Choosing the Right Device for the Right Anatomy

AP Valves 2019 Main Arena, Vista Hall, B2

10/8/2019 10:02am to 10:12am

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Queen Mary Hospital, Hong Kong

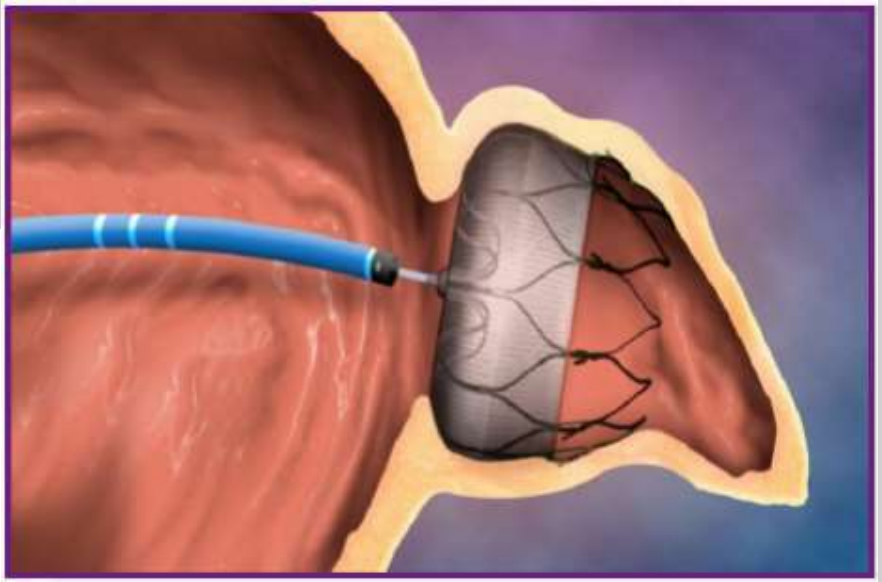
Disclosures

- Proctor
  - St Jude Medical/Abbott
  - Edwards LifeScience
  - Lifetech Scientific
  - Boston/Claret

Challenges in getting the correct device for different LAA Anatomies

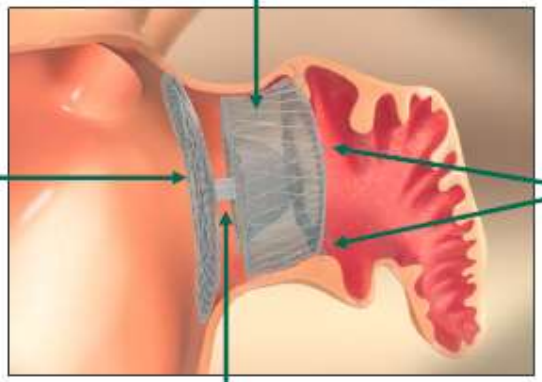
- Large anatomical variations among LAA anatomies
- Devices of fixed shape
- Complete sealing of LAA is our goal

From the Product Information Animations



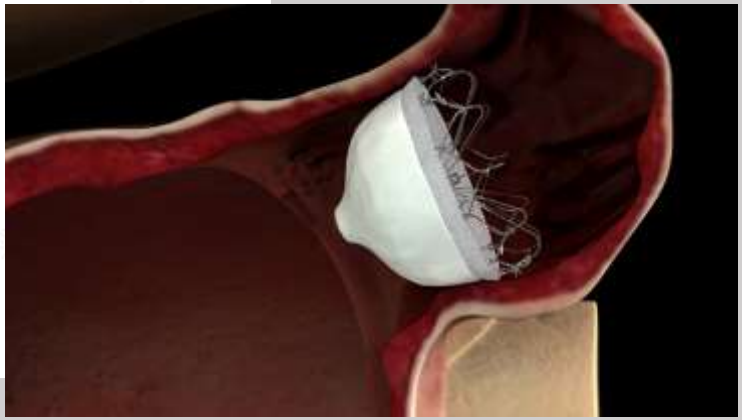
Lobe
- Positioned inside the LAA neck
- Designed to conform to different sizes and shapes of LAA anatomy

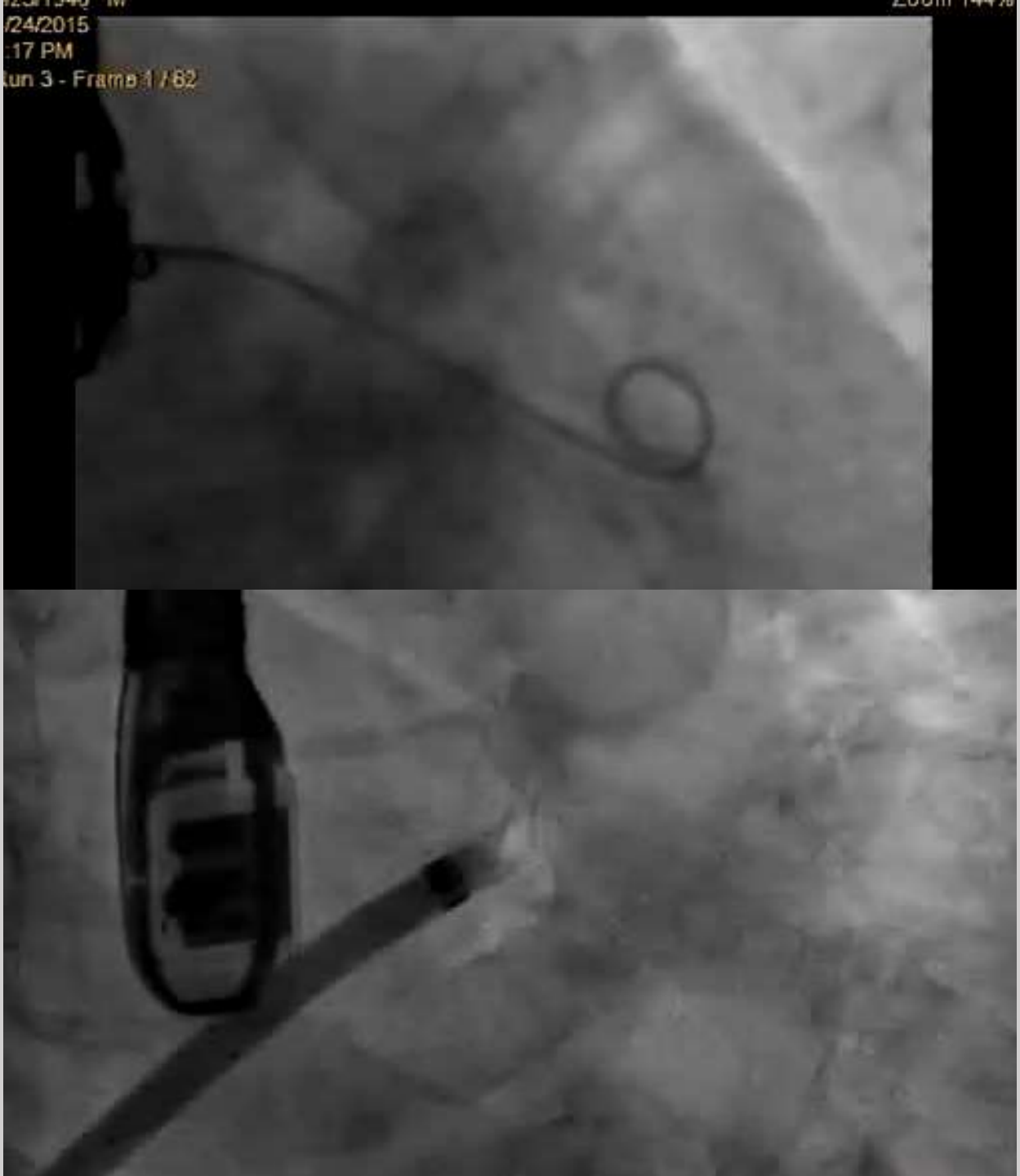
Disc
- Designed to completely seal the LAA at the orifice



Stabilizing Wires
- Engage with the wall of the LAA
- Help hold the device in place

Waist
- Maintains tension between lobe and disc
- Flexible connection allows device to self-orient




/24/2015
:17 PM
un 3 - Frame 1 / 82

Is One System Better Than The Other?

- It is rare that a left atrial appendage cannot be closed (less than 5 % with all device)
- No data comparing different device head to head
- Differences in
  - backup clinical data
  - some specific exclusion-inclusion criteria
  - some potential advantages/disadvantages in specific anatomical subsets

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Size of the LAA

Feature	Amplatzer™ Cardiac Plug 1								Amplatzer™ Cardiac Plug 2 (Amulet™)							
Sizes (mm)	16	18	20	22	24	26	28	30	16	18	20	22	25	28	31	34
Disc diameter	Lobe + 4 mm				Lobe + 6 mm				Lobe + 6 mm				Lobe + 7 mm			
Lobe length	6.5 mm								7.5 mm				10 mm			
Waist length	4 mm								5.5 mm				8 mm			
SW diameter	0.006"								0.0065"							
SW pairs	6								6				8		10	
Sheath (Fr)	9		10		13				12				14			
Proximal disc end-screw	Protruding								Recessed							
Preparation	Partially pre-loaded								Fully pre-loaded							
SW: stabilising wires																

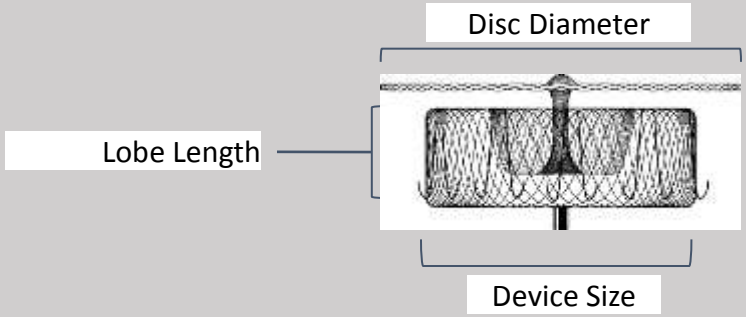
- ACP –
  - max Landing zone width
    - 12.6 mm – 28.5 mm
    - 8 sizes (16, 18, 20, 22, 24, 26, 28, 30 mm)

- Watchman
  - max ostium diameter
    - 17 mm – 31mm
    - 5 sizes (21, 24, 27, 30, 33 mm)

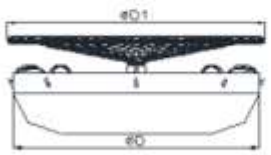
Max LAA Ostium	Device Diameter
17 – 19 mm	21 mm
20 – 22 mm	24 mm
23 – 25 mm	27 mm
26 – 28 mm	30 mm
29 – 31 mm	33 mm

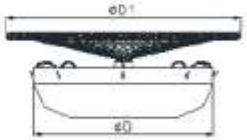
Device Size Selection - Amulet

Maximum Landing Zone Width (mm)	Amulet™Device Size	Lobe Length (mm)	Minimum LAA Depth (mm)	Disc Diameter (mm)	Sheath Diameter
11.0-13.0	**16**	7.5	≥ 10	22	12 F *or* 14 F (with adaptor)
13.0-15.0	**18**	7.5	≥ 10	24	
15.0-17.0	**20**	7.5	≥ 10	26	
17.0-19.0	**22**	7.5	≥ 10	28	
19.0-22.0	**25**	10	≥ 12	32	
22.0-25.0	**28**	10	≥ 12	35	14 F
25.0-28.0	**31**	10	≥ 12	38	
28.0-31.0	**34**	10	≥ 12	41	



Device Sizes and Corresponding Delivery Systems of LAmbre





Cat.	Diameter of Umbrella(mm)	Diameter of Cover(mm)	Delivery system
LT-LAA-1622	16	22	8F-900 9F-900 10F-900
LT-LAA-1824	18	24	
LT-LAA-2026	20	26	9F-900 10F-900
LT-LAA-2228	22	28	
LT-LAA-2430	24	30	
LT-LAA-2632	26	32	10F-900
LT-LAA-2834	28	34	
LT-LAA-3036	30	36	
LT-LAA-3236	32	36	
LT-LAA-3438	34	38	
LT-LAA-3640	36	40	

Cat.	Diameter of Umbrella(mm)	Diameter of Cover(mm)	Delivery system
LT-LAA-1630	16	30	9F-900 10F-900
LT-LAA-1832	18	32	
LT-LAA-2032	20	32	
LT-LAA-2234	22	34	10F-900
LT-LAA-2436	24	36	
LT-LAA-2638	26	38	

- If pre-defined landing zone being out of range, sometimes can consider deploy in a relatively deeper position

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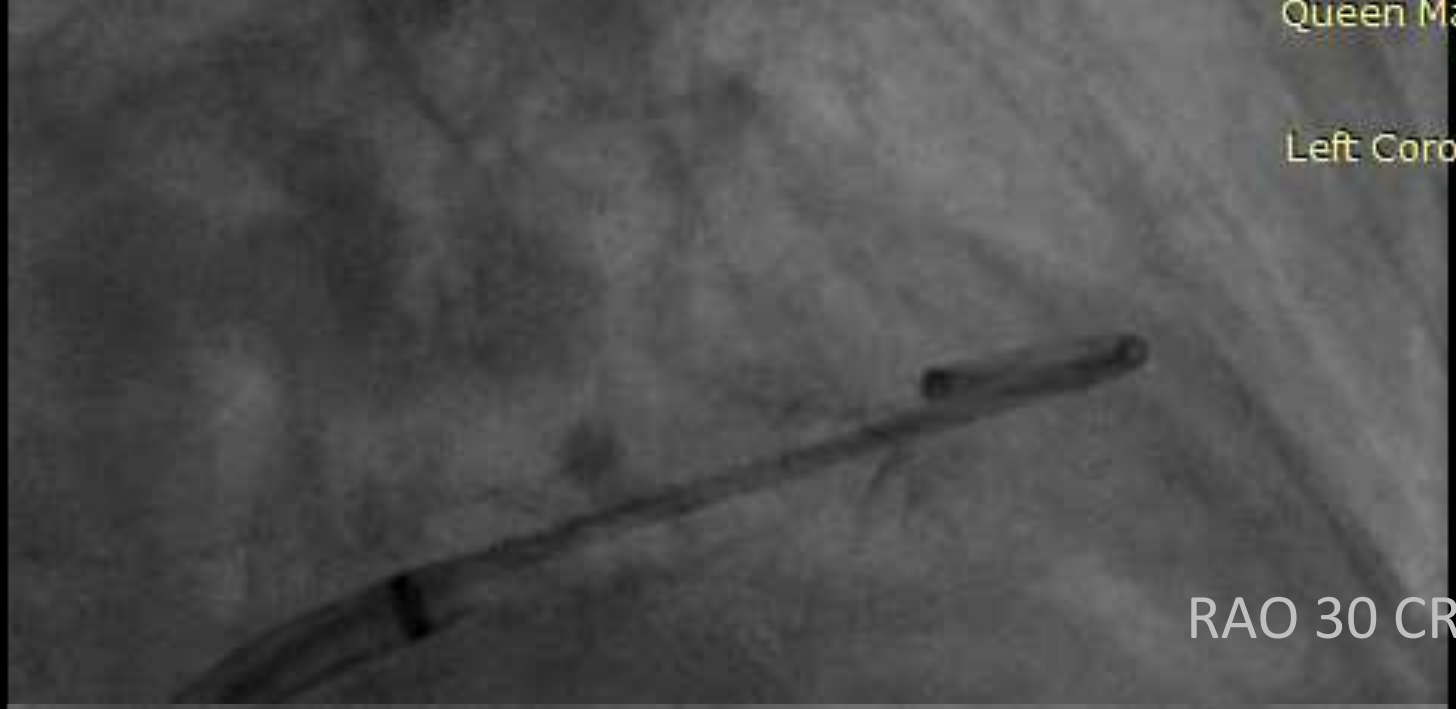
Depth of the LAA

- ACP
  - minimal functional LAA length 10 mm
- Amulet
  - minimal functional LAA length 10-12 mm
- Watchman
  - minimal functional LAA length at least = device diameter
- LAmbre
  - Minimal requirement

Need for Deep Seating of Introductory Sheath

- Watchman – yes
- Other devices – not always necessary

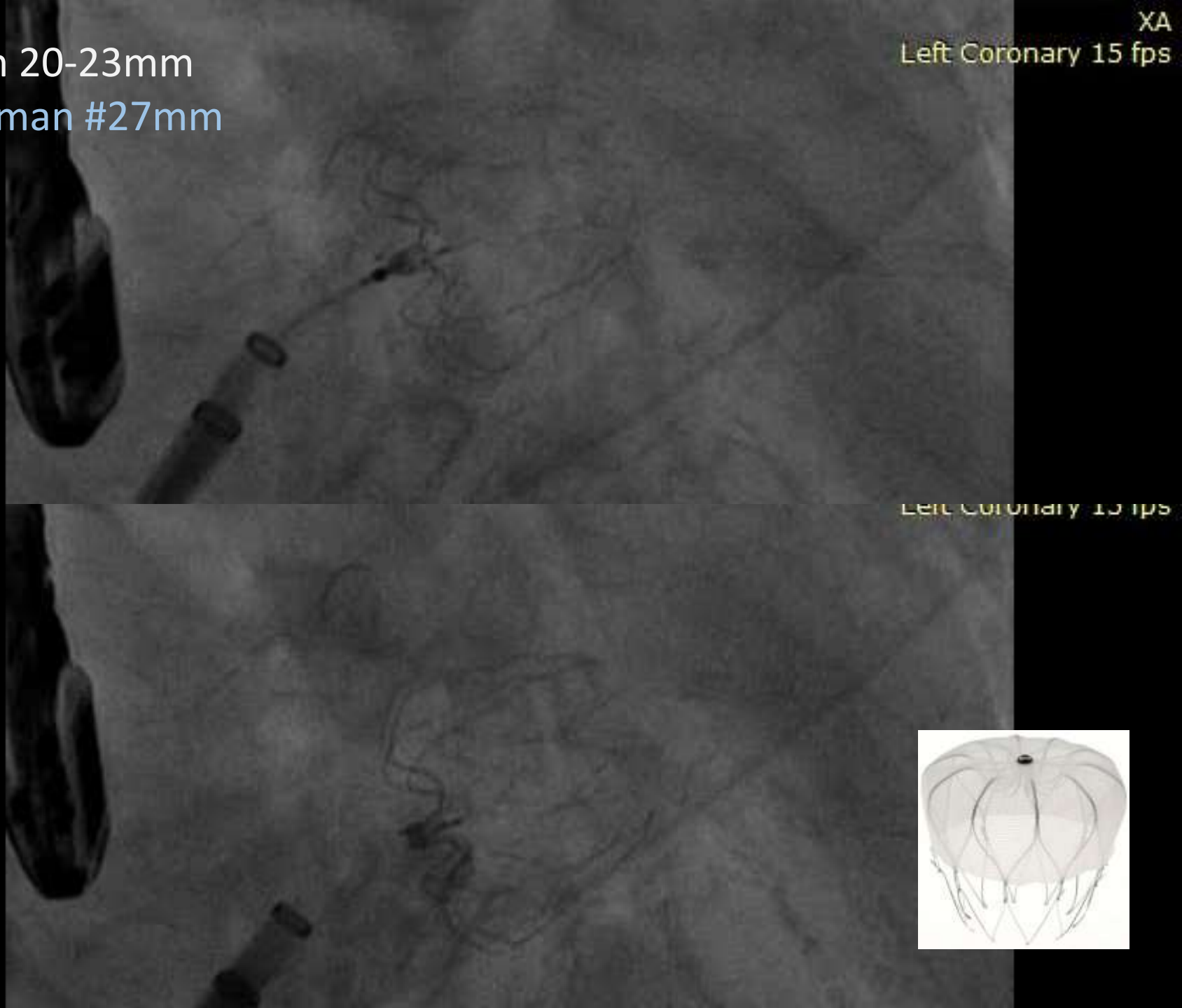

Queen Mary Hospital
0341-2017
XA
Left Coronary 15 fps
RAO 30 CRAN 20


XA
Left Coronary 15 fps
RAO 30 CAU 20

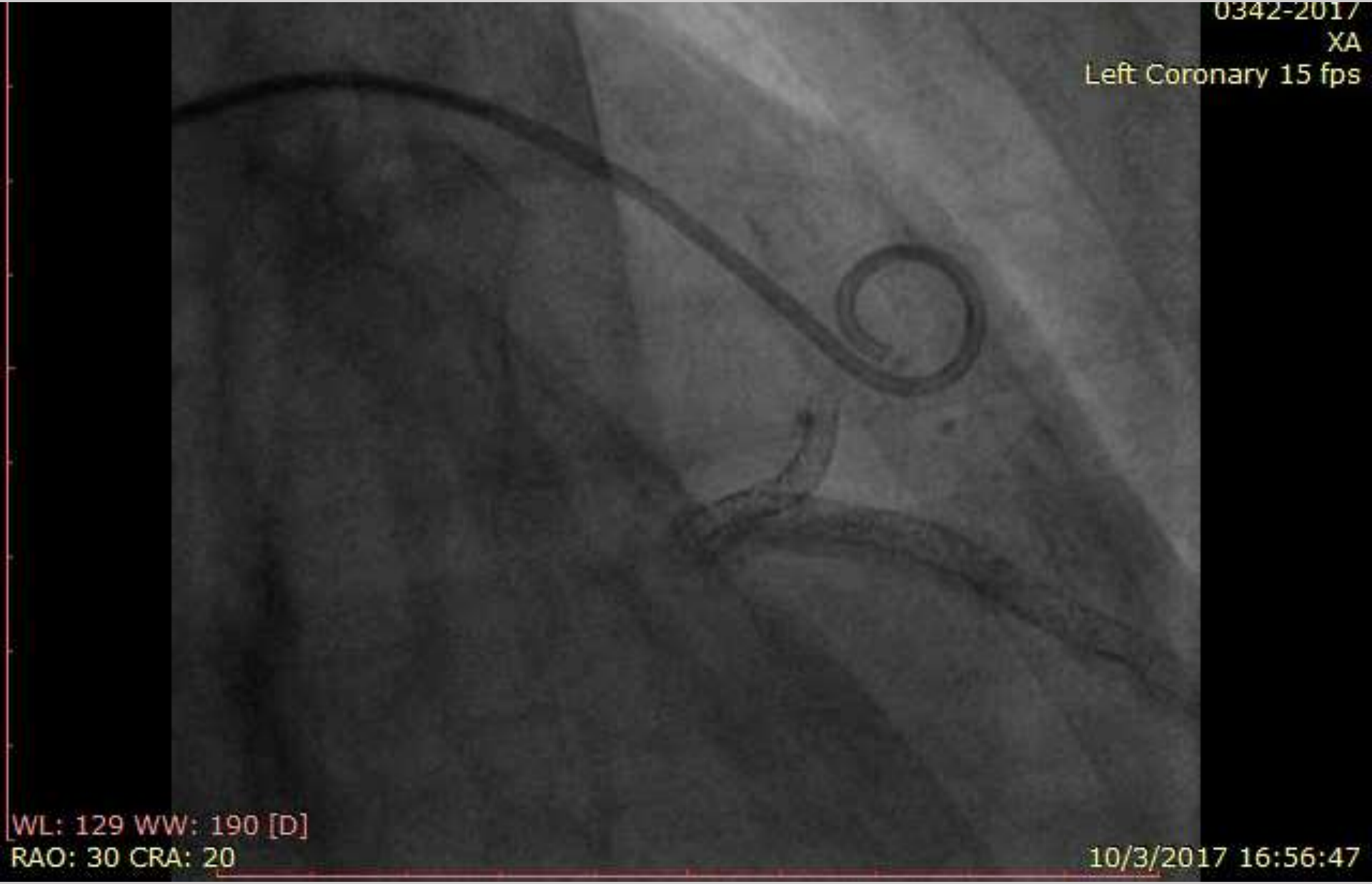

Im: 1/48
Se: 13
Queen Mary Hospital
0341-2017
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
3/10/2017 2:06:05 PM

Ostium 20-23mm

Watchman #27mm



Shallow LAA - Case




Im: 1/57
Landing Zone 25mm
AMULET #28mm
Queen Mary Hospital
0342-2017
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
10/3/2017 17:14:25


Im: 1/300
Se: 17
Queen Mary Hospital
0342-2017
XA
Fluoroscopy
WL: 115 WW: 213 [D]
RAO: 30 CAU: 20
10/3/2017 17:16:46


Im: 1/300
Se: 18
Queen Mary Hospital
0342-2017
XA
Fluoroscopy
WL: 115 WW: 213 [D]
RAO: 30 CAU: 20
10/3/2017 17:17:21

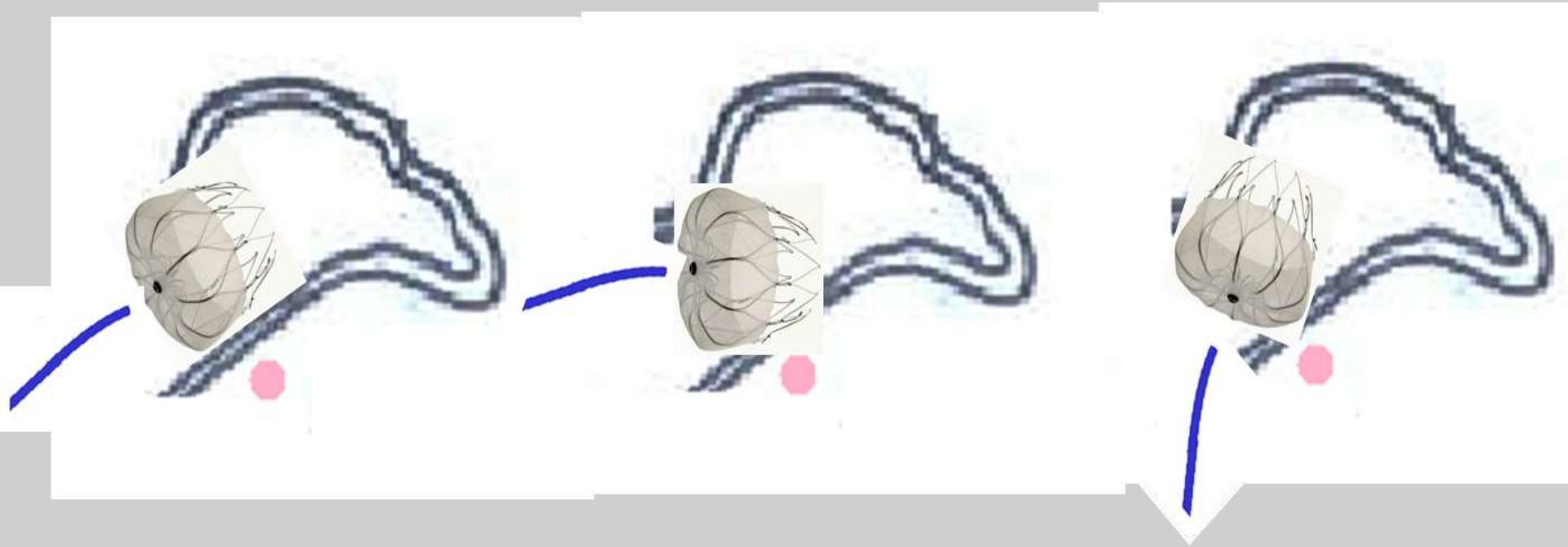

Im: 1/60
Se: 19
Queen Mary Hospital
0342-2017
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
10


Im: 1/15
Se: 24
Queen Mary Hospital
0342-2017
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CRA: 20
10

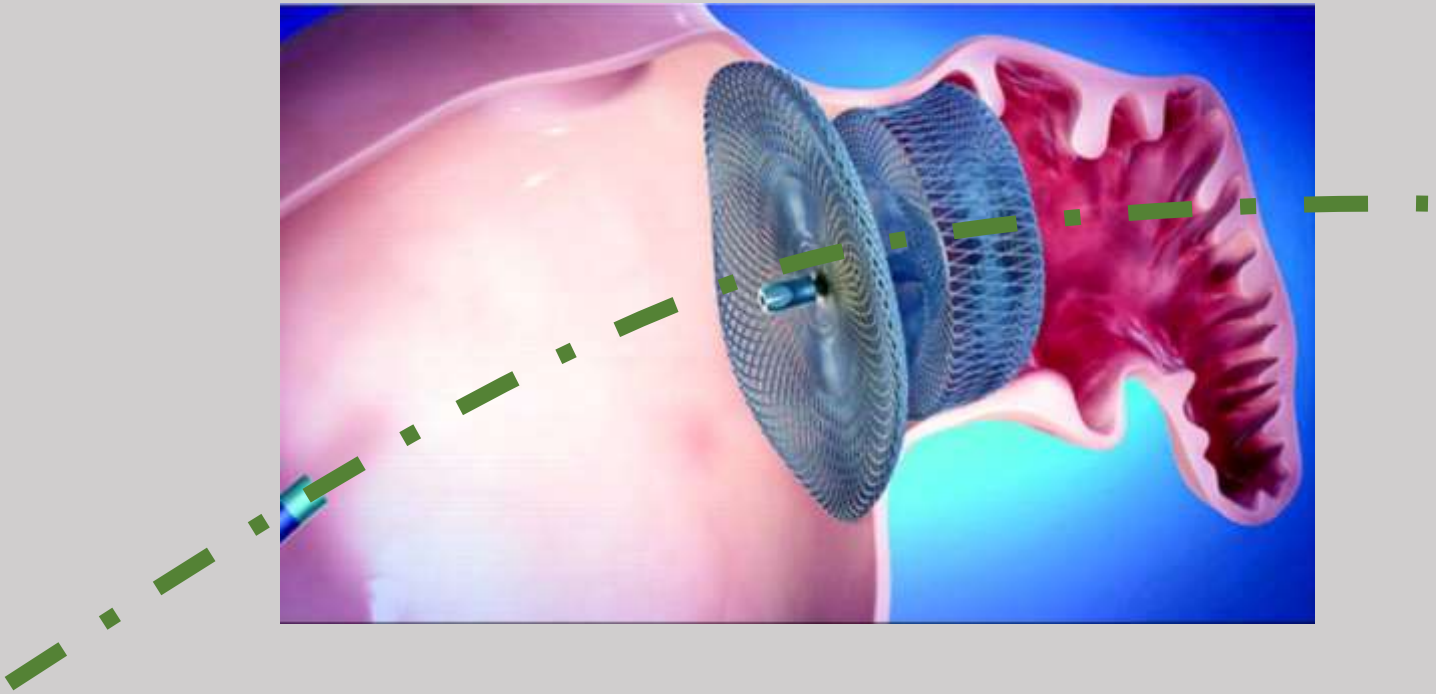
Im: 1/53
Se: 31
Queen Mary Hospital
0342-2017
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
10

Delivery Sheath – LAA alignment

- Watchman is more forgiving regarding sheath position/orientation



- ACP/Amulet requires more than Watchman for a well defined landing zone/perpendicular orientation of the sheath in relation to the LAA ostium



- ACP in difficult alignment angle – Sheath modification
- ACP in poor defined landing zone – **Sandwich technique**
  - overcome challenging anatomies
  - extreme chicken wing type
  - secured position
  - forgiving extreme angles

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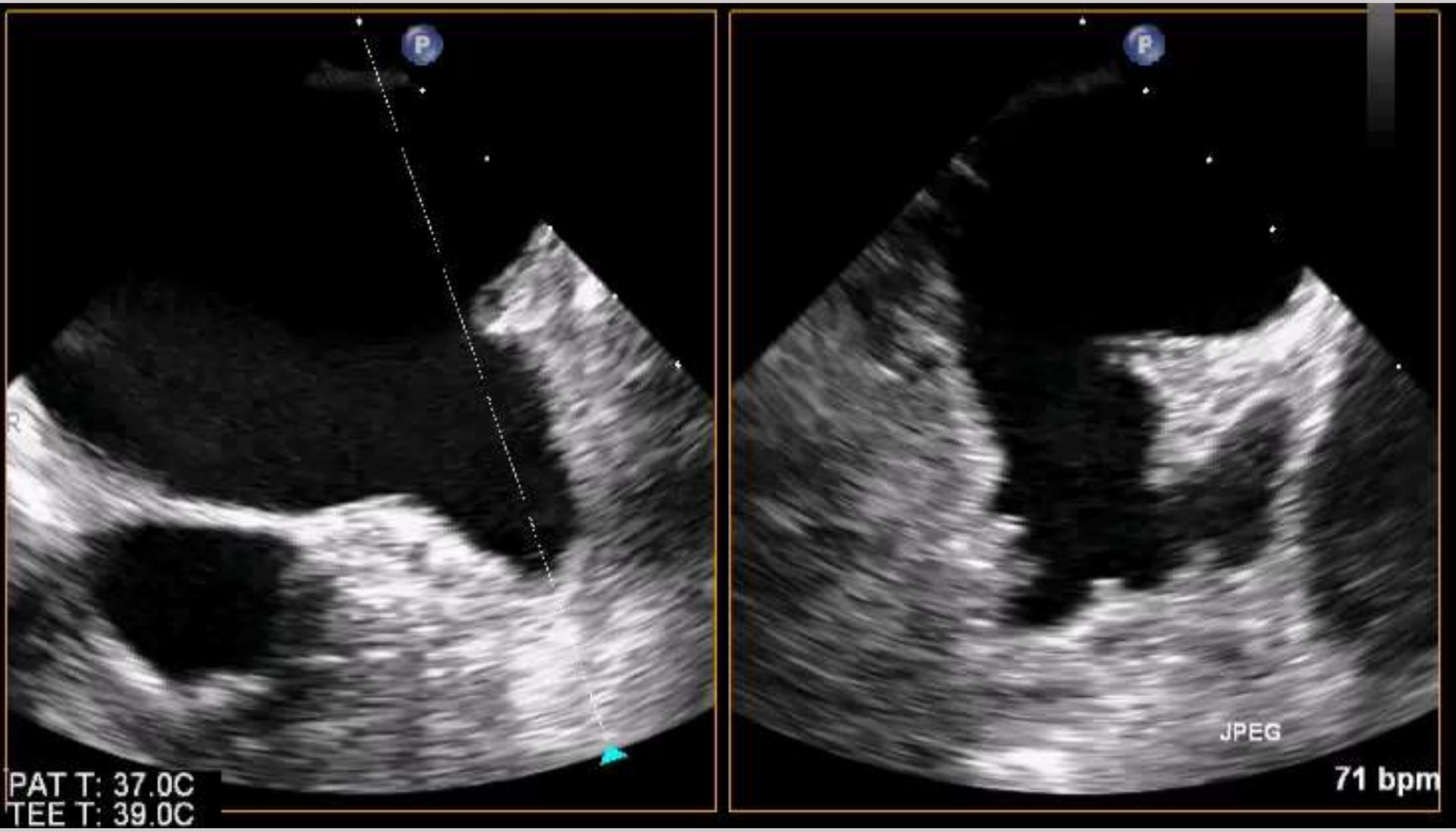
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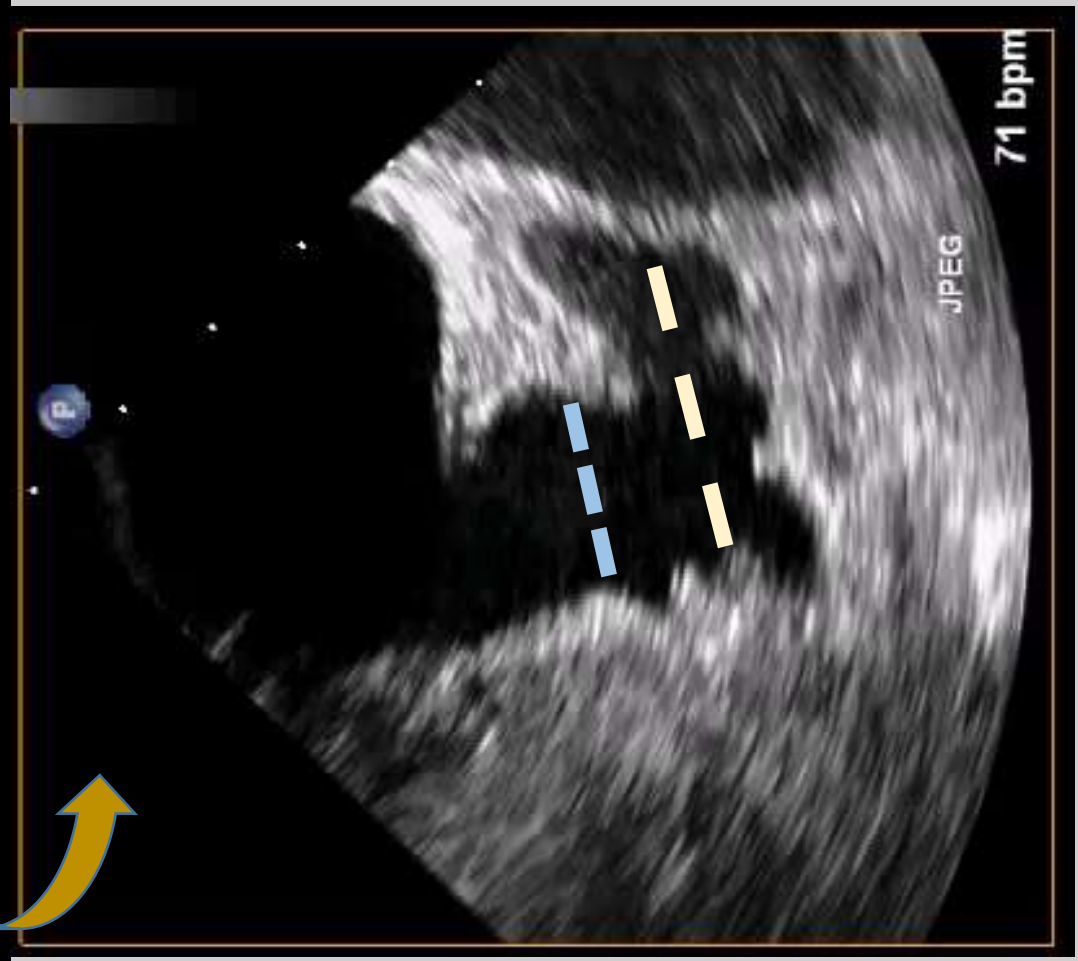
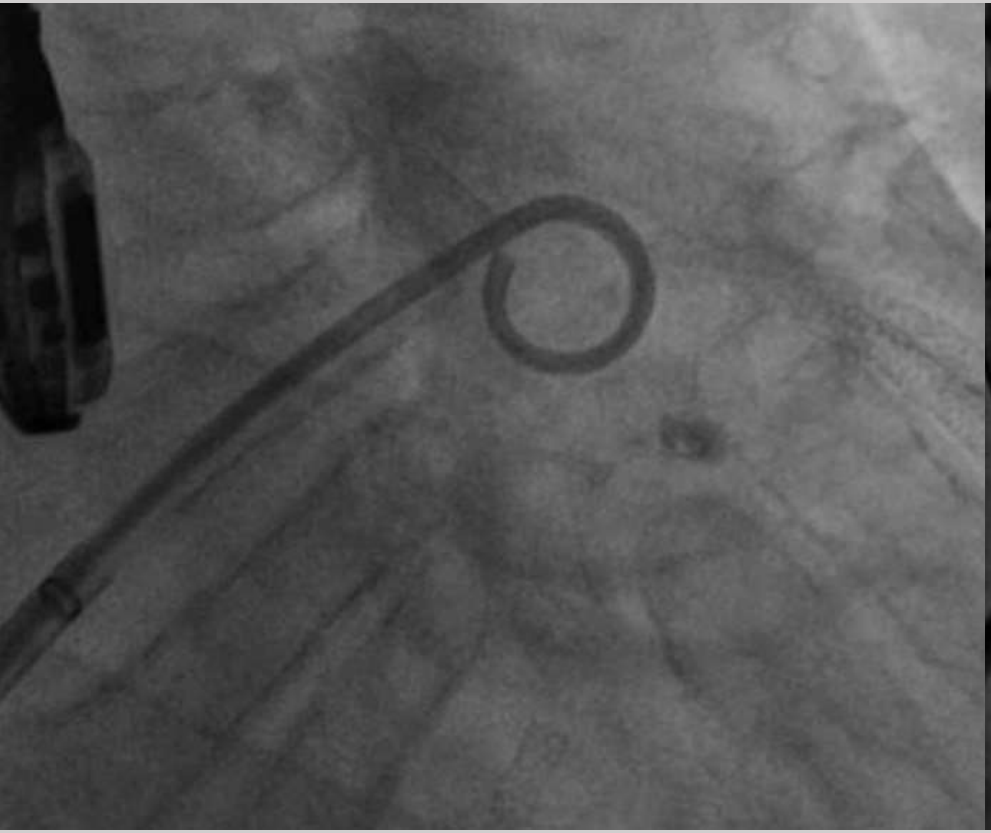
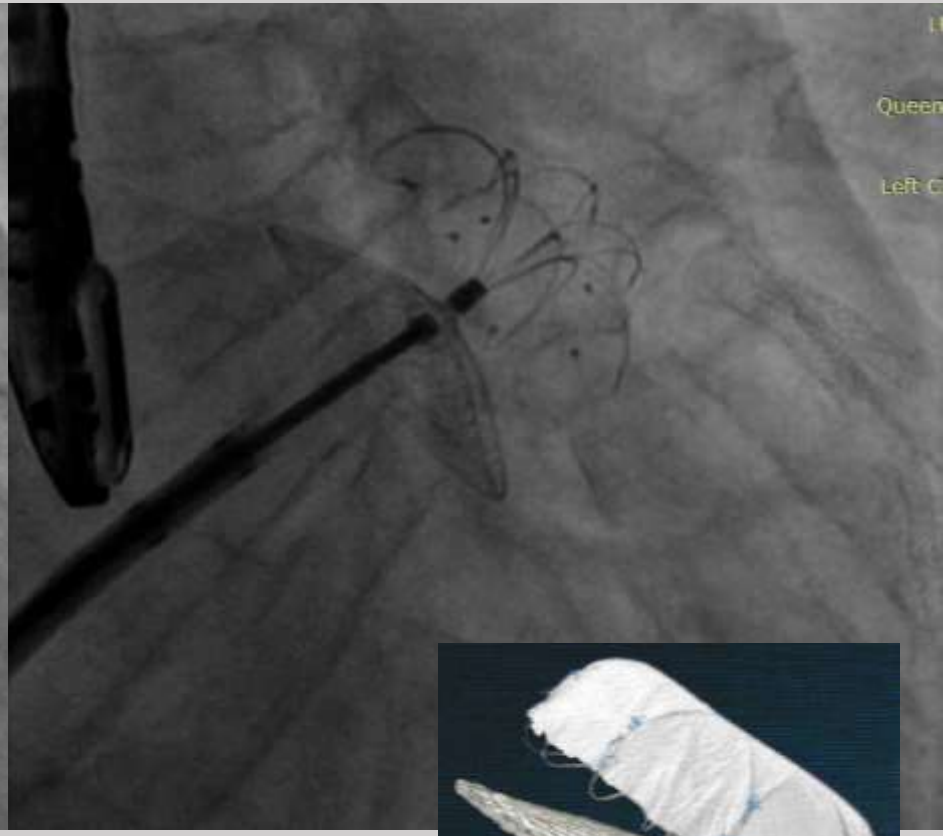
TEE T: 39.0C
JPEG
71 bpm



TEE 135 correlates with RAO 30 CRAU 20




Queen
Left C


PHILIPS
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X7-2t/Adult
FR 81Hz
7.9cm
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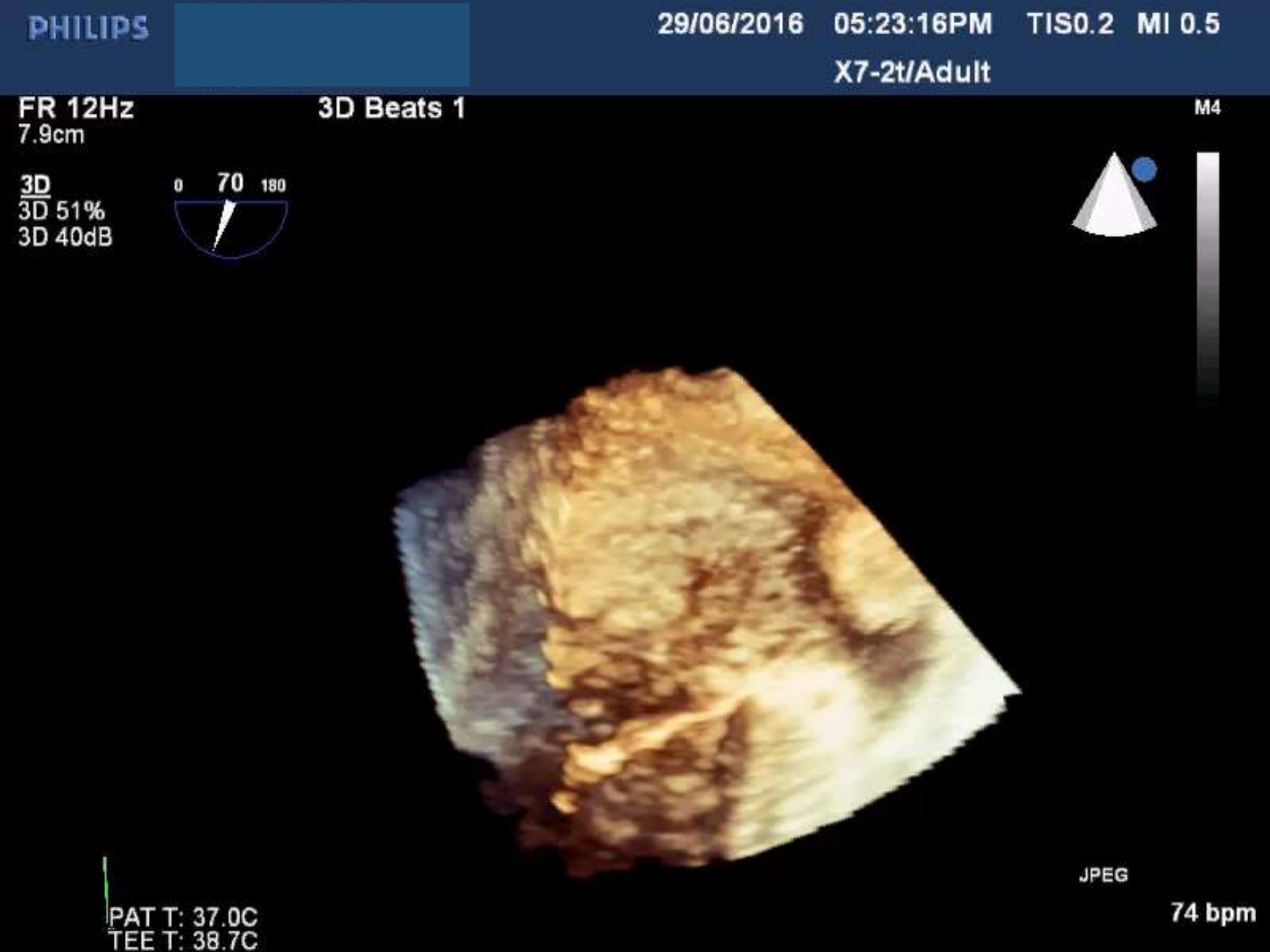
C 50
P Off
Gen
0 70 180
G
P R
JPEG
66 bpm
PAT T: 37.0C
TEE T: 39.0C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M4
3D
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3D 40dB
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JPEG
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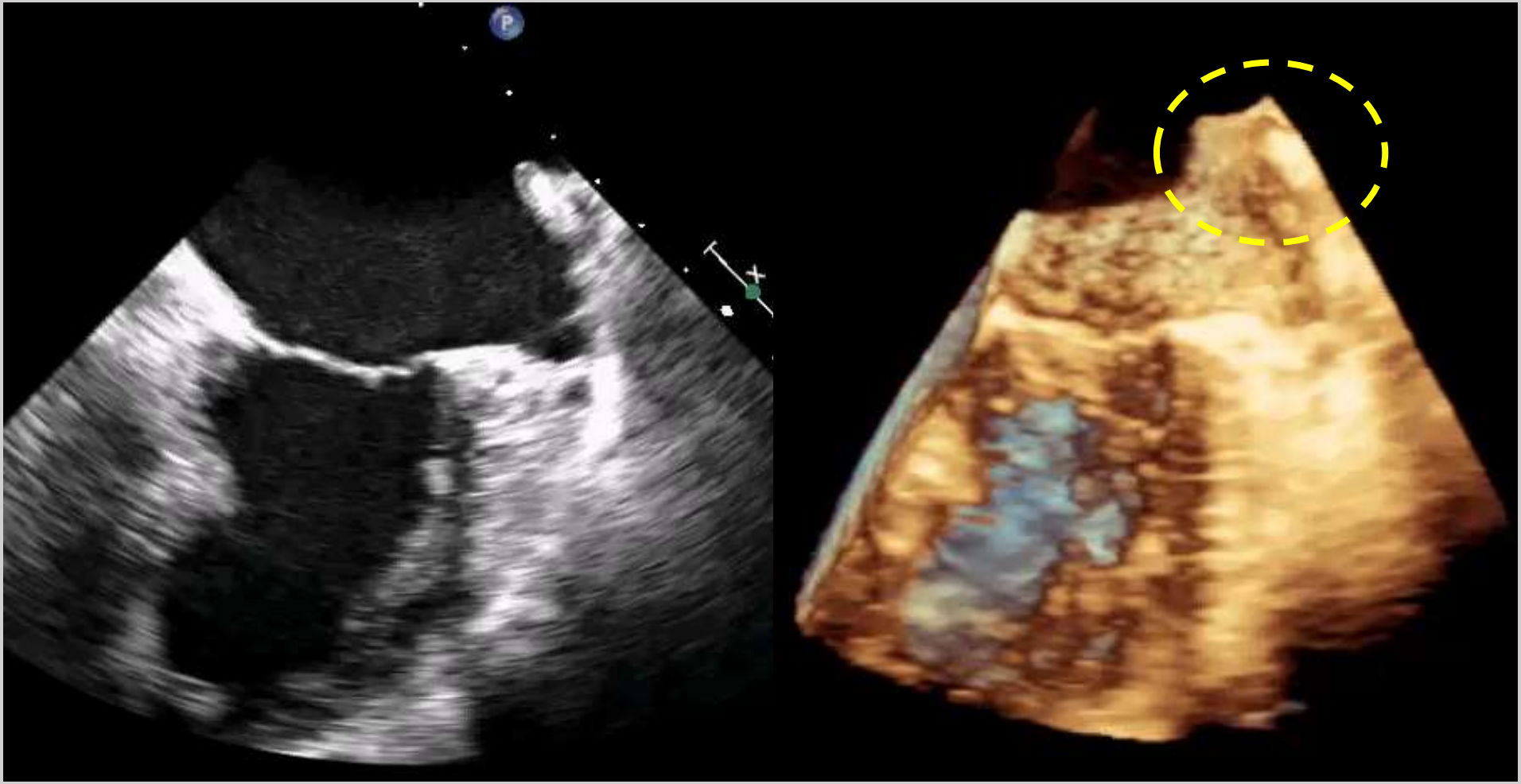
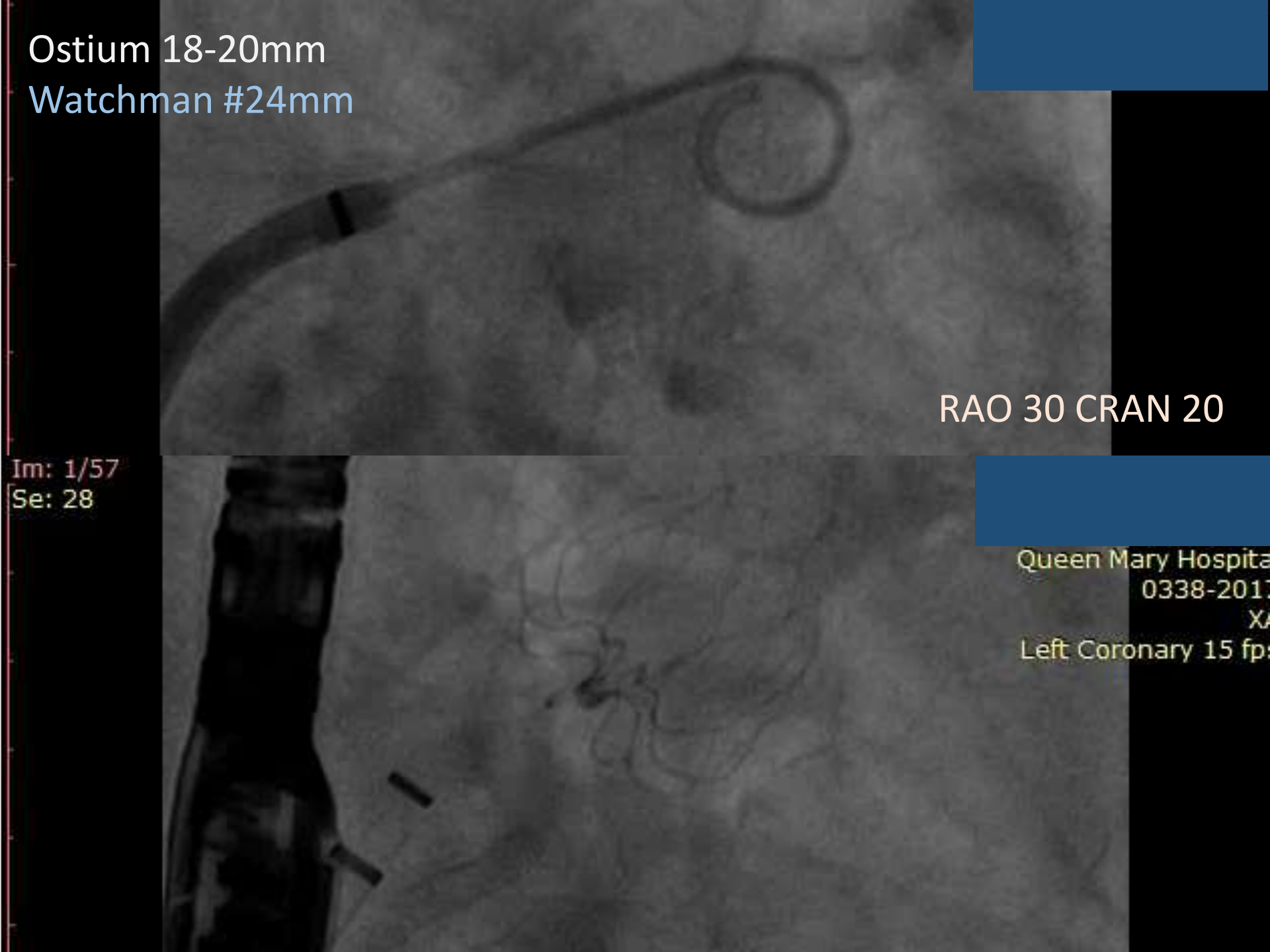
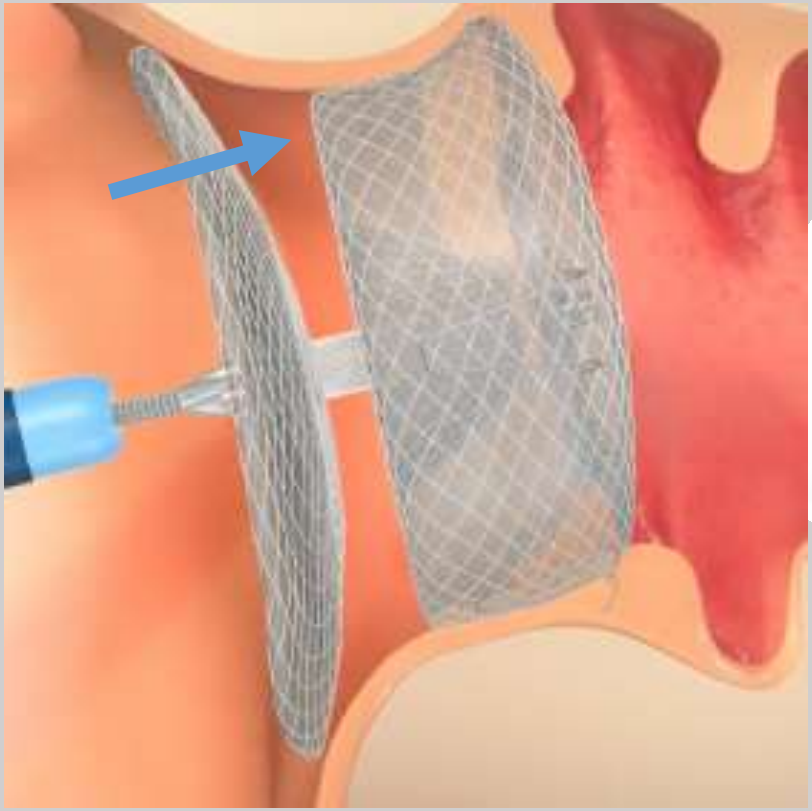
TEE T: 38.7C

After 6M Therapeutic Warfarin

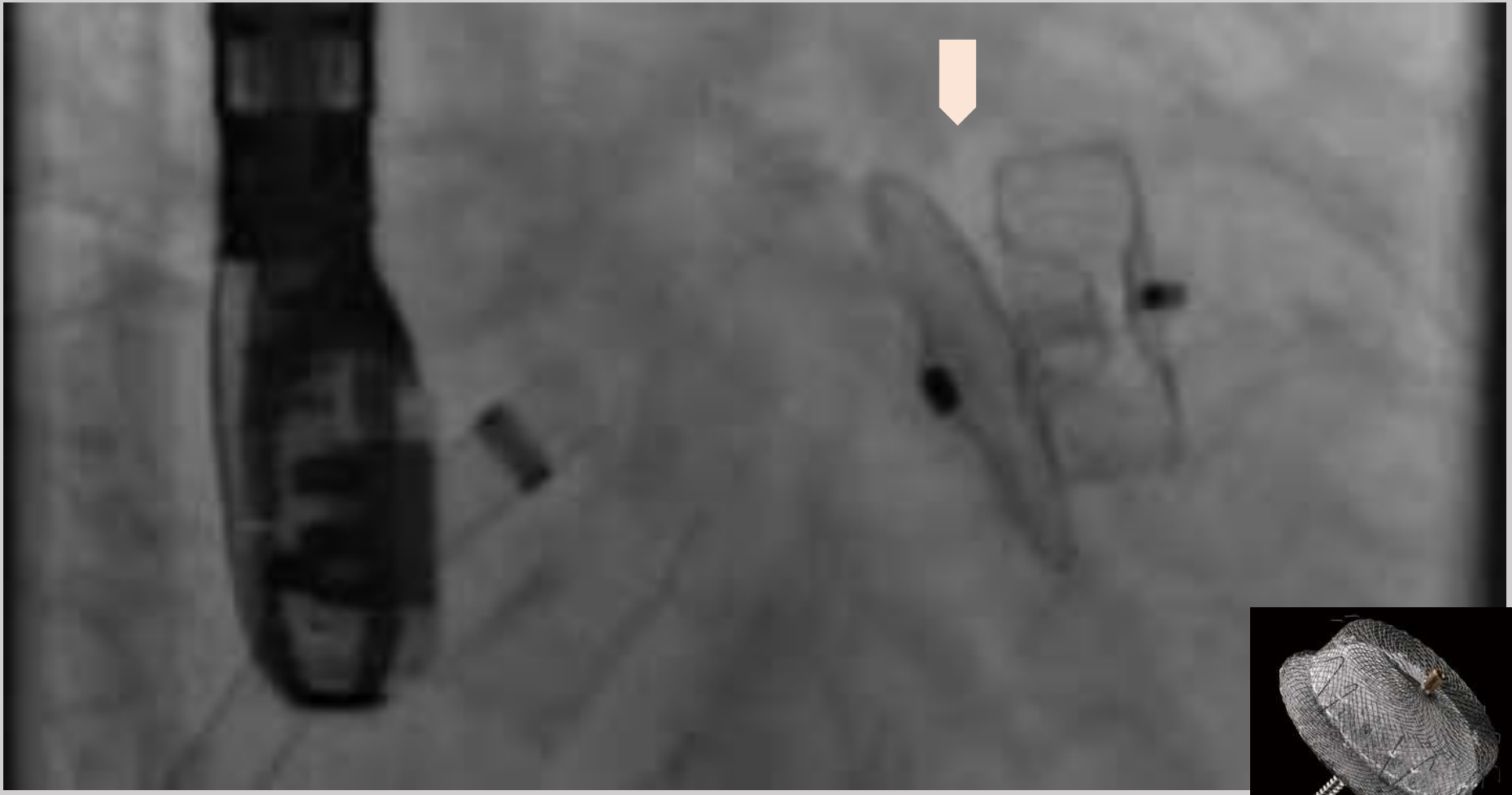



Ostium 18-20mm
Watchman #24mm
RAO 30 CRAN 20
Im: 1/57
Se: 28
Queen Mary Hospita
0338-201
X
Left Coronary 15 fp

2 Component Disc Type Devices

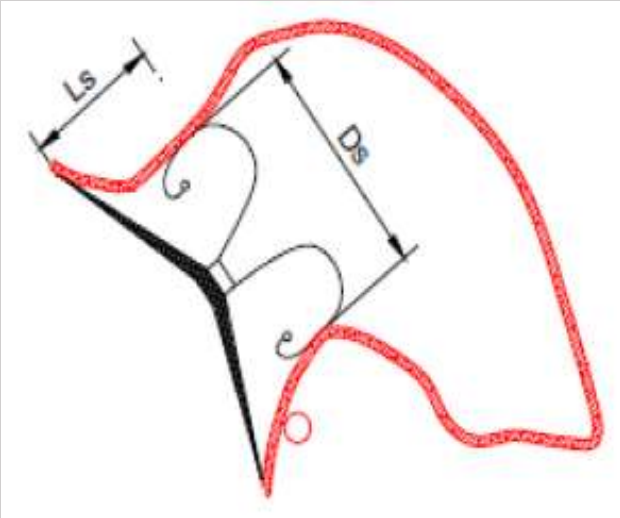


AMULET #22mm

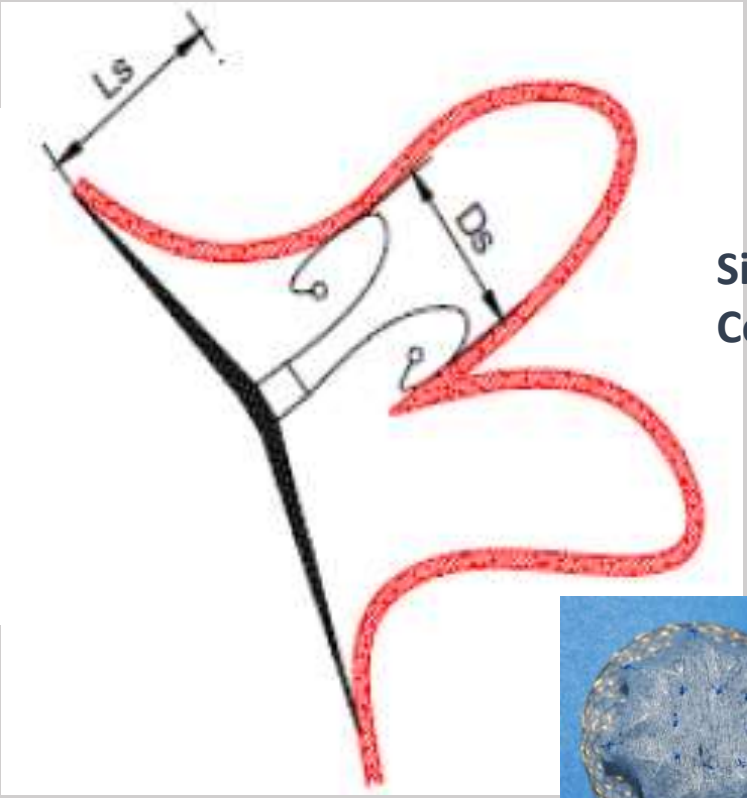


Special LAA Morphology

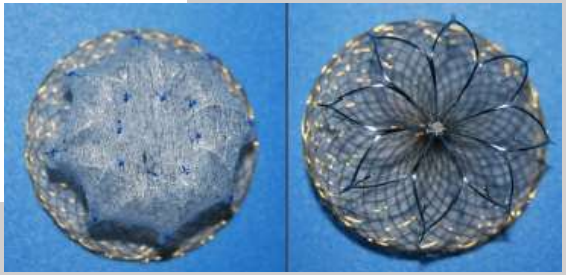
- Small LAA
- LAA with multiple lobes and restrictive septum
- Special design of **LAmbre Device**

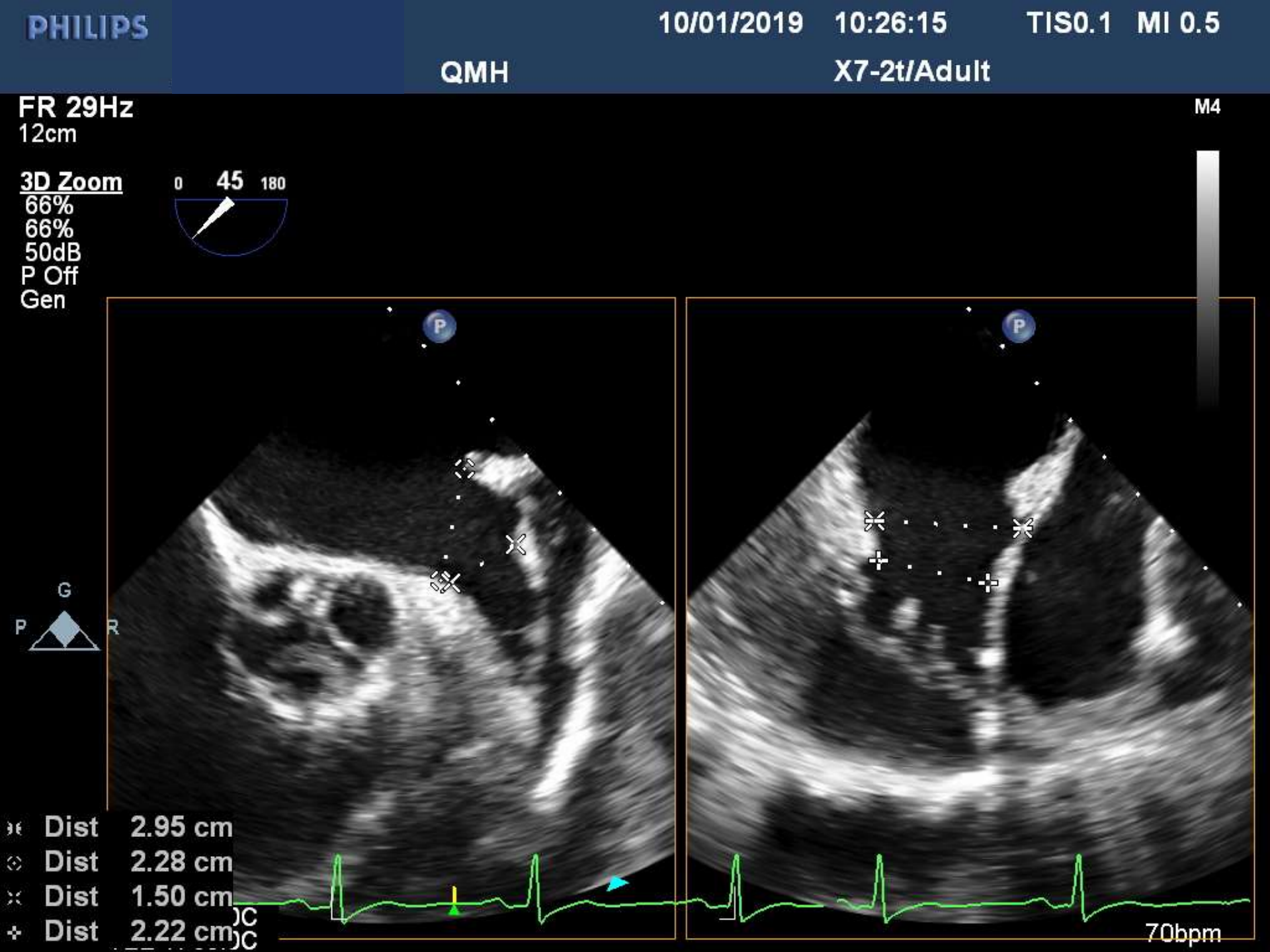


Size: 16-36mm
Cover 4-6mm larger



Size: 16-26mm
Cover 12mm larger

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X7-2t/Adult
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12cm
M4
3D Zoom
66%
66%
50dB
P Off
Gen
0 45 180
G
P
R
Dist 2.95 cm
Dist 2.28 cm
Dist 1.50 cm
Dist 2.22 cm
70bpm


PHILIPS
10/01/2019 10:27:13 TIS0.2 MI 0.5
X7-2t/Adult
FR 14Hz
7.9cm
3D Beats 1
M4
3D
3D 47%
3D 40dB
0 45 180
JPEG
70 bpm
PAT T: 37.0C
TEE T: 38.7C


Im: 1/51
Se: 7
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CRA: 20


Im: 1/72
Se: 8
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20


Im: 1/1
Se: 7
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
A: 19.69 mm
B: 28.74 mm
WL: 512 WW: 1024 [D]
CF 0.1346 mm/pix
12/4/2019 12:16:48 PM


Im: 1/1
Se: 8
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
A: 17.58 mm
D: 12.32 mm
C: 11.02 mm
E: 15.40 mm
B: 26.75 mm
WL: 512 WW: 1024 [D]
CF: 0.1305 mm/pix
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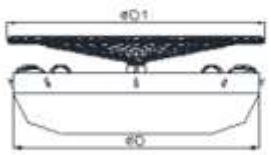
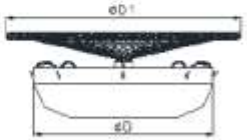
Device Sizes and Corresponding Delivery Systems of LAmbre





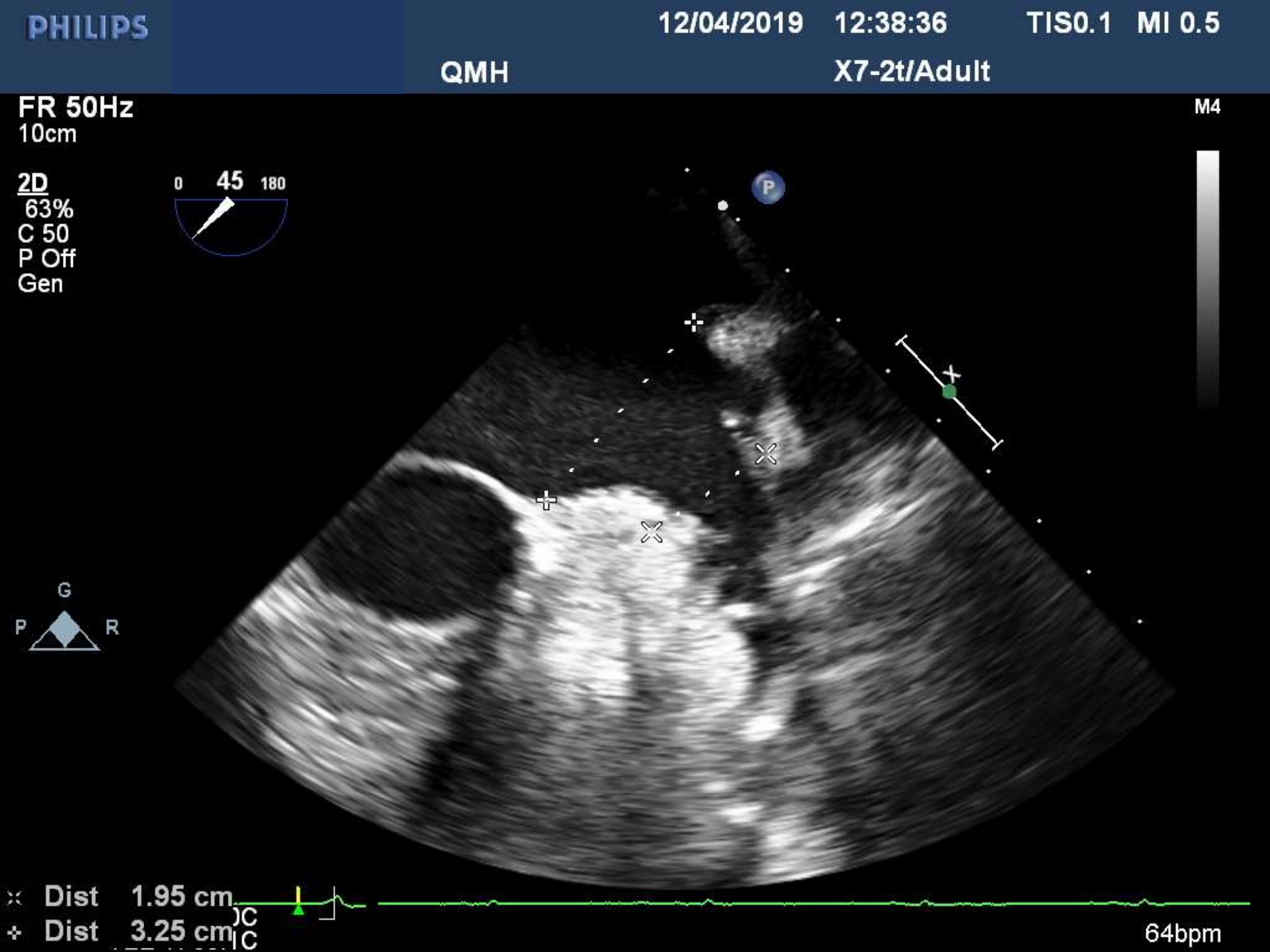
Cat.	Diameter of Umbrella(mm)	Diameter of Cover(mm)	Delivery system
LT-LAA-1622	16	22	8F-900 9F-900 10F-900
LT-LAA-1824	18	24	
LT-LAA-2026	20	26	9F-900 10F-900
LT-LAA-2228	22	28	
LT-LAA-2430	24	30	
LT-LAA-2632	26	32	10F-900
LT-LAA-2834	28	34	
LT-LAA-3036	30	36	
LT-LAA-3236	32	36	
LT-LAA-3438	34	38	
LT-LAA-3640	36	40	

Cat.	Diameter of Umbrella(mm)	Diameter of Cover(mm)	Delivery system
LT-LAA-1630	16	30	9F-900 10F-900
LT-LAA-1832	18	32	
LT-LAA-2032	20	32	
LT-LAA-2234	22	34	10F-900
LT-LAA-2436	24	36	
LT-LAA-2638	26	38	

- Ostium max 28mm
- Anterior lobe 17mm
- Disc selection = 28 + 5 (round up) to 33
- Lobe/umbrella selection = 33-6 = 27 or 33-12 = 21

- Selection LAMBRE 22/34mm or LAMBRE 20/32

(Special device)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C 50
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Gen
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G
P R
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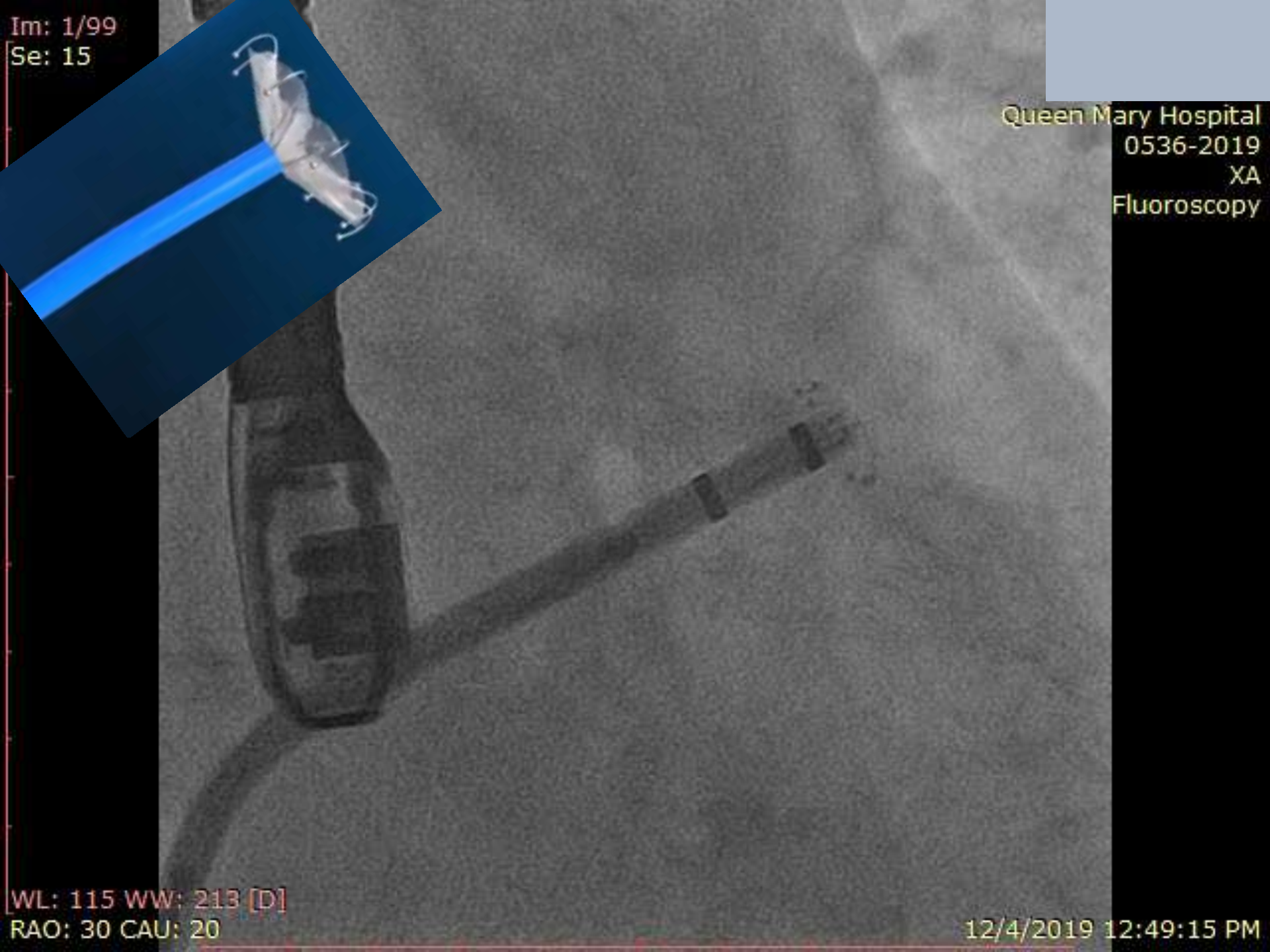
Dist 3.25 cm
64bpm


Im: 1/99
Se: 15
Queen Mary Hospital
0536-2019
XA
Fluoroscopy
WL: 115 WW: 213 [D]
RAO: 30 CAU: 20
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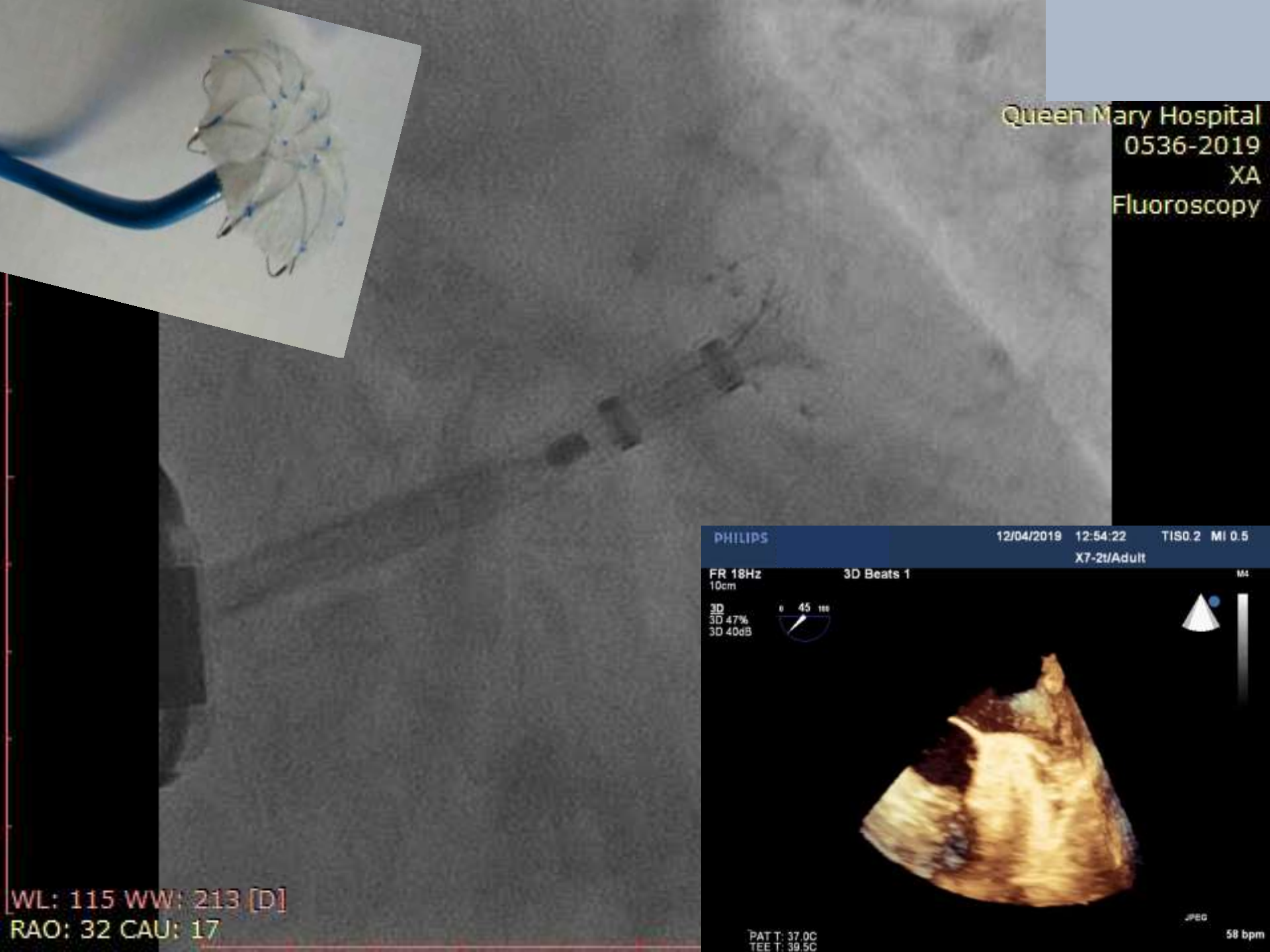
Queen Mary Hospital
0536-2019
XA
Fluoroscopy
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TIS0.2 MI 0.5
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10cm
3D Beats 1
3D
3D 47%
3D 40dB
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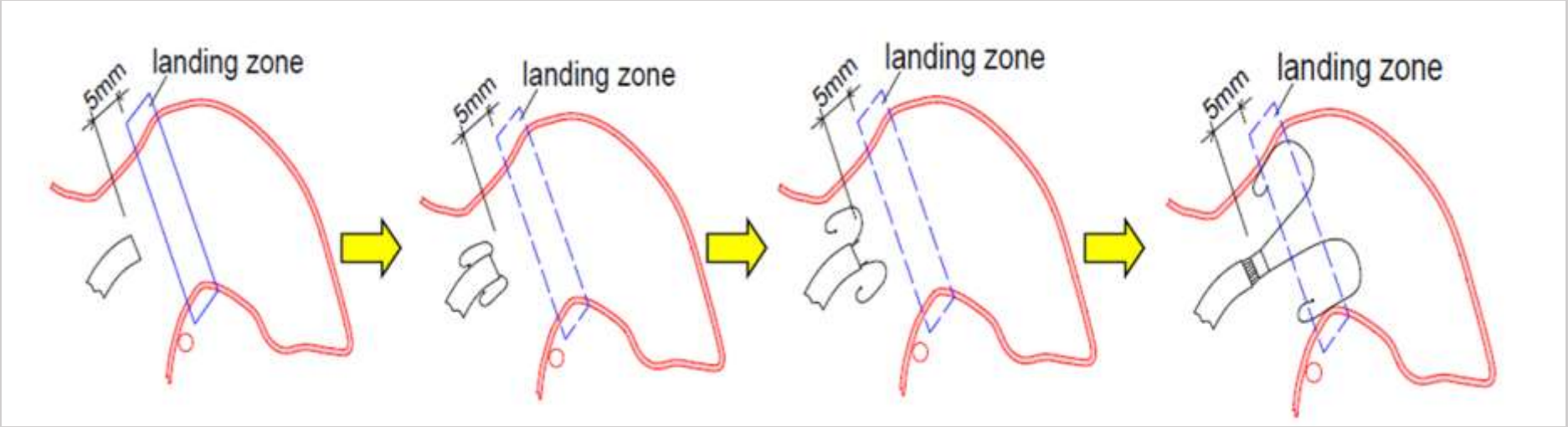
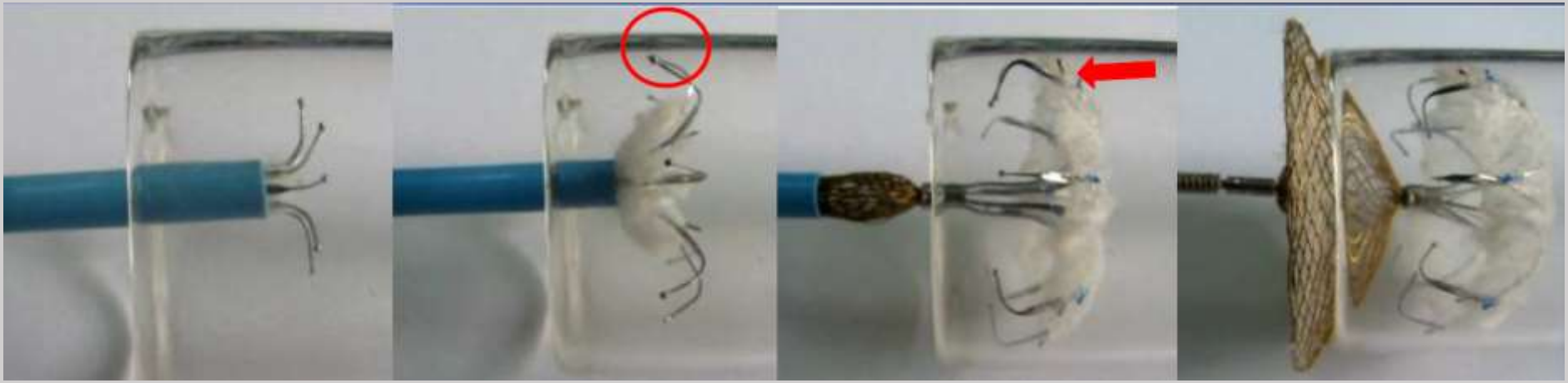
JPEG
PAT T: 37.0C
TEE T: 39.5C
58 bpm
WL: 115 WW: 213 [D]
RAO: 32 CAU: 17

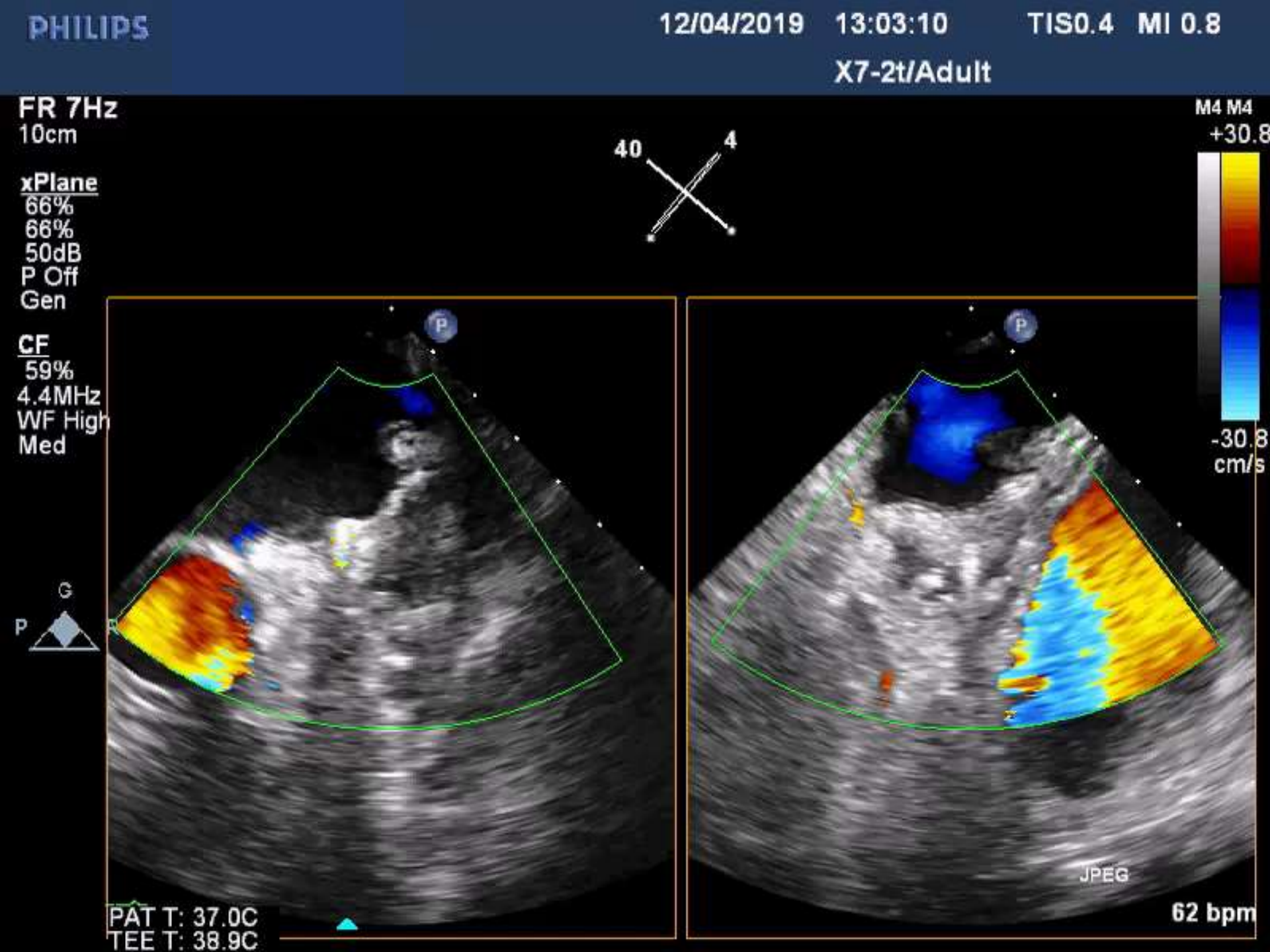
Deployment of Umbrella/Lobe





Im: 1/17
Se: 19
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
LAMBRE #22/34mm
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
12/4/2019 12:55:24 PM


PHILIPS
12/04/2019 12:55:27 TIS0.1 MI 0.5
X7-2t/Adult
FR 50Hz
10cm
M4
2D
63%
C 50
P Off
Gen
0 45 180
G
P R
JPEG
71 bpm
PAT T: 37.0C
TEE T: 38.9C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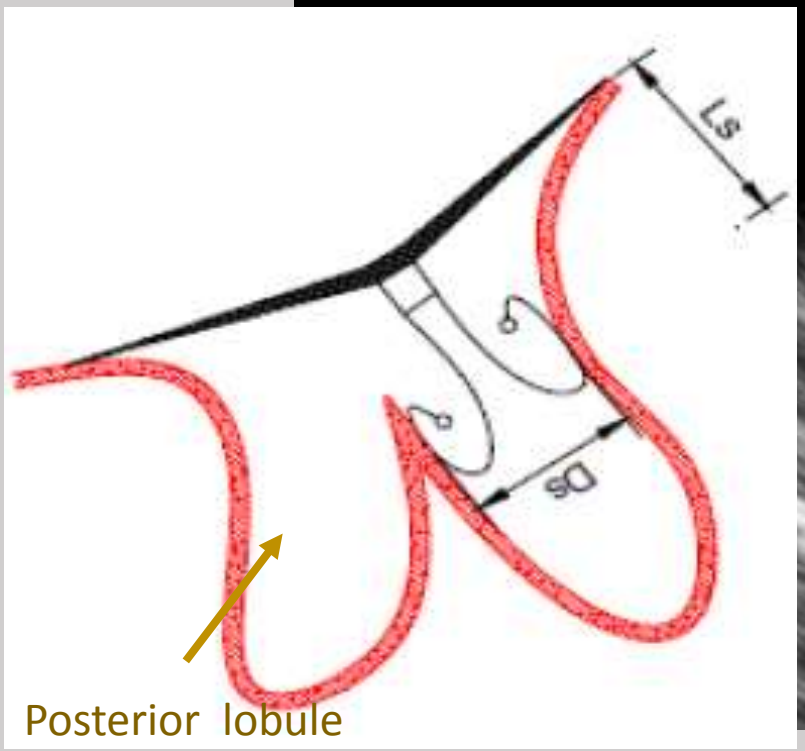
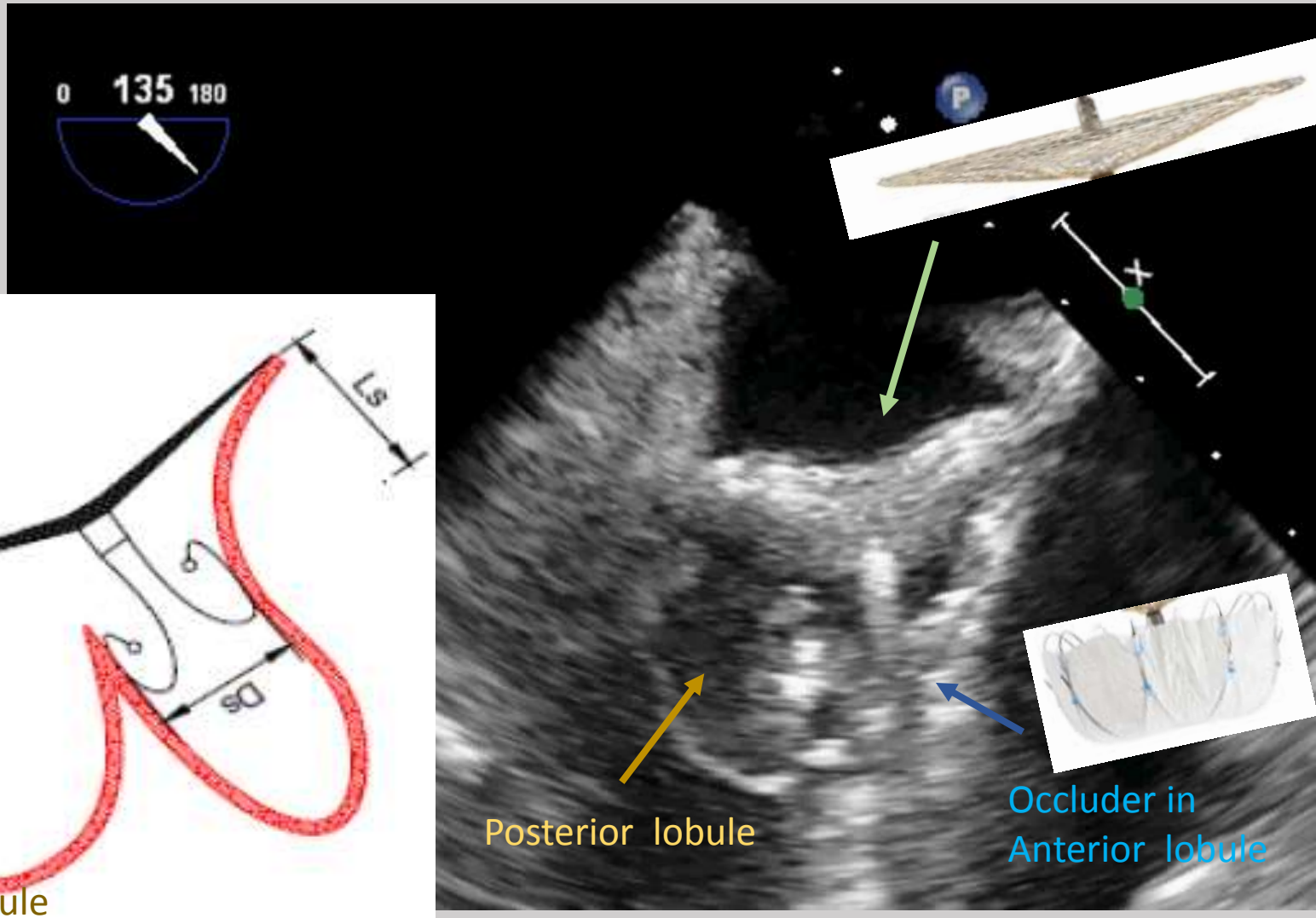
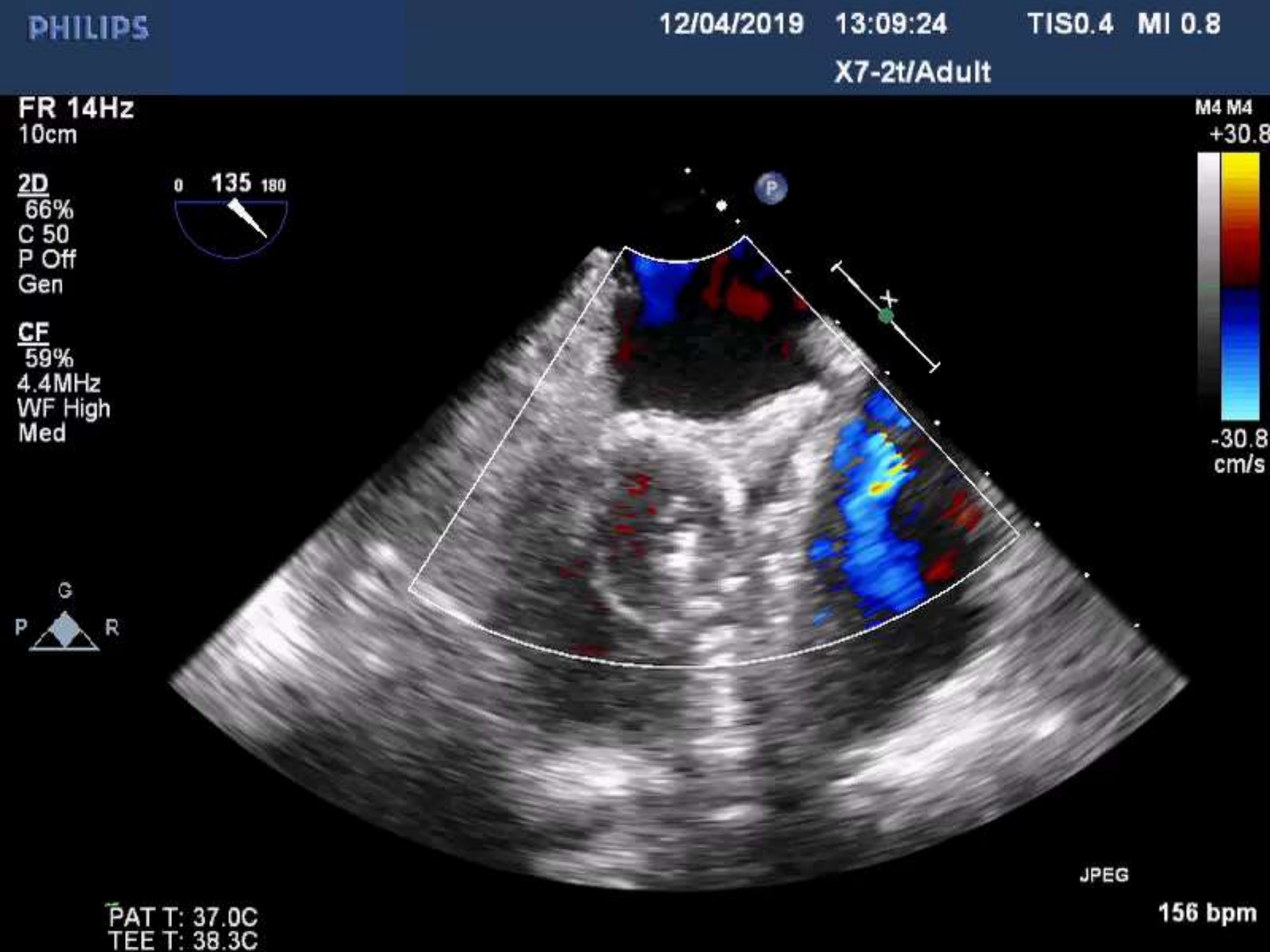
X7-2t/Adult
FR 7Hz
10cm
xPlane
66%
66%
50dB
P Off
Gen
CF
59%
4.4MHz
WF High
Med
40
4
M4 M4
+30.8
-30.8
cm/s
G
P
JPEG
62 bpm
PAT T: 37.0C
TEE T: 38.9C

Im: 90/248
Se: 22
Queen Mary Hospital
0536-2019
XA
Fluoroscopy
LAMBRE #22/34mm
WL: 115 WW: 213 [D]
RAO: 30 CAU: 20
12/4/2019 12:56:51 PM

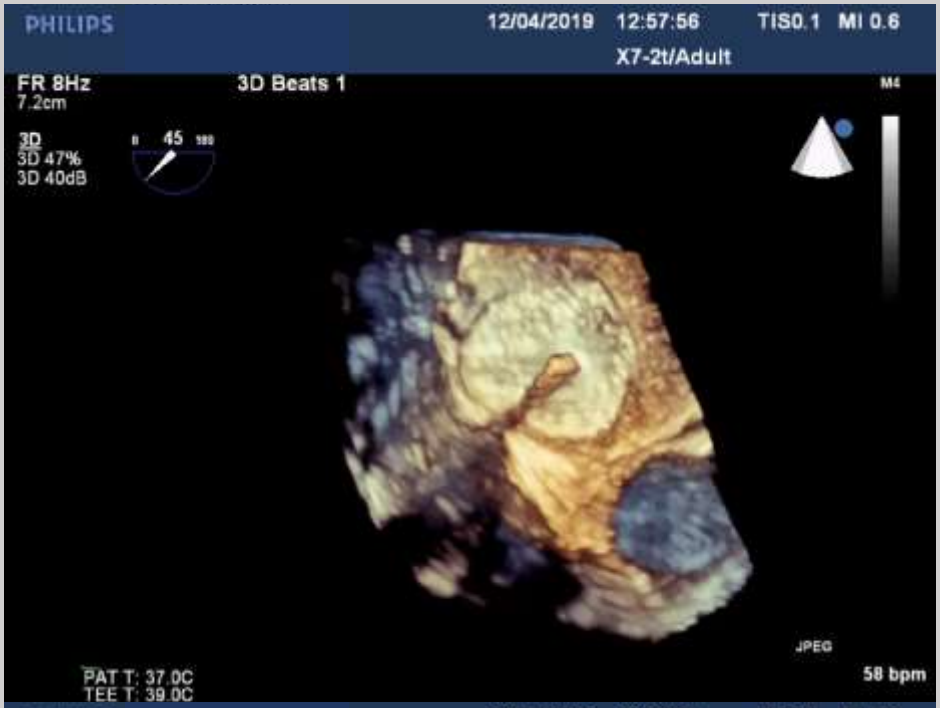
Im: 1/48
Se: 26
Queen Mary Hospital
0536-2019
XA
Left Coronary 15 fps
LAMBRE #22/34mm
WL: 129 WW: 190 [D]
RAO: 30 CAU: 20
12/4/2019 1:00:15 PM


LS
SD
Posterior lobule

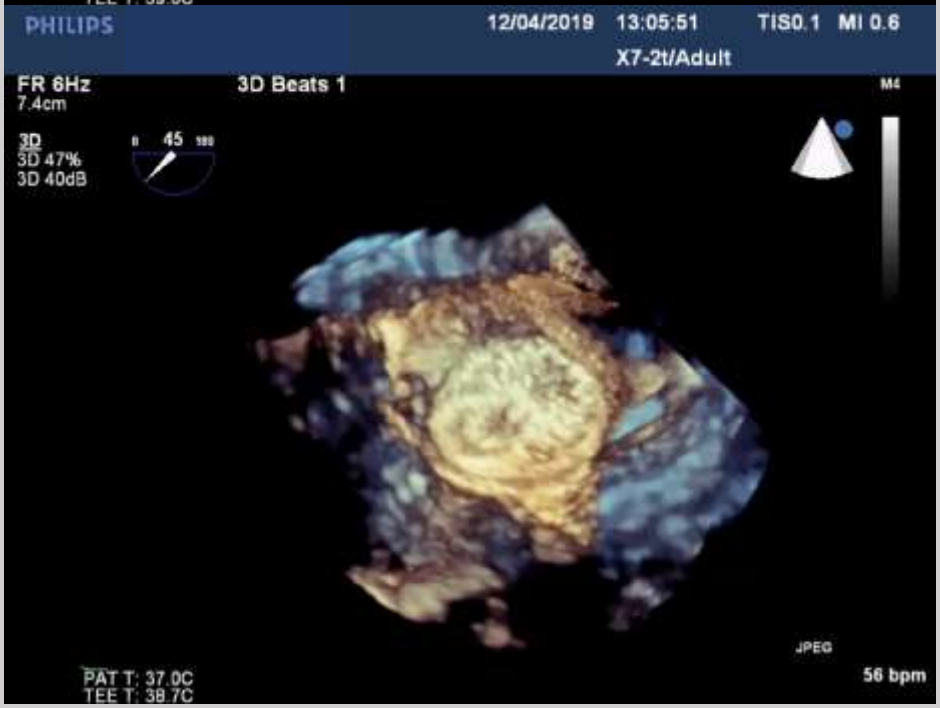

0
135
180
P
Posterior lobule
Occluder in
Anterior lobule


PHILIPS
12/04/2019 13:09:24 TIS0.4 MI 0.8
X7-2t/Adult
FR 14Hz
10cm
2D
66%
C 50
P Off
Gen
CF
59%
4.4MHz
WF High
Med
0 135 180
M4 M4
+30.8
-30.8
cm/s
G
P
R
JPEG
PAT T: 37.0C
TEE T: 38.3C
156 bpm


PHILIPS
12/04/2019 12:55:11 TIS0.2 MI 0.5
X7-2t/Adult
FR 9Hz
7.1cm
3D Beats 1
M4
3D
3D 47%
3D 40dB
45
JPEG
PAT T: 37.0C
TEE T: 39.5C
59 bpm

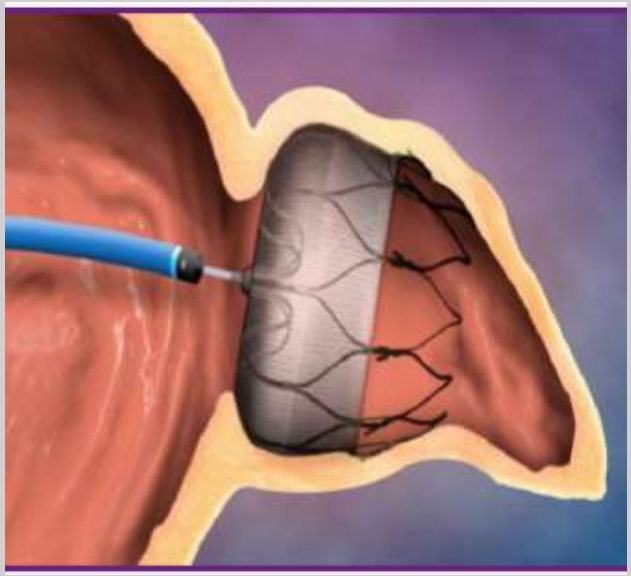

PHILIPS
12/04/2019 12:57:56 TIS0.1 MI 0.6
X7-2t/Adult
FR 8Hz
7.2cm
3D Beats 1
M4
3D
3D 47%
3D 40dB
45
JPEG
PAT T: 37.0C
TEE T: 39.0C
58 bpm

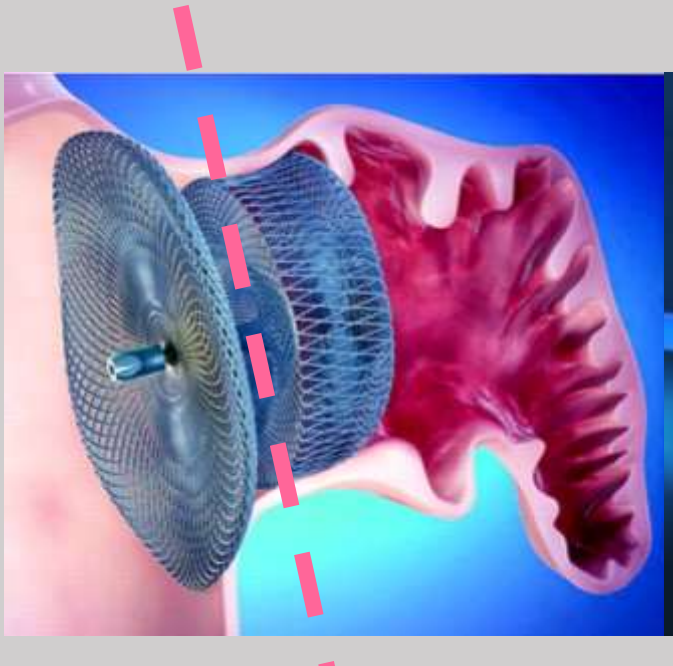

PHILIPS
12/04/2019 13:01:43 TIS0.1 MI 0.6
X7-2t/Adult
FR 5Hz
7.0cm
3D Beats 1
M4
3D
3D 47%
3D 40dB
40
JPEG
PAT T: 37.0C
TEE T: 38.9C
62 bpm

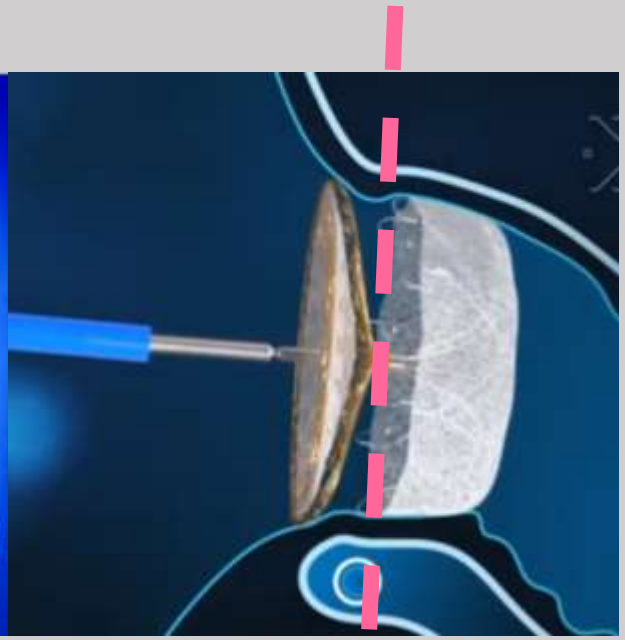

PHILIPS
12/04/2019 13:05:51 TIS0.1 MI 0.6
X7-2t/Adult
FR 6Hz
7.4cm
3D Beats 1
M4
3D
3D 47%
3D 40dB
45
JPEG
PAT T: 37.0C
TEE T: 38.7C
56 bpm

Preservation of LAA ostium for future AF ablation

- Non-disc type of device –Favourable
  - Watchmen
- Non-device based eg. Lariat







Other Considerations

- Recapture and repositioning
- Ease of management of device embolization
- Variety of size selection
- Introductory sheath design/choice
- Sheath size
- Ease of device preparation
- Occurrence of Leaks
- LARIAT – excluded if history of cardiac surgery
- Atricue AtriClip – no requirement for post antiplatelet/anticoagulation
- Doubt on pre-existing LAA clot

Conclusion

- Limitations of individual device exists
- In many circumstances
  - theoretical limitations can be overcome by operator skill and technique
  - limitations of one device can be overcome by its next generation
- No head-to-head comparison so far
- Operators' familiarity with, personal preference and accessibility to a device may also play a role
- Cost
- Potential for tailor made device in future (?)

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