



Società Italiana di Ecografia Cardiovascolare

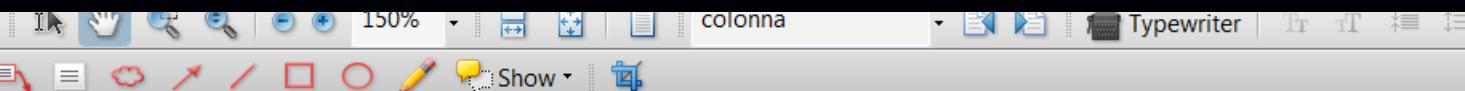
WWW.SIEC.IT



3D echo: una nuova finestra su endocarditi, trombi e auricola

Paolo Colonna, MD FESC
*Cardiologia Ospedaliera,
Policlinico di Bari*
Presidente eletto nazionale SIEC





VENERDÌ, 17 APRILE 2015

■ 14.00-15.00

AUDITORIUM

**EVOLUZIONI NEL 3D E NELLO SPECKLE TRACKING:
SEMPRE UNA PROMESSA O UNA MATURA REALTÀ DIAGNOSTICA?**

*EVENTO SCIENTIFICO NON AVENTE DIRITTO AI CREDITI ECM
organizzato con il supporto di Philips*

Moderatori: **M. Marzilli** (Pisa), **F. Romeo** (Roma)

14.00 Anatomical Intelligent e Big Data: le nuove soluzioni per rendere
l'ecocardiografia avanzata fruibile nell'attività quotidiana
R. Francavilla (Roma)

14.10 Novità nel campo transtoracico tridimensionale sul prolasso mitralico
M. Pepi (Milano)

14.22 3D echo: una nuova finestra su endocarditi, trombi e auricola
P. Colonna (Bari)

14.34 Meriti dell'eco 3D nel trattamento delle cardiopatie strutturali
G. La Canna (Milano)

14.46 La profonda rivisitazione nella valutazione della funzione cardiaca
con modalità speckle tracking
V. Di Bello (Pisa)

VENERDÌ
17 APRILE

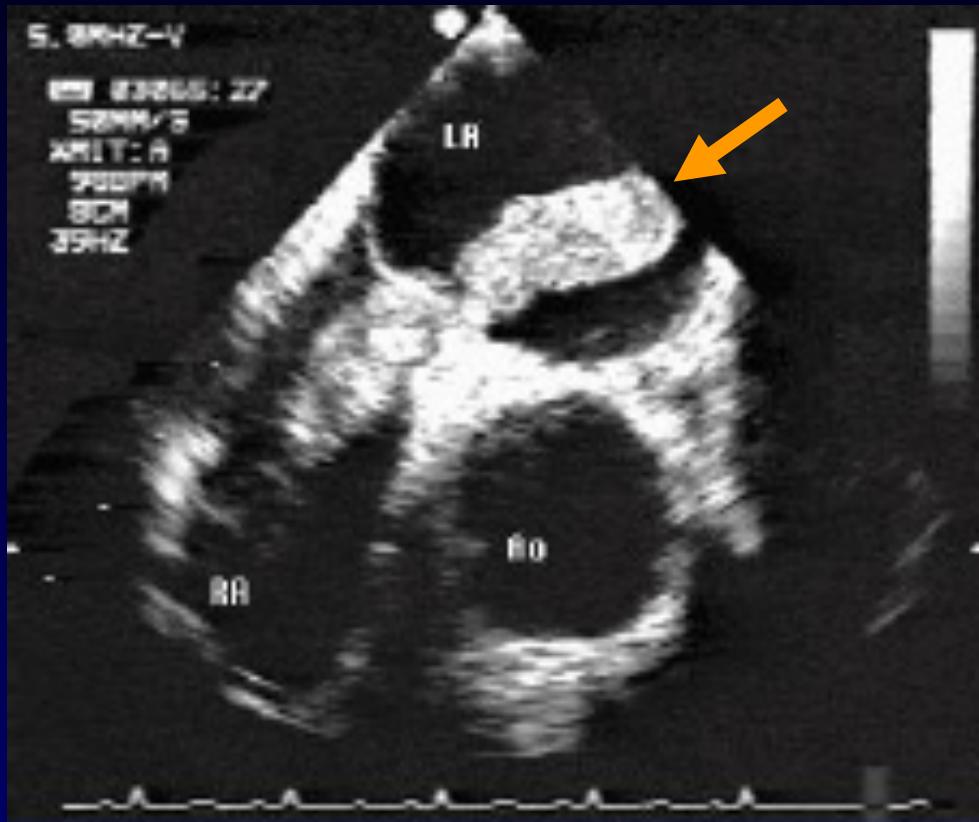


Actual Source	Echocardiographic Findings
LV thrombus	Apical aneurysm, presence of thrombus, dilated CM, <i>hypertrabeculation / noncompaction</i>
LA thrombus	3 Thrombus in LAA, spontaneous echo contrast, LAA emptying velocity, mitral stenosis, interatrial septal low aneurysm
Pelvic veins or LL thrombus	ASD, atrial septal aneurysm, PFO 1
Native valves	Vegetation, tumor, MVP, mitral annular calcification, sclerotic aortic valve 4
Prosthetic valves	Thrombus, vegetation
Cardiac tumor	LA myxoma, papillary fibroelastoma
a	Complex aortic plaque, atheroma 2



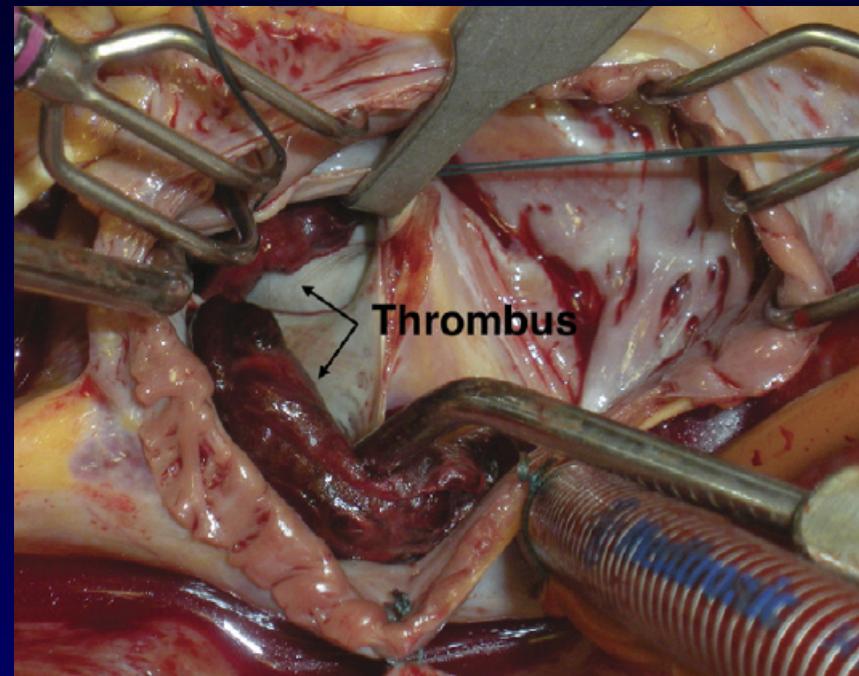
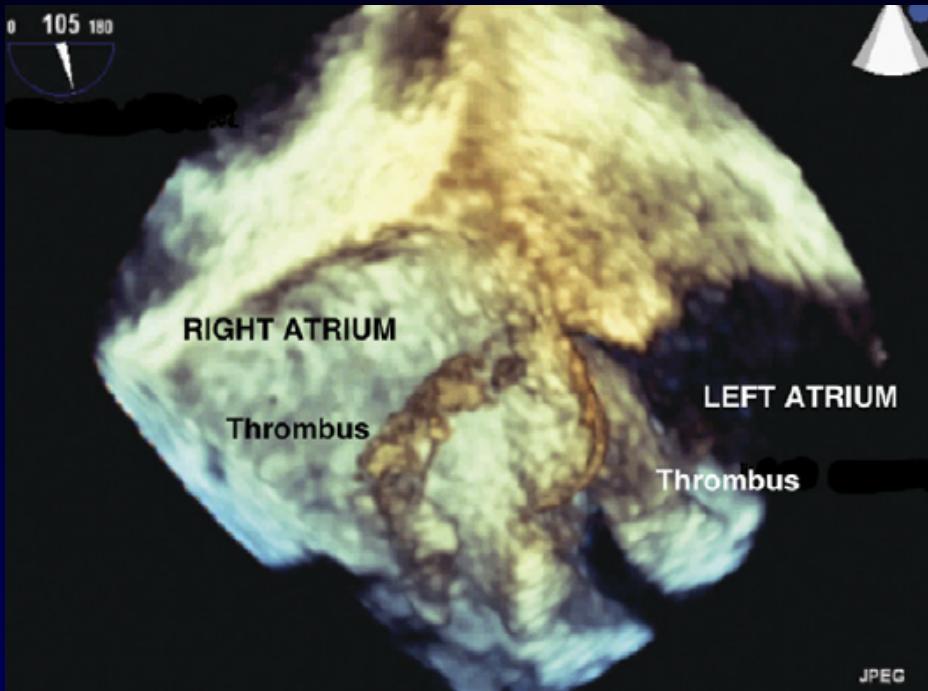
Multiplane TEE to detect effectiveness of selective pulmonary rt-PA thrombolysis in pulmonary embolism and PFO

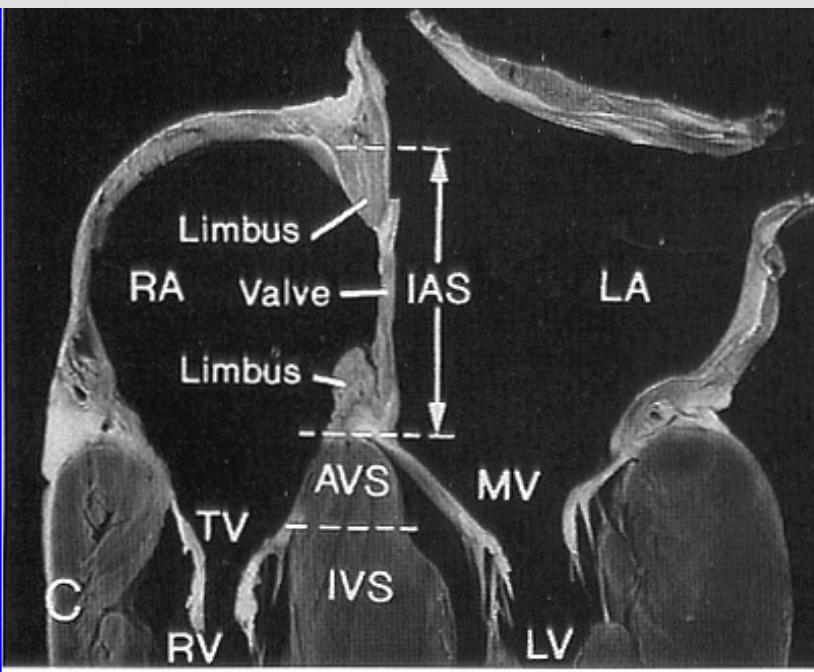
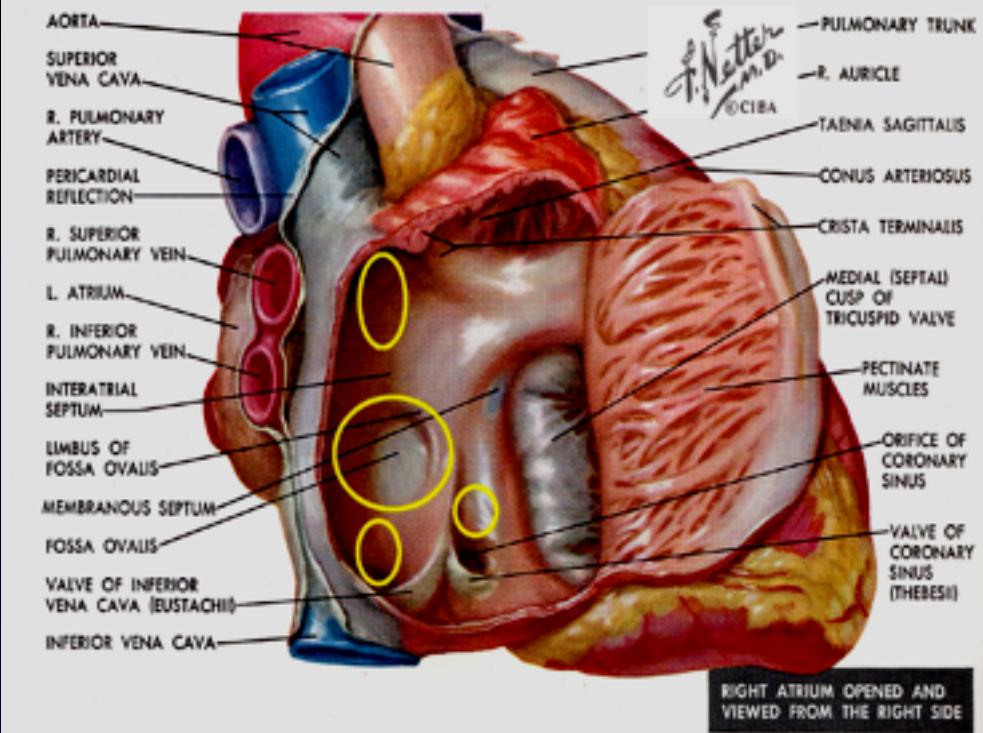
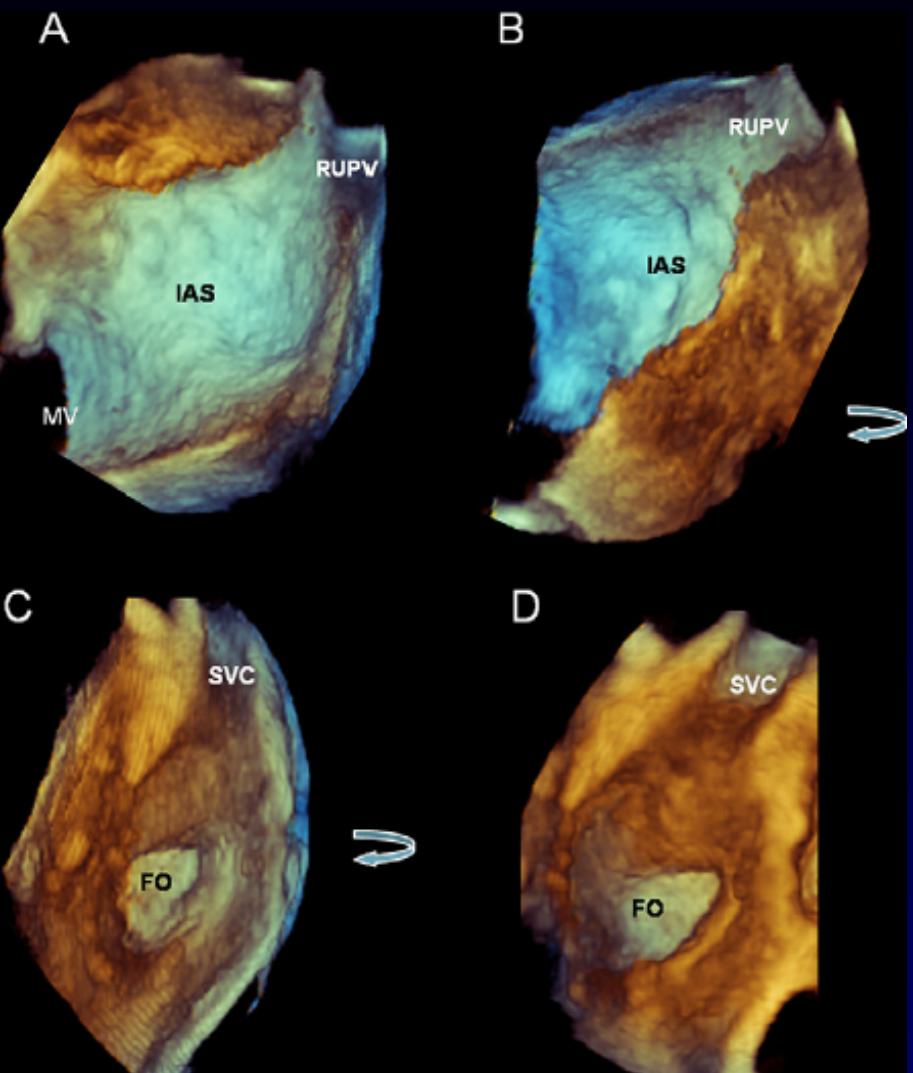
Colonna, JASE 1997

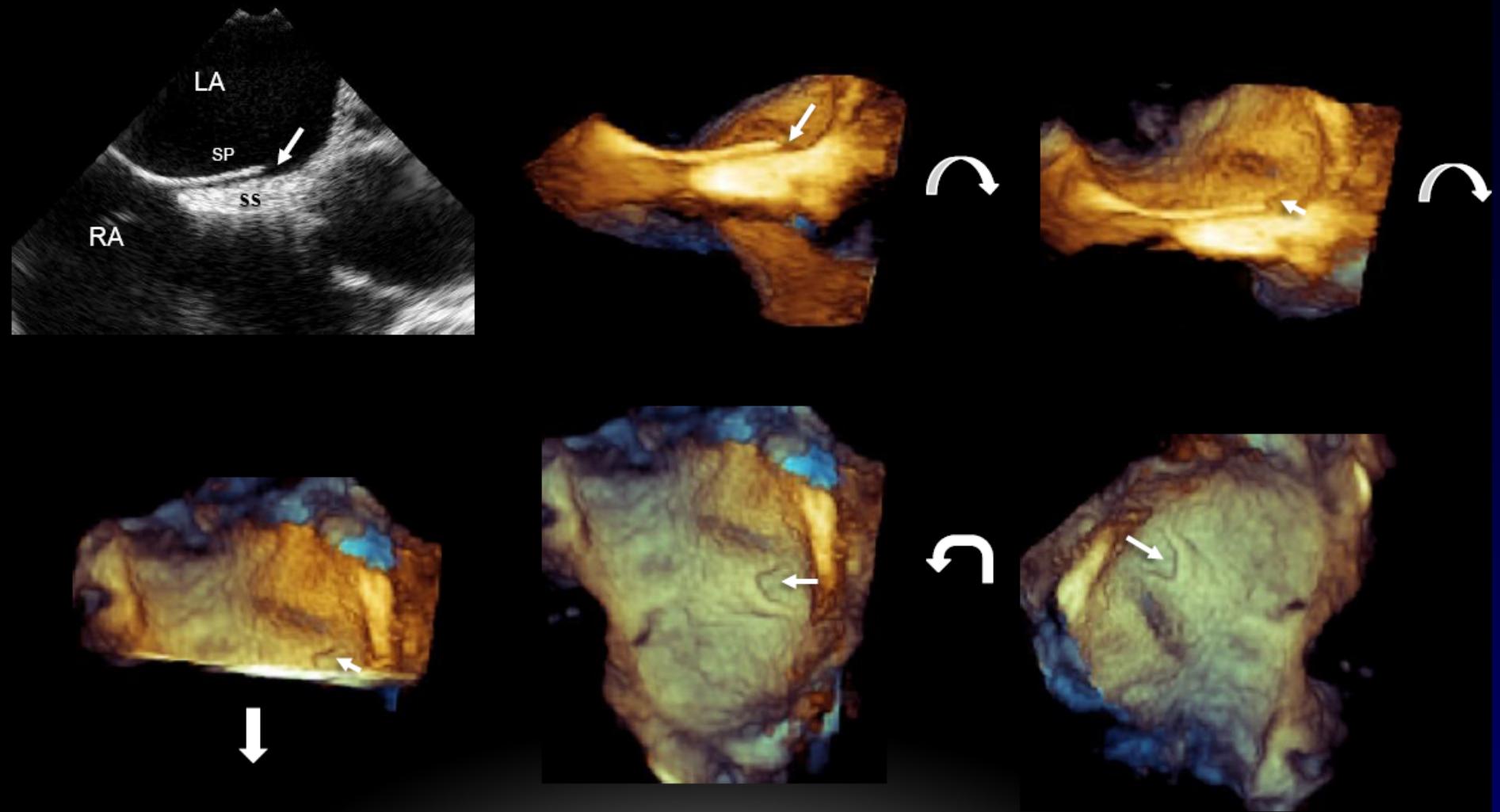


3D TEE of a thrombus entrapped by a patent foramen ovale

Sattiraju, Ann Thorac Surg 2012



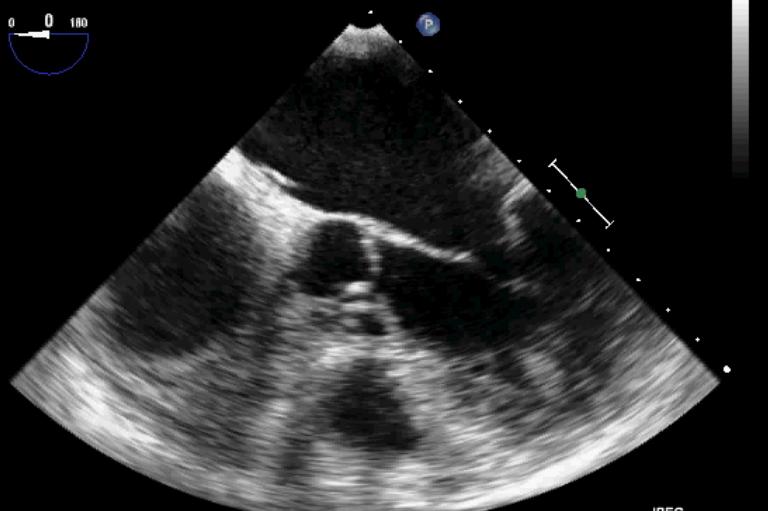




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FR 52Hz
12cm
2D
74%
C 50
P Off
Gen



PHILIPS SALVEMINI GIUSEPPE
41041420121016

16/10/2012 14:31:17 TIS0.2 MI 0.5
CX7-2t/Adult

FR 26Hz
12cm
Live 3D
3D 47%
3D 40dB
Gen



PHILIPS SALVEMINI GIUSEPPE
41041420121016

16/10/2012 14:31:17 TIS0.2 MI 0.5
CX7-2t/Adult

FR 26Hz
12cm
Live 3D
3D 47%
3D 40dB
Gen

PHILIPS SALVEMINI GIUSEPPE
41041420121016

16/10/2012 14:31:53 TIS0.2 MI 0.5
CX7-2t/Adult

FR 26Hz
12cm
Live 3D
3D 47%
3D 40dB
Gen



Temp. PAZ.: 37.0C
Temp. TEE: 40.0C

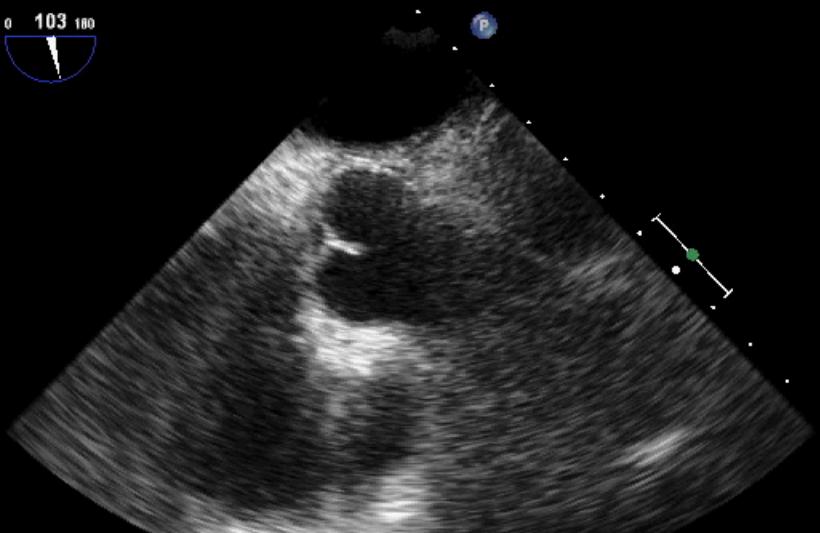
Temp. PAZ.: 37.0C
Temp. TEE: 40.1C

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Prosthetic valves	Thrombus, vegetation
Cardiac tumor	LA myxoma, papillary fibroelastoma
Aorta	Complex aortic plaque , atheroma

PHILIPS Cardiology Hosp Policlinico Bari 17/09/2012 10:46:41 TIS0.6 MI 1.3 Cardiology Hosp Policlinico Bari 17/09/2012 15:10:36 TIS0.1 MI 0.5
26211020120917 S5-1/ColonnaP Diffici 26211020120917 CX7-2t/Adulti

FR 45Hz
15cm

2D
46%
C 50
P Bassa
APen



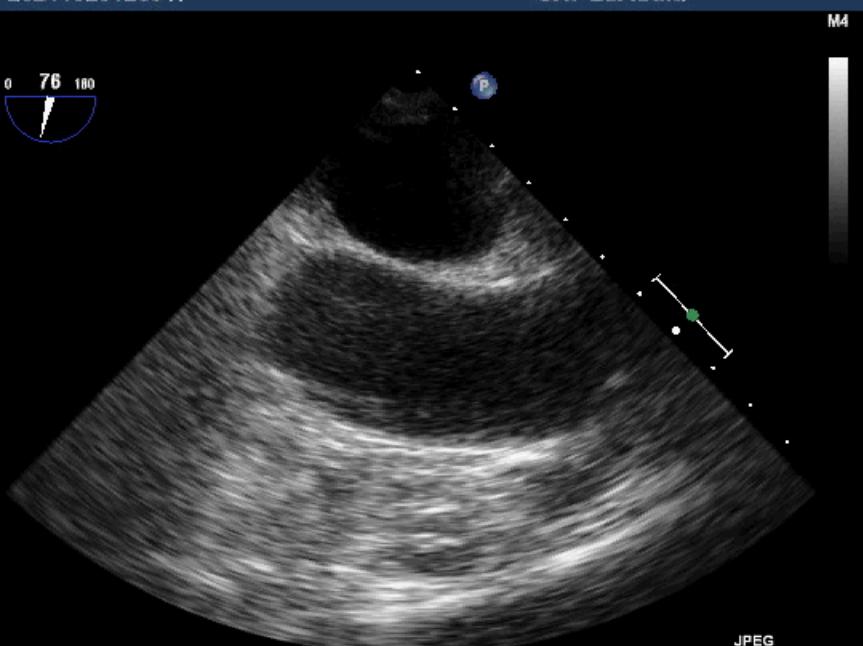
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26211020120917 CX7-2t/Adulti

FR 52Hz
11cm

2D
66%
C 50
P Off
Gen



Cardiology Hosp Policlinico Bari 17/09/2012 15:11:41 TIS0.1 MI 0.5
26211020120917 CX7-2t/Adulti



Temp. PAZ: 37.0C
Temp. TEE: 39.1C

JPEG

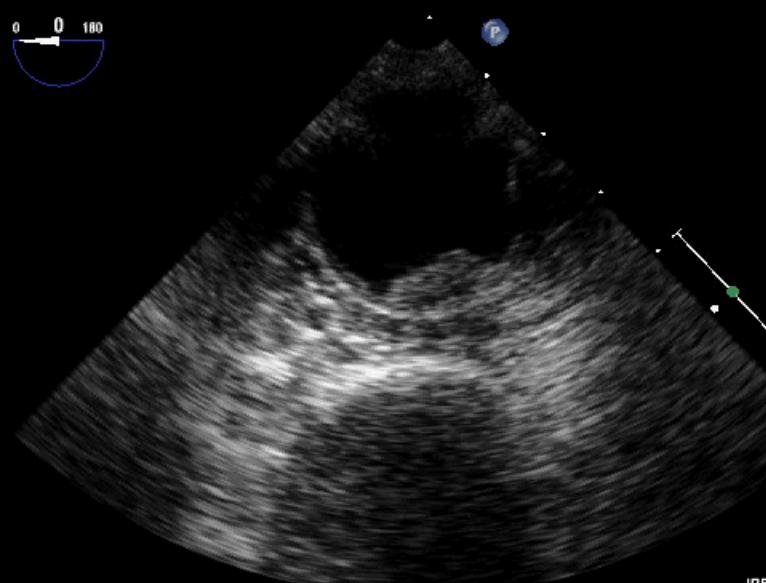
93 bpm p. PAZ: 37.0C
p. TEE: 39.1C

JPEG

93 bpm

26211020120917

CX7-2t/Adulti

FR 52Hz
7.0cmTemp. PAZ.: 37.0C
Temp. TEE: 39.3CFR 37Hz
5.0cmLive 3D
3D 52%
3D 40dB
Gen

JPE

FR 37Hz
5.0cmLive 3D
3D 52%
3D 40dB
GenTemp. PAZ.: 37.0C
Temp. TEE: 39.5C

JPEG

92 bpm

PHILIPS Cardiology Hosp Policlinico Bari

17/09/2012 15:16:43

TIS0.1

26211020120917

FR 52Hz
0cm



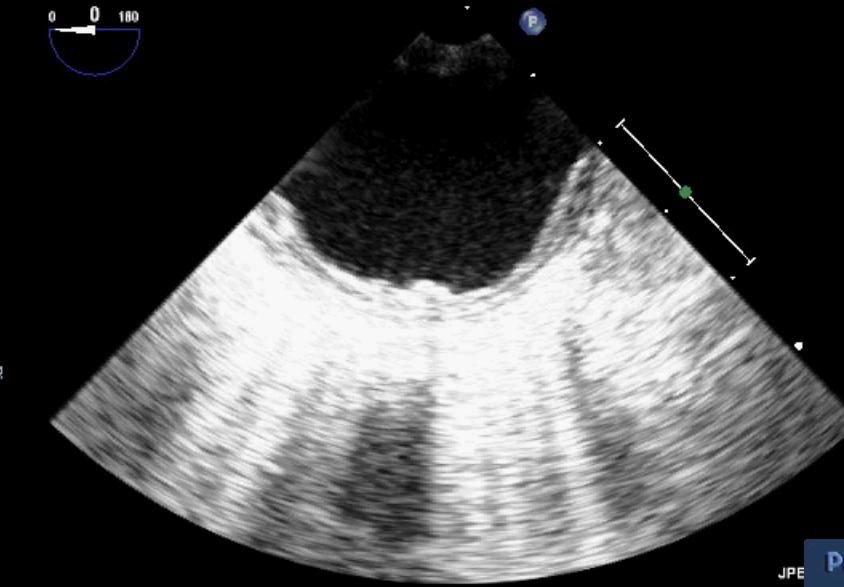
Gen

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26211020120917 CX7-2t/Adulti

FR 52Hz
6.0cm

2D
70%
C 50
P Off
Gen

G
P R



Temp. PAZ.: 37.0C
Temp. TEE: 38.9C

JPE

PHILIPS Cardiology Hosp Policlinico Bari 17/09/2012 15:20:55 TISO.1 MI 0.6
26211020120917 CX7-2t/Adulti

FR 37Hz
6.0cm

Live 3D
3D 45%
3D 40dB
Gen

0 85 100



Temp. PAZ.: 37.0C
Temp. TEE: 38.9C

JPEG

91 bpm



37341220120601

CX7-2t/Adulti

37341220120601

CX7-2t/Adulti

FR 52Hz

4.0cm

2D
54%
C 50
P Off
Gen

FR 37Hz

4.0cm

Live 3D
3D 47%
3D 40dB
GenTemp. PAZ.: 39.2C
Temp. TEE: 40.2C

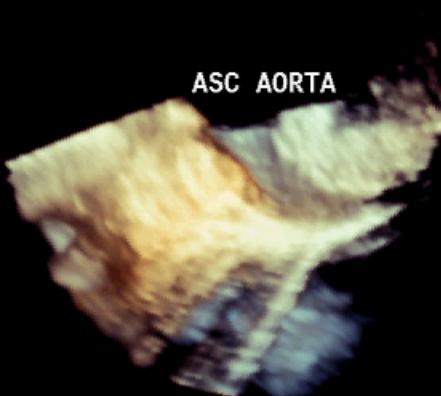
JPE

37341220120601

CX7-2t/Adulti

FR 37Hz
4.0cmLive 3D
3D 47%
3D 40dB
Gen

ASC AORTA

Temp. PAZ.: 39.2C
Temp. TEE: 40.1C

JPEG

129 bpm

Actual Source	Echocardiographic Findings
LV thrombus	Apical aneurysm, presence of thrombus, dilated CM, <i>hypertrabeculation / noncompaction</i>
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a	Complex aortic plaque , atheroma

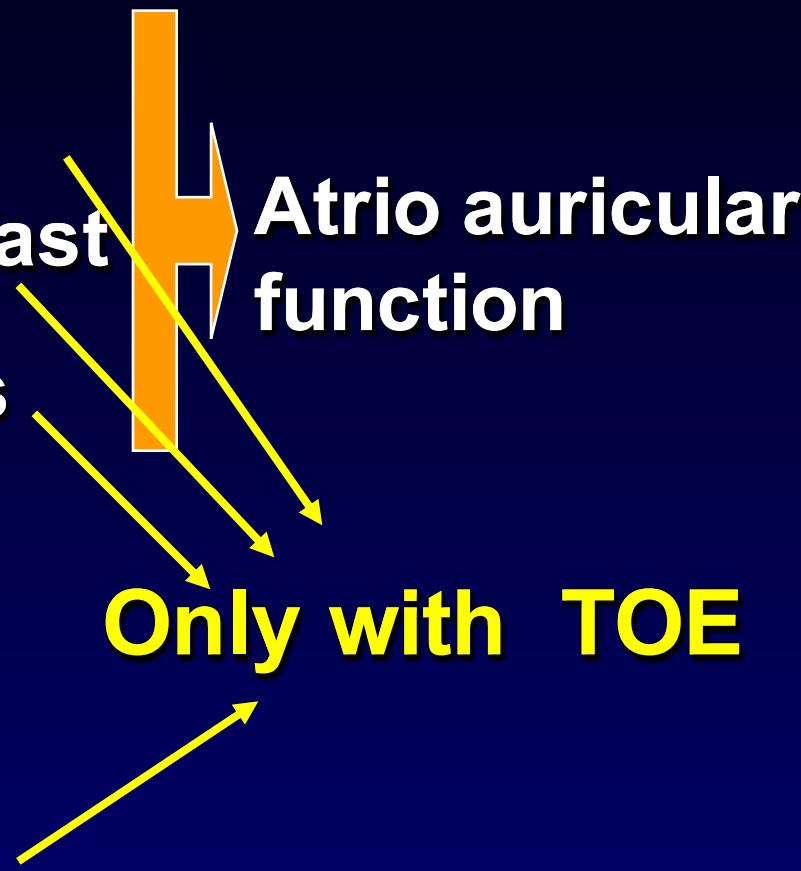
3



Echocardiography in atrial fib: information for clinical decisions

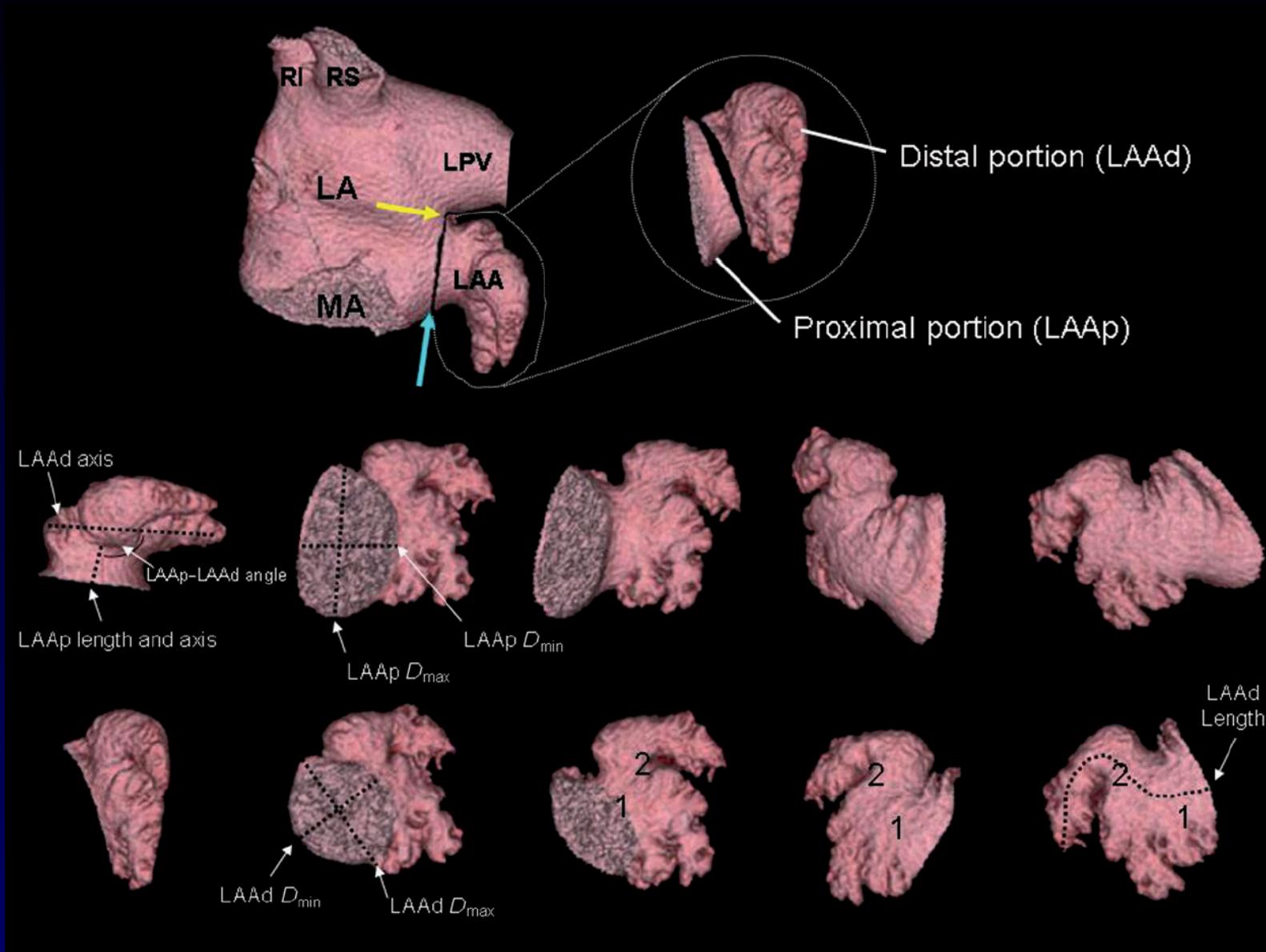
EAE recommendations, EJE '10

- Thrombi
- Spontaneous echocontrast
- LA appendage velocities
- LV function and thrombi
- Patent foramen ovale



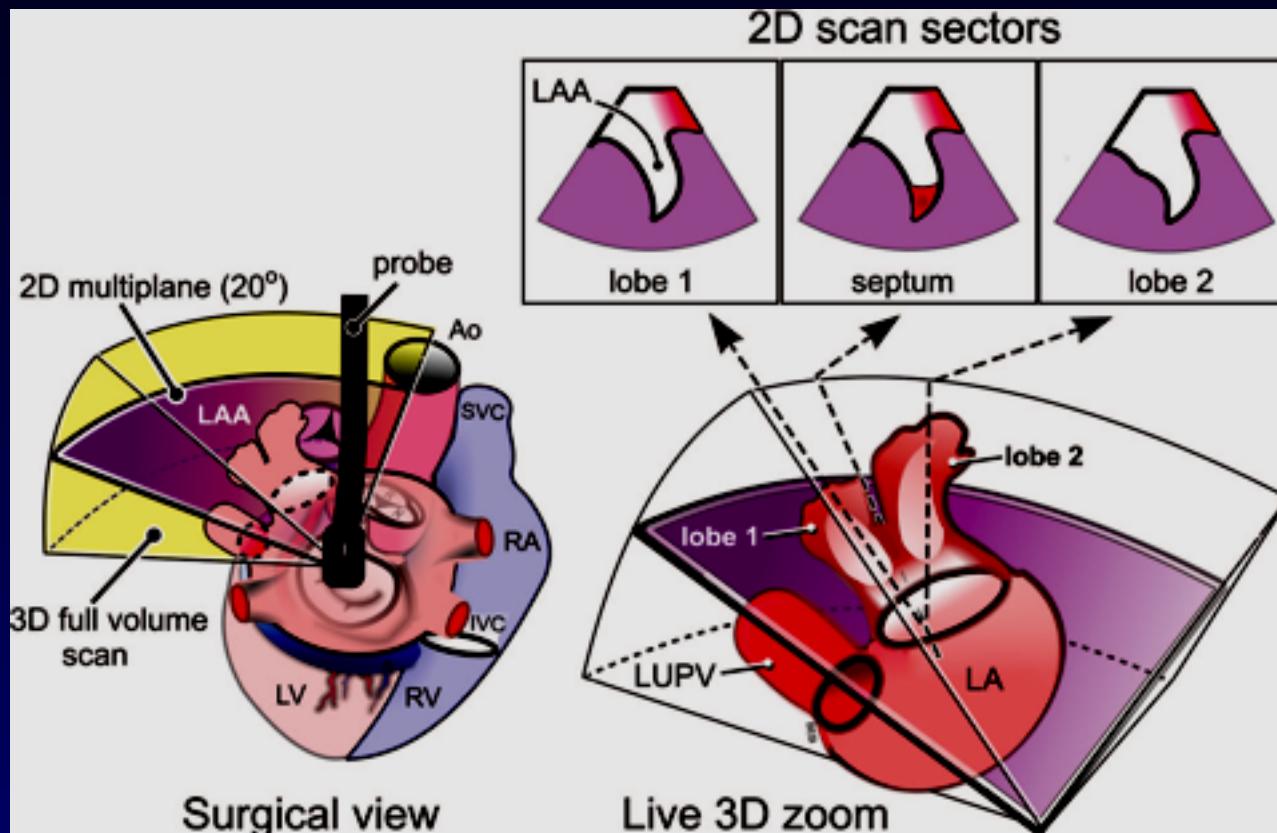
Complex aortic plaques

Complexity of LAA anatomy



Thrombus or bilobar left atrial appendage? Diagnosis by Real-Time 3D TEE

Mizuguchi, Anesth analg 2009



Thrombus or bilobar left atrial appendage? Diagnosis by Real-Time 3D TEE

Mizuuchi, Anesth analg 2009

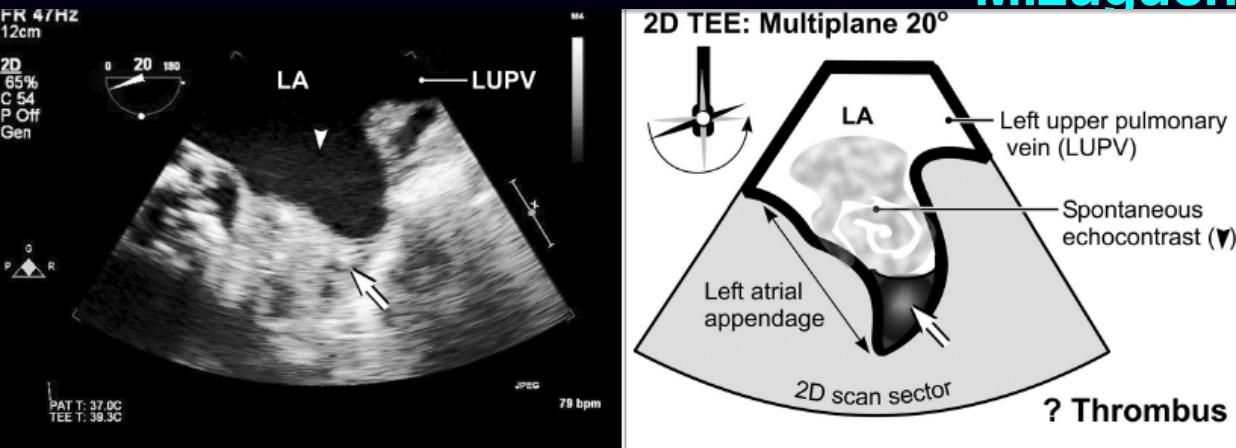
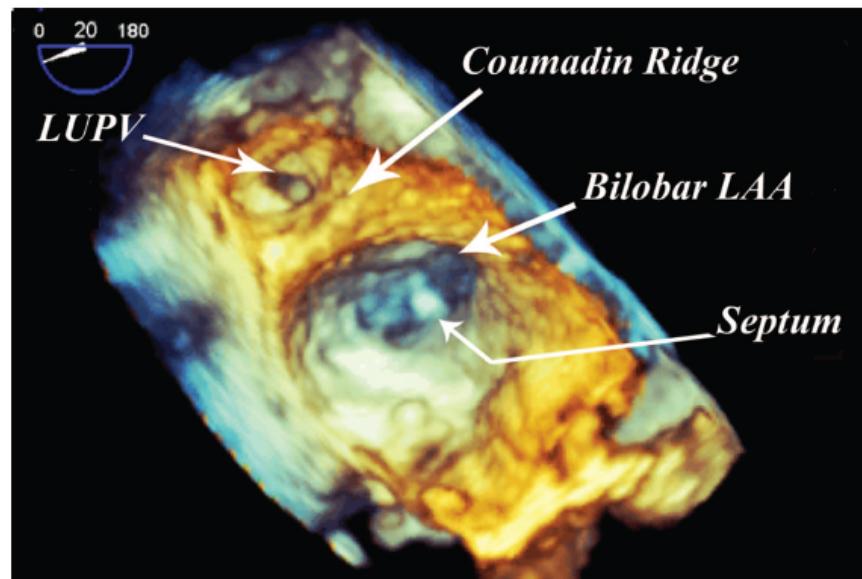


Figure 1. 2D TEE View of LAA. Mid-esophageal 20° 2D TEE view of the LAA showing spontaneous echo contrast and the questionable thrombus is noted on the left. A schematic of the view is noted on the right. The arrows in the figures point to the questionable thrombus and the arrowhead (left figure) points to the spontaneous echo contrast. 2D TEE = two-dimensional transesophageal echocardiography; LAA = left atrial appendage.



Evaluation of left atrial appendage function and thrombi in patients with AF: from transthoracic to real time 3D TEE

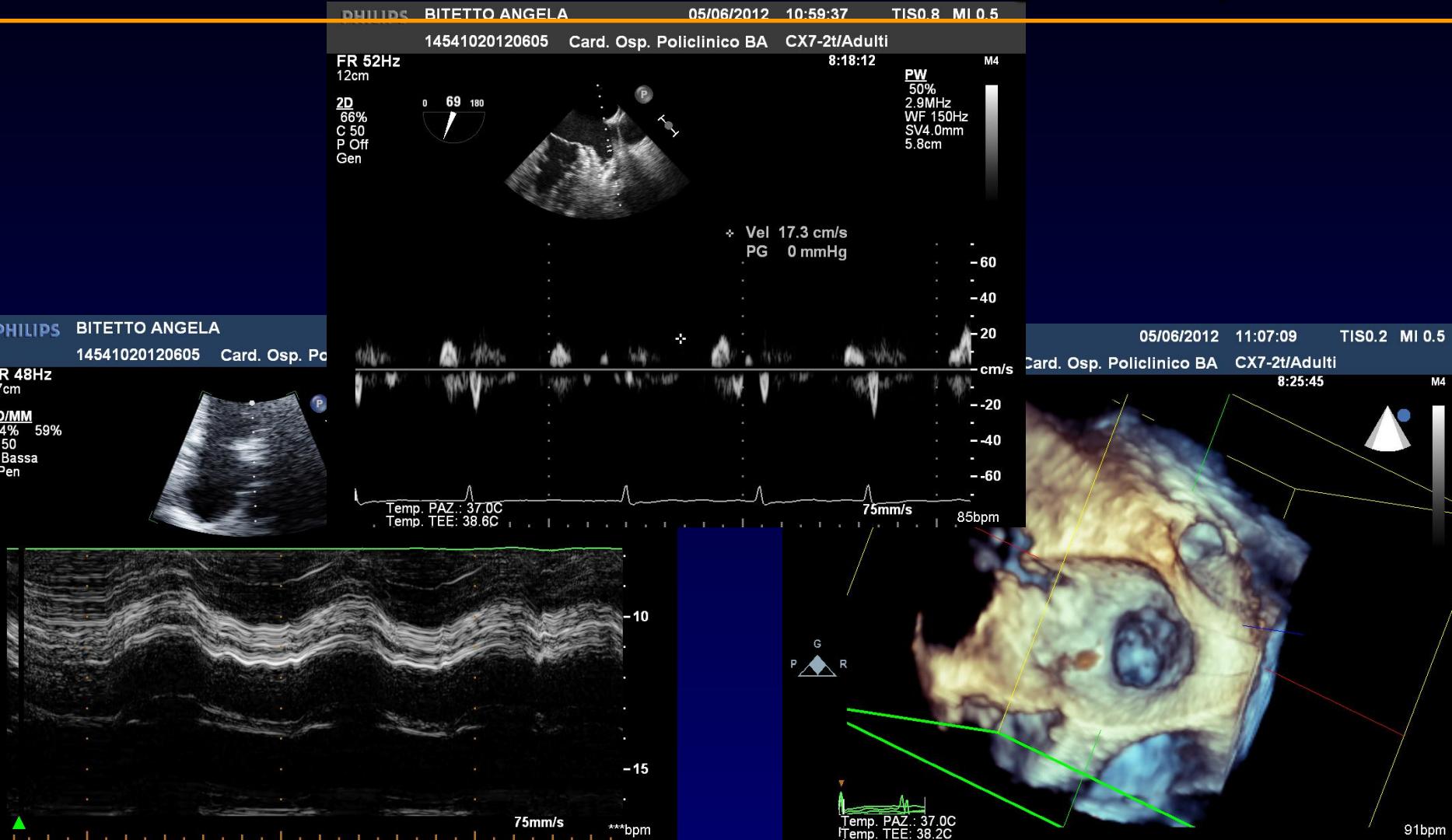
Colonna et al. Eur J CV Imag 2012 in press

Parametri ecocardiografici pre-CV, media ± DS 2DTEE e RT3DTEE	Totale 93 pazienti
Definizione della LLAeV, n (%)	93 (100)
LLAeV, cm/s (93/93)	41,3 ± 17,3
LLAeV < 40 cm/s (LLA disfunzionante), n (%)	49 (52,7)
LLAeV ≤ 20 cm/s (LLA gravemente disfunzionante), n (%)	10 (10,7)
LLArV, cm/s (67/93)	41,1 ± 15,4
Visualizzazione della LAA, n (%)	93 (100)
Diametro diastolico massimo della LAA, mm (38/93)	17,8 ± 7,9
Diametro sistolico minimo della LAA, mm (24/93)	10,5 ± 6,5
Change percentuale dell'area della LAA (24/93)	0,4 ± 0,4
Presenza certa di trombi alla 2DTEE, n (%)	8 (8,6)
Dubbio diagnostico per trombosi alla 2DTEE, n (%)	5 (5,4)
Presenza certa di trombi alla RT3DTEE, n (%)	9 (9,7)
Presenza di muscoli pettinati alla RT3DTEE, n (%)	4 (4,3)



Evaluation of left atrial appendage function and thrombi in patients with AF: from transthoracic to real time 3D TEE

Colonna et al. Eur J CV Imag 2012 in press



14541020120605

CX7-2t/Adulti

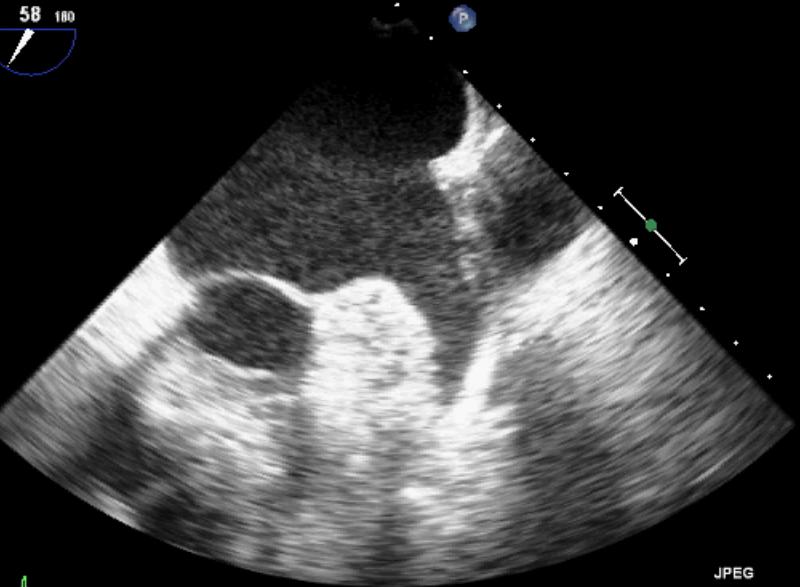
M4

FR 52Hz

12cm

2D
75%
C 50
P Off
Gen

P

G
P R

JPEG

103 bpm

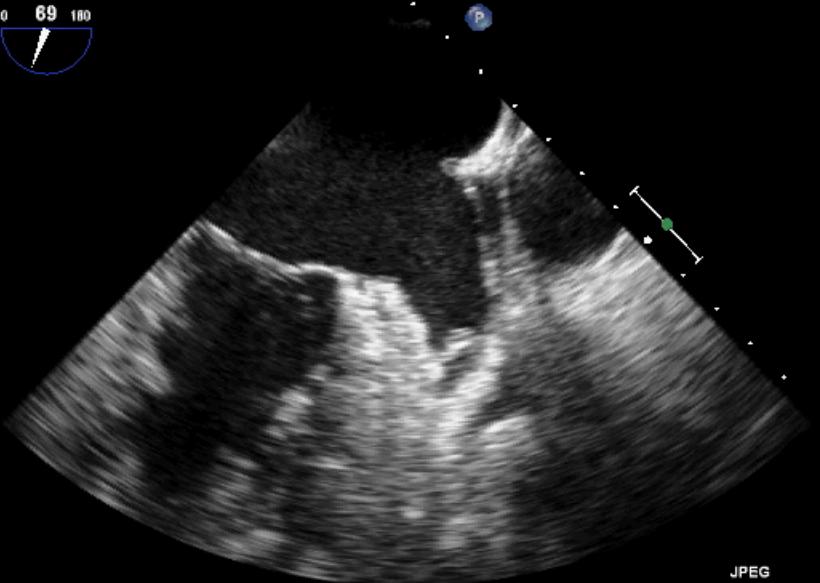
14541020120605

CX7-2t/Adulti

M4

FR 52Hz
12cm2D
66%
C 50
P Off
Gen

P

G
P R

JPEG

99 bpm

Temp. PAZ.: 37.0C
Temp. TEE: 38.6C

14541020120605

CX7-2t/Adulti

14541020120605

CX7-2t/Adulti

FR 26Hz
12cmLive 3D
3D 47%
3D 40dB
GenFR 32Hz
8.1cmVolume completo 65 100
3D 47%
3D 40dB

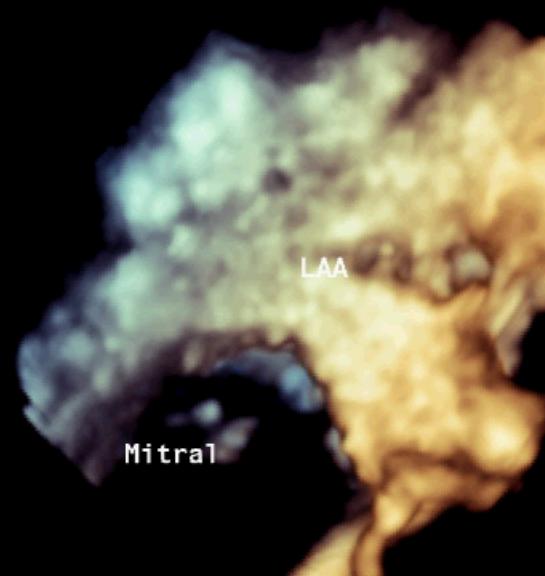
M4



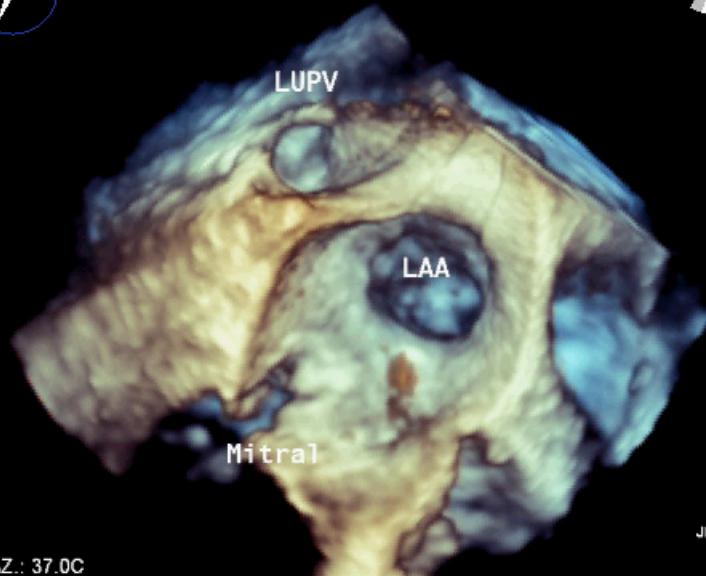
14541020120605

CX7-2t/Adulti

CX7-2t/Adulti

FR 32Hz
8.1cmVolume completo 65 100
3D 47%
3D 40dBFR 32Hz
8.1cmVolume completo 65 100
3D 47%
3D 40dB

M4



07291220120526

CX7-2t/Adulti

07291220120526

CX7-2t/Adulti

FR 28Hz

11cm

Live 3D
3D 47%
3D 40dB
Gen

FR 52Hz
12cm

2D
69%
C 50
P Off
Gen



M4

Temp. PAZ.: 37.0C
Temp. TEE: 38.9C

12cm

Live 3D
3D 47%
3D 40dB
Gen



JPE

Temp. PAZ.: 37.0C
Temp. TEE: 38.9C



JPEG

83 bpm

Temp. PAZ.: 37.0C
Temp. TEE: 39.6C

83 bpm



07291220120526

CX7-2t/Adulti

M4

FR 26Hz
12cmLive 3D
3D 47%
3D 40dB
Gen

Atrio sinistro



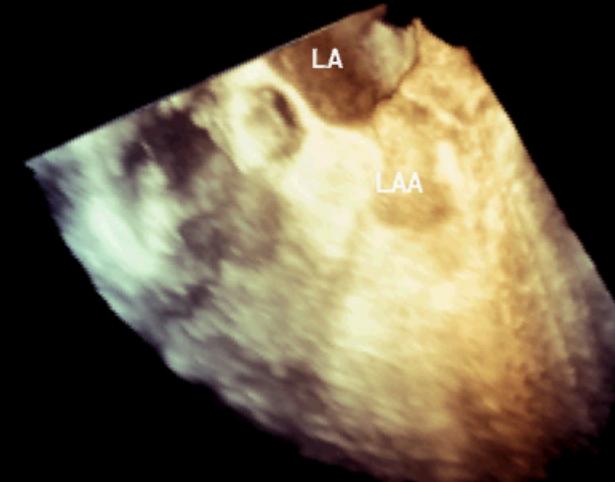
JPEG

67 bpm

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07291220120526 CX7-2t/Adulti

12cm

Volume completo 65 100

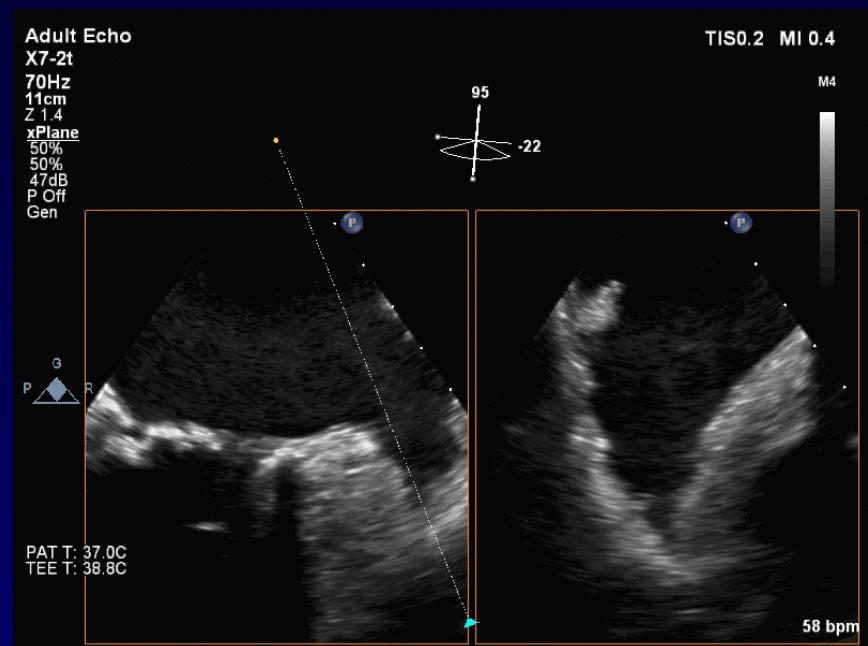
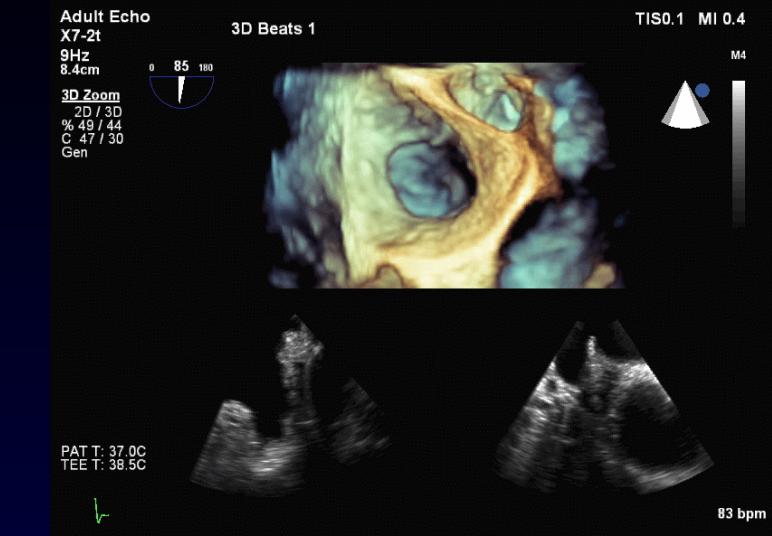
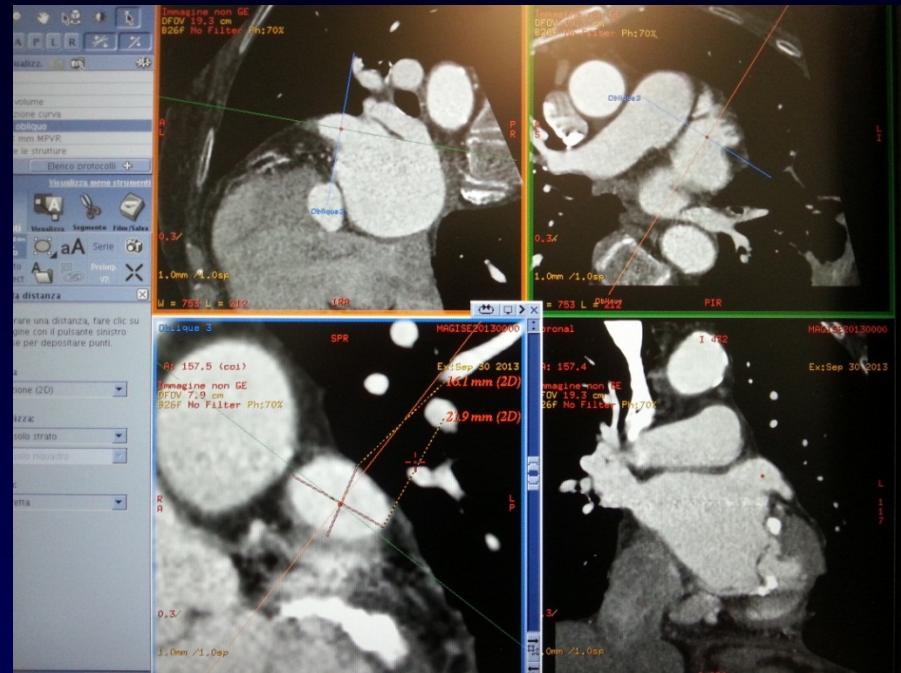
3D 47%
3D 40dB

JPEG

79 bpm

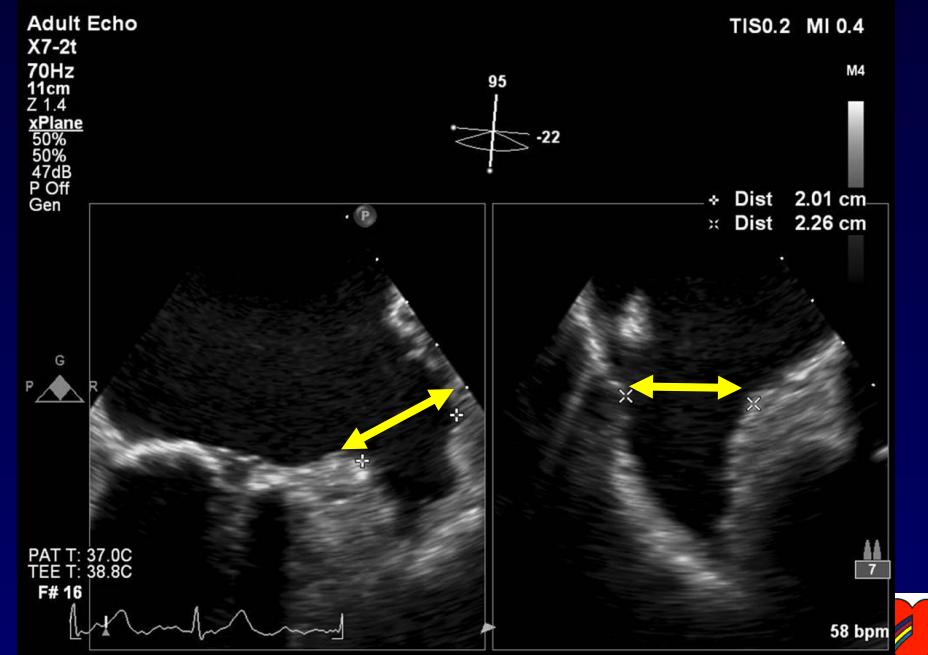
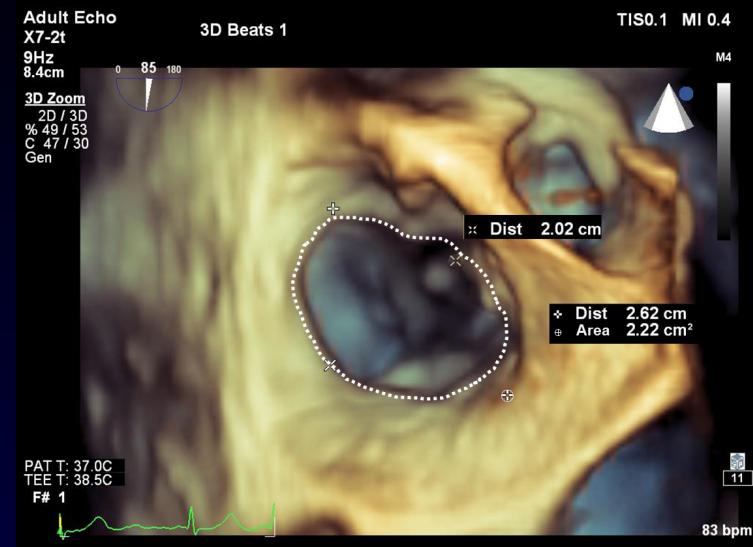
Temp. PAZ.: 37.0C
Temp. TEE: 39.5C

Approccio Multimodality: TAC – ECO 3D



Misure dirette rapide on board su 3D e xPLANE

l'esame TC impiega tecniche di resezione «simili» all'attuale 3D (uso di piani MPR blu, rosso e verde). Oggi però il 3D consente approcci diretti , rapidi e altrettanto precisi anche nella valutazione durante la seduta stessa !



Misure dirette avanzate on board con MPR



ECO 3D-MPR (Multi Plane Reconstruction):
i piani BLU, ROSSO e VERDE sono
liberamente orientabili nello spazio e
quindi permettono il miglior
allineamento al fine di effettuare misure
ad elevata precisione «anatomica»

The screenshot shows the 3DQ software interface for EF BP-3DQ Measurements. The interface includes a navigation bar, a tasks menu, and several measurement tools. Four main panels display different views of the ultrasound image with measurement annotations. A results sidebar on the right summarizes the measurements taken.

Measurement Type	Value
Annotation(s)	area 22,9 cm ²
Distance(s)	20 mm 21 mm
Area(s)	2.29 cm ² Circ 5.39 cm

La Concordanza di dati...

TAC

ECO 3D

Exhibit 30 2013
16.1 mm (2D)
21.9 mm (2D)

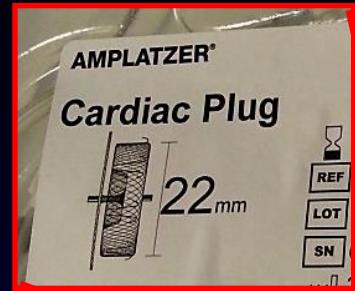
Dist 2.02 cm

Dist 2.62 cm
Area 2.22 cm²

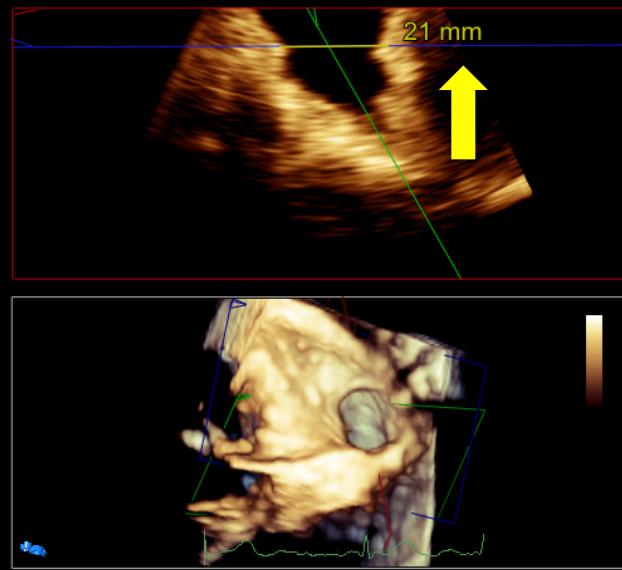
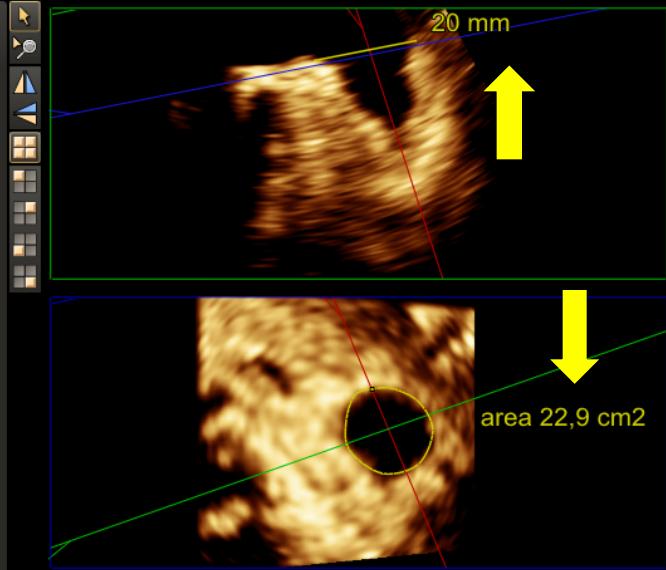
ECO MPR

ECO XPLANE

—+ Dist 2.01 cm
× Dist 2.26 cm

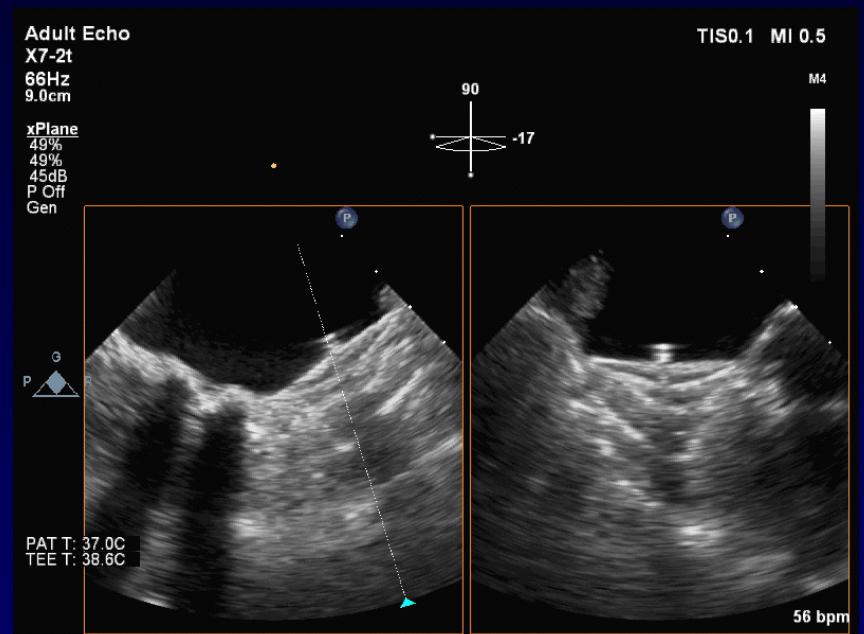
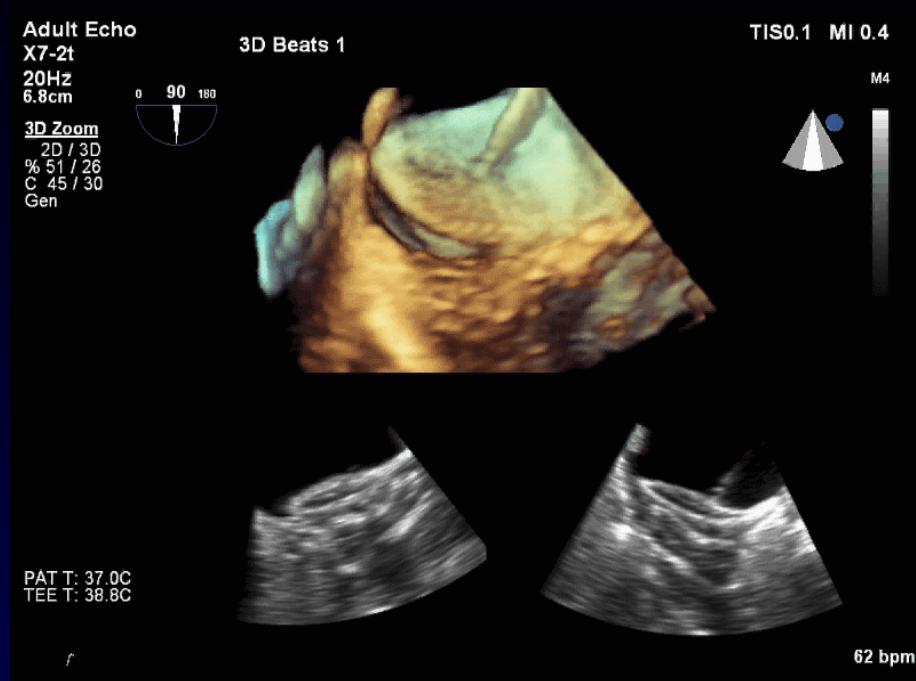


The screenshot shows a mobile application interface. At the top left is a stylized icon of a clipboard with a pencil. To its right, the text "3DQ" is displayed in large, bold, black letters. On the far right, there is a small, dark arrow icon pointing to the right. Below this header, there is a horizontal navigation bar containing three items: "Tasks", "Controls", and "QApps". The "Tasks" item is highlighted with a yellow background and a black border. The other two items are white with black borders. Underneath the navigation bar, the text "EF BP-3DQ Measurements" is displayed in a standard black font. Below this, the text "Basic Measurements" is also in black. A large, semi-transparent rectangular box covers the central area of the screen. Inside this box, the text "Perform Basic Measurements" is at the top in a large, bold, black font. Below it, the text "Measure Tools" is in a smaller, regular black font. At the bottom of the box, there are three rectangular buttons with rounded corners, each containing a label: "Annotation" on the left, "Distance" in the middle, and "Area" on the right. All three buttons have a light gray background and black text.



Results	
<input checked="" type="checkbox"/>	Annotation(s)
<input type="checkbox"/>	Distance(s)
20 mm	2.04 cm
21 mm	2.12 cm
<input type="checkbox"/>	Area(s)
Area	2.29 cm ²
Circ	5.39 cm

Monitoraggio e Verifica post-Amplatzer



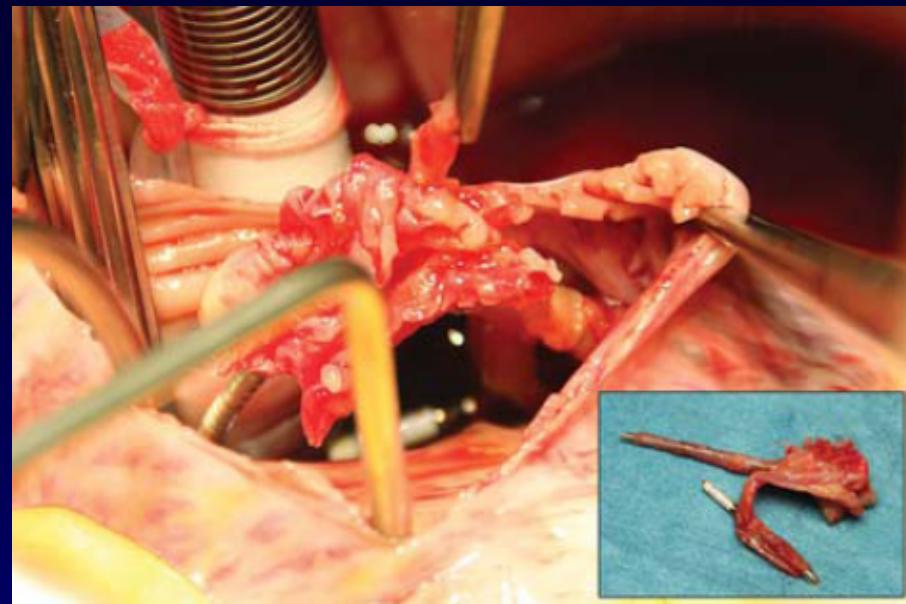
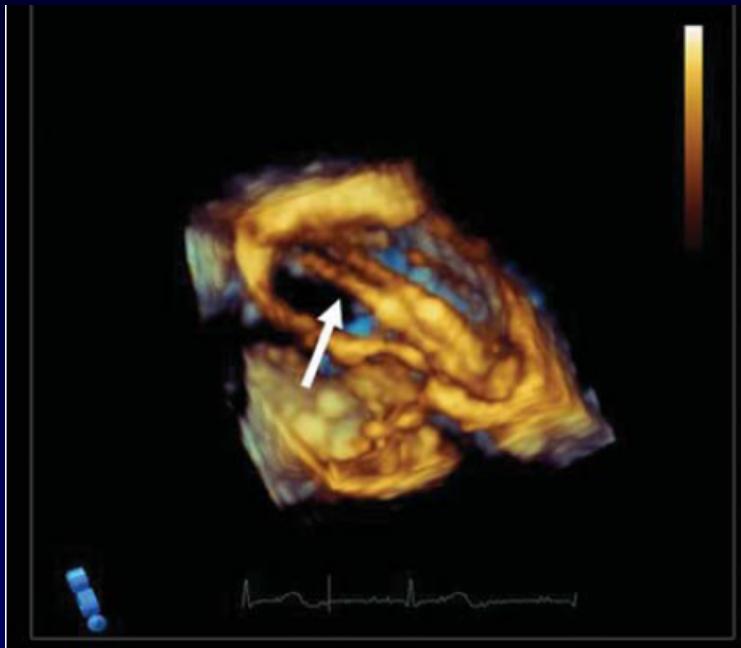
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Prosthetic valves	Thrombus, vegetation
Cardiac tumor	LA myxoma, papillary fibroelastoma
a	Complex aortic plaque , atheroma



A challenging lead endocarditis

C. Mihl, Z. Geyik, E.C. Cheriex, and J.M. van Opstal*

Department of Cardiology, Maastricht University Medical Centre, PO Box 5800, 6202 AZ Maastricht, The Netherlands



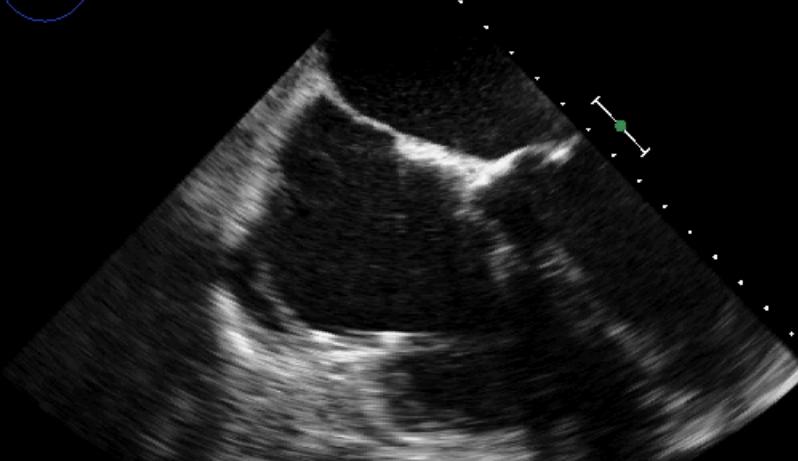
PHILIPS Cardiology Hosp Policlinico Bari 28/03/2012 13:01:52 TIS0.1 MI 0.5 Cardiology Hosp Policlinico Bari 28/03/2012 12:53:53 TIS0.1 MI 0.5

54241220120328 CX7-2t/Adulti

FR 52Hz
16cm

2D
66%
C 50
P Off
Gen

0 170 180



54241220120328

CX7-2t/Adulti

M4

0 90 180



PHILIPS Cardiology Hosp Policlinico Bari 28/03/2012 12:55:03 TIS0.3 MI 0.7
54241220120328 CX7-2t/Adulti

FR 40Hz
12cm

2D
70%
C 50
P Off
AGen

0 90 180



M4

JPEG

JPEG

89 bpm



54241220120328

CX7-2t/Adulti

M4

FR 31Hz

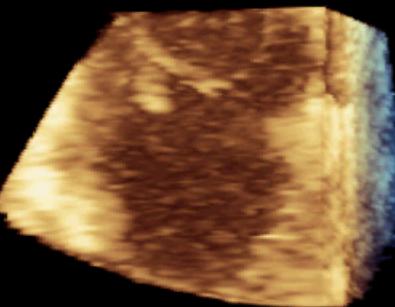
9.9cm

Live 3D

3D 47%

3D 40dB

Gen



PHILIPS Cardiology Hosp Policlinico Bari 28/03/2012 12:51:28 TIS0.2 MI 0.5

54241220120328

CX7-2t/Adulti

JPEG

80 bpm

FR 24Hz
12cmVolume completo 00 100
3D 47%
3D 40dB

M4



JPEG

78 bpm



PHILIPS Cardiology Hosp Policlinico Bari 28/03/2012 13:05:47 TIS0.1 PHILIPS Cardiology Hosp Policlinico Bari 28/03/2012 13:10:46 TIS0.1 MI 0.5

FR 20Hz
16cm
54241220120328

CX7-2t/Adulti

FR 20Hz
16cm
54241220120328

CX7-2t/Adulti

Live 3D
3D 47%
3D 40dB
Gen

Live 3D
3D 47%
3D 40dB
Ris



PHILIPS SATURNO GIOVANNI
54241220120328

28/03/2012 13:05:47 TIS0.1 MI 0.
CX7-2t/Adulti

FR 20Hz
16cm

Live 3D
3D 47%
3D 40dB
Gen



28

43 bpm



PHILIPS Cardiology Hosp Policlinico Bari 01/06/2012 12:41:41 TIS0.8 MI 1.4
37341220120601

FR 47Hz
17cm

2D
67%
C 50
P Bassa
APen

G
P 1.4 R 2.8

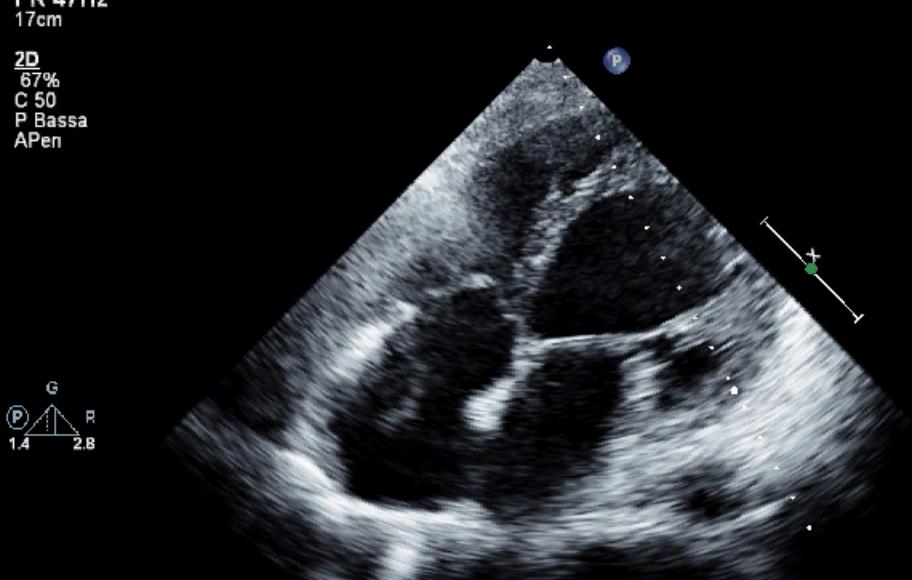
PHILIPS Cardiology Hosp Policlinico Bari 05/06/2012 13:31:55 TIS0.3
37341220120601

FR 40Hz
12cm

2D
67%
C 50
P Off
AGen

G
P 2.7 R 5.4

M3



JPE

Temp. PAZ.: 37.0C
Temp. TEE: 39.1C

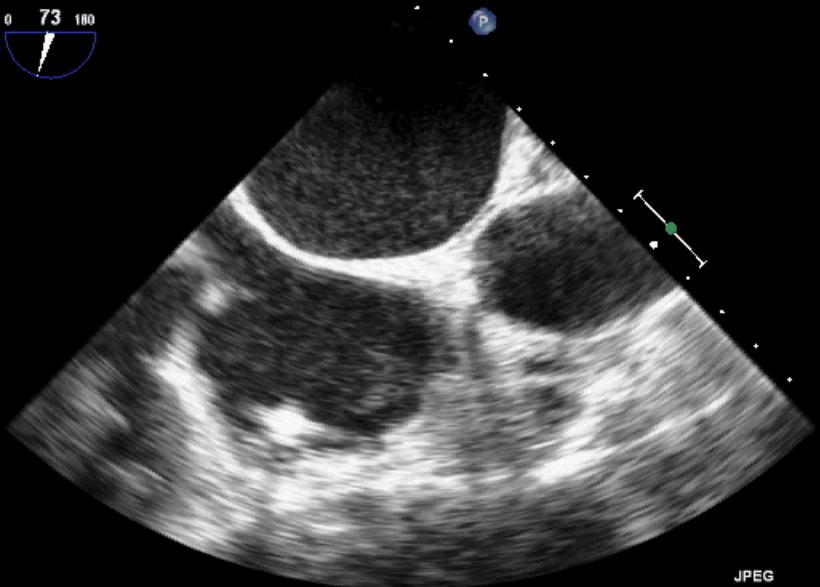
PHILIPS Cardiology Hosp Policlinico Bari 05/06/2012 13:34:10 TIS0.1 MI 0.5
37341220120601

FR 52Hz
12cm

2D
72%
C 50
P Off
Gen

G
P 73 R

M4



JPEG

Temp. PAZ.: 39.2C
Temp. TEE: 42.0C

89 bpm

PHILIPS Cardiology Hosp Policlinico Bari 05/06/2012 13:35:02 TIS0.2 PHILIPS Cardiology Hosp Policlinico Bari 05/06/2012 13:35:02 TIS0.2 MI 0.5

37341220120601

CX7-2t/Adulti

37341220120601

CX7-2t/Adulti

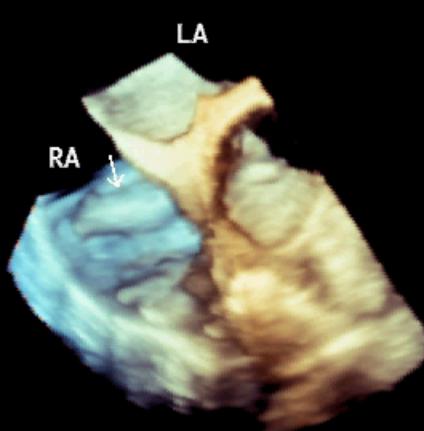
FR 26Hz
12cm

FR 26Hz
12cm

M4

Live 3D
3D 47%
3D 40dB
Gen

Live 3D
3D 47%
3D 40dB
Gen



PHILIPS Cardiology Hosp Policlinico Bari 05/06/2012 13:34:41 TIS0.2 MI 0.5

37341220120601

CX7-2t/Adulti

JPEG

94 bpm

FR 26Hz
12cm

b. PAZ.: 39.2C
b. TEE: 41.2C

M4

Live 3D
3D 47%
3D 40dB
Gen



JPEG

96 bpm

Temp. PAZ.: 39.2C
Temp. TEE: 41.2C



L'Eco 3D come grande opportunità clinica nella ricerca di fonti emboligene

- Importanza in casi selezionati
- Utilità con immagini di buona qualità (TT o meglio TE)
- Non sostituisce la diagnosi 2D ma la integra con spazialità 3D
- Ti accorgi della utilità solo quando ce l'hai a disposizione ... con un solo pulsante



Grazie per l'attenzione

