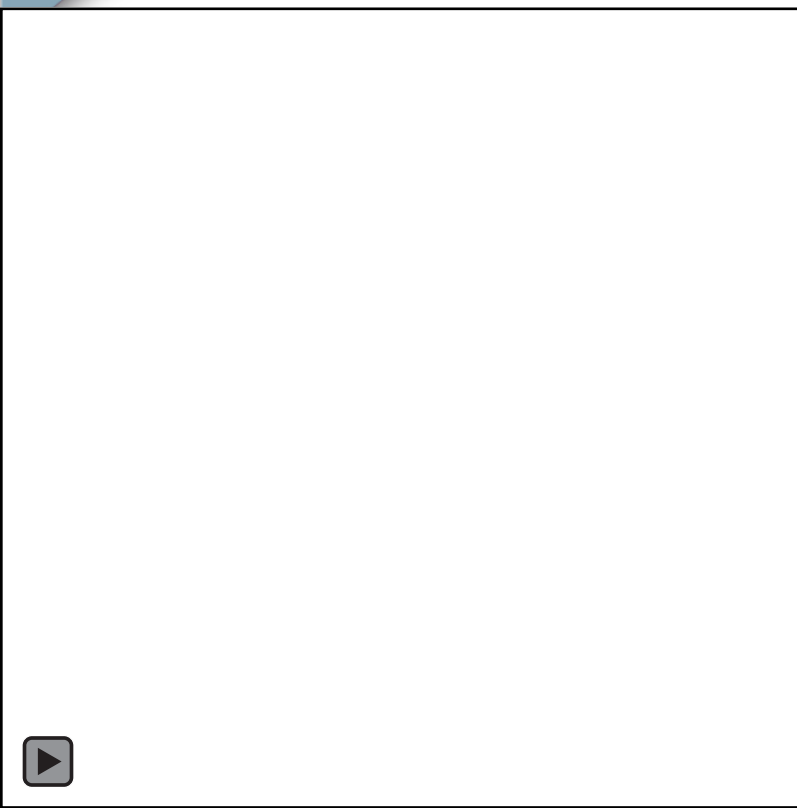
TEMP. PCTE.: 37.0C
TEMP. ETE: 38.4C

75mm/s 88lpm

Other possible problems iii







PHILIPS

TIs0.1 MI 0.5

H. CLÍNICO SAN CARLOS X7-2t/ETE

FA 50Hz
12cm

2D
79%
C 50
P Des.
Pen.



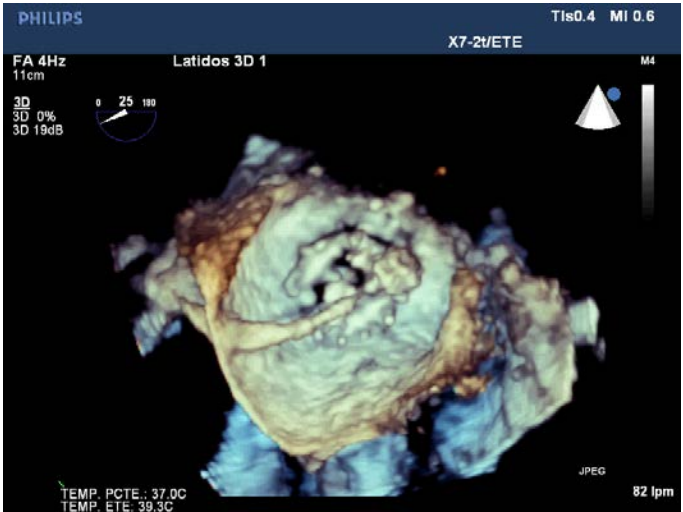
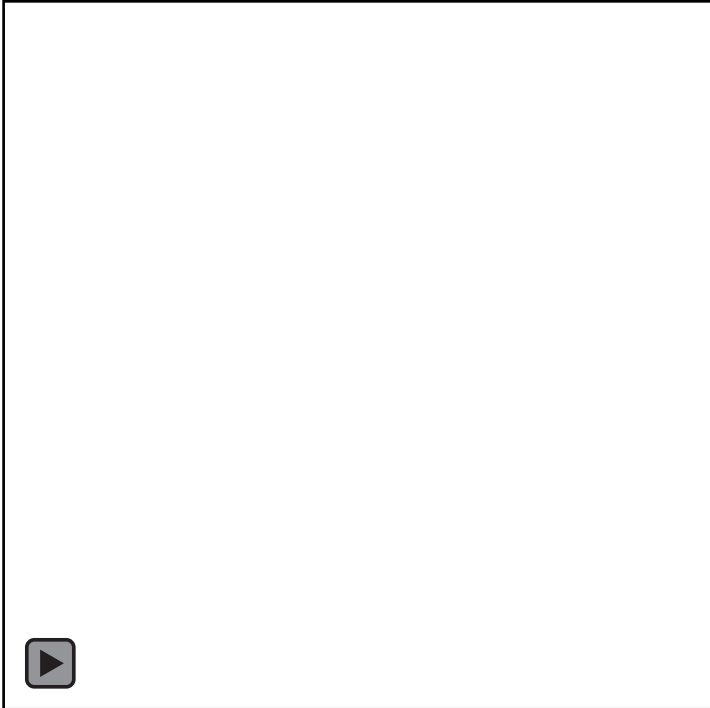
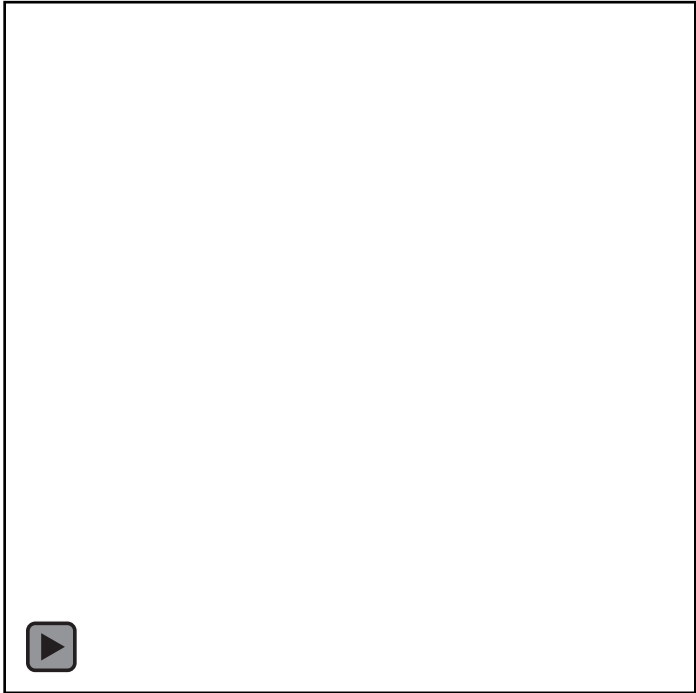
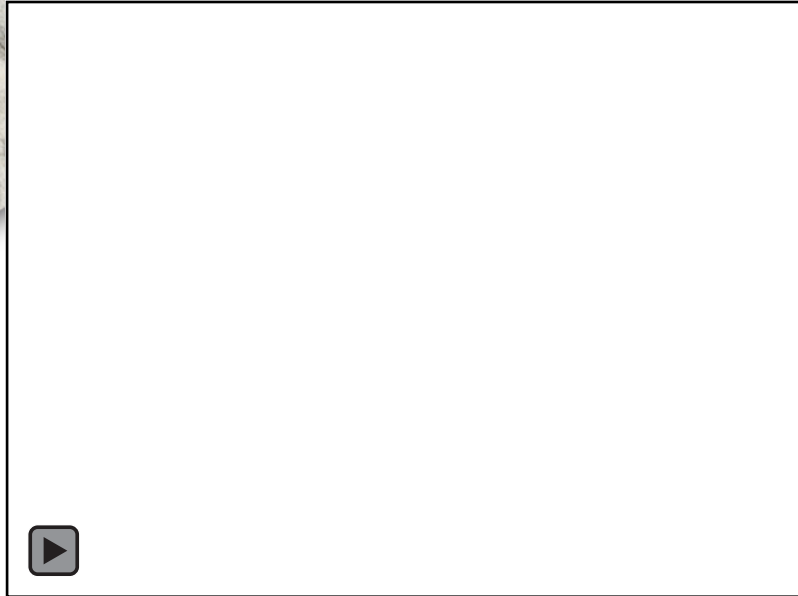
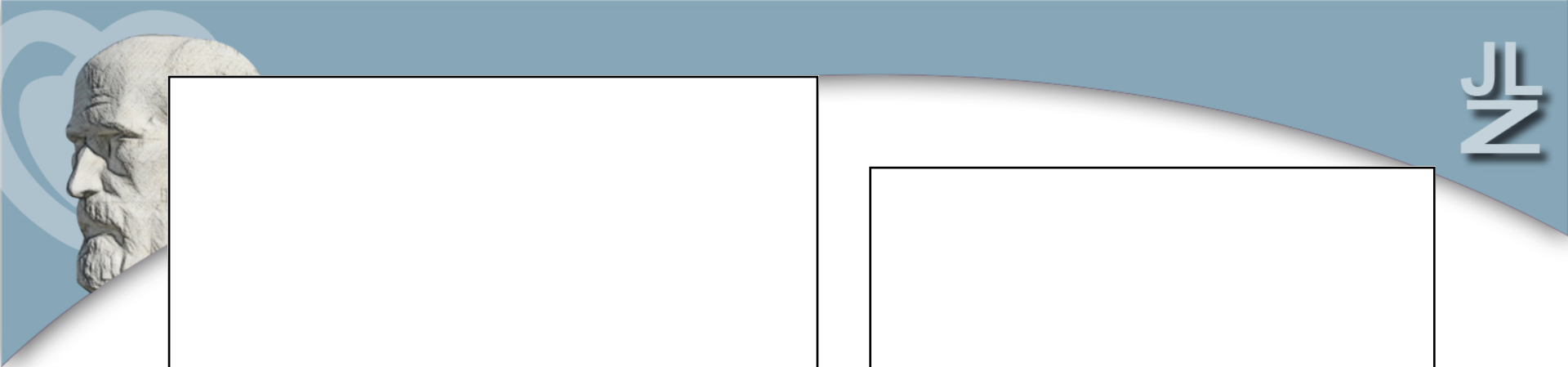
M4



TEMP. PCTE.: 37.0C
TEMP. ETE: 37.8C

81bpm

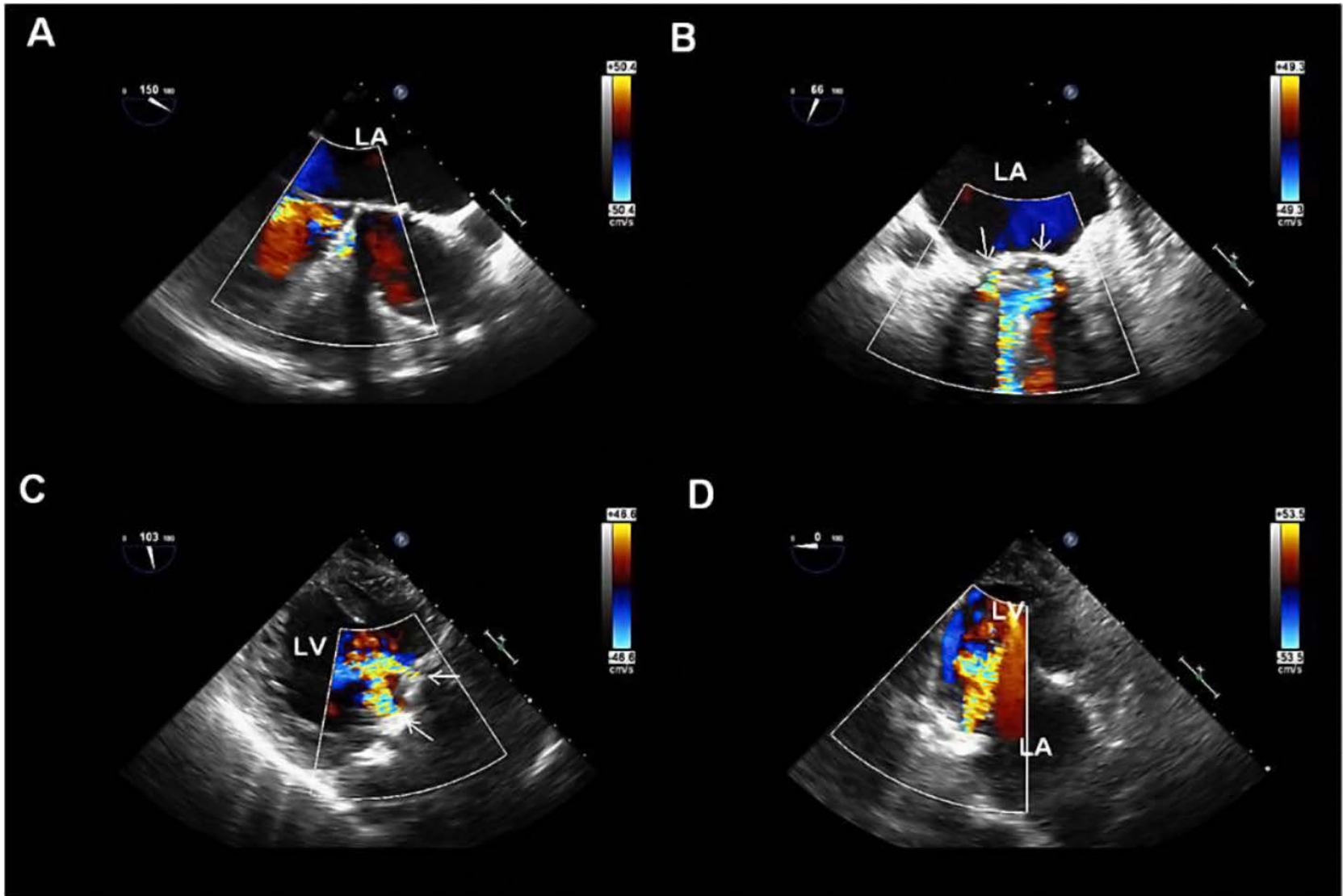




2. PARAVALVULAR REGURGITATION

AORTIC PROSTHESES

- Mid-esophageal long and short axis views, transgastric view (+ zero degree deep transgastric view)
- **Location of RCO** (2D-TEE) and **LCO** (3D-TEE)
- Coronary ostia and aortic sinuses= internal landmarks
- **Flow convergence** = significant regurgitation



Cardiac Imaging

Real-Time 3-Dimensional Transesophageal Echocardiography in the Evaluation of Post-Operative Mitral Annuloplasty Ring and Prosthetic Valve Dehiscence

Itzhak Kronzon, MD,* Lissa Sugeng, MD,† Gila Perk, MD,* David Hirsh, MD,*
Lynn Weinert, RDCS,† Miguel Angel Garcia Fernandez, MD,† Roberto M. Lang, MD‡
New York, New York; Chicago, Illinois; and Madrid, Spain

Original Articles

Percutaneous Repair of Paravalvular Prosthetic Regurgitation Acute and 30-Day Outcomes in 115 Patients

Paul Sorajja, MD; Allison K. Cabalka, MD; Donald J. Hagler, MD; Charanjit S. Rihal, MD
(Circ Cardiovasc Interv. 2011;4:00-00.)

FOCUS ISSUE: STRUCTURAL HEART DISEASE

Clinical Research

Long-Term Follow-Up of Percutaneous Repair of Paravalvular Prosthetic Regurgitation

Paul Sorajja, MD,* Allison K. Cabalka, MD,† Donald J. Hagler, MD,† Charanjit S. Rihal, MD*
Rochester, Minnesota

Utility of Real-Time Three-Dimensional Transesophageal Echocardiography in Evaluating the Success of Percutaneous Transcatheter Closure of Mitral Paravalvular Leaks

Miguel Angel García-Fernández, PhD, MD, Marcelino Cortés, PhD, MD, Jose A. García-Robles, MD,
Jose J. Gomez de Diego, MD, Esther Perez-David, PhD, MD, and Eulogio García, MD, *Madrid, Spain*

Journal of the American Society of Echocardiography
Volume 23 Number 1

FOCUS ISSUE: STRUCTURAL HEART DISEASE

Clinical Research

Clinical Outcomes in Patients Undergoing Percutaneous Closure of Periprosthetic Paravalvular Leaks

Carlos E. Ruiz, MD, PhD, Vladimir Jelmin, MD, Itzhak Kronzon, MD, Yuriy Dudi, MD,
Raquel Del Valle-Fernandez, MD, Bryce N. Einhorn, Paul T. L. Chiam, MD, Claudia Martinez, MD,
Rocio Eiros, MS, Gary Roubin, MD, PHD, Howard A. Cohen, MD
New York, New York

Role of ECHO

- Evaluation of the **severity** of the lesion
- **Guiding** the transeptal puncture
- Supporting the **positioning** of the device
- Real time evaluation of **complications** : atrial septal defect. Intraprosthetic MR
- **Assessment of immediate and long term** results of the intervention
- **Selection of patients**: Real time 3D TEE mandatory to evaluate the real extension of the leak

