

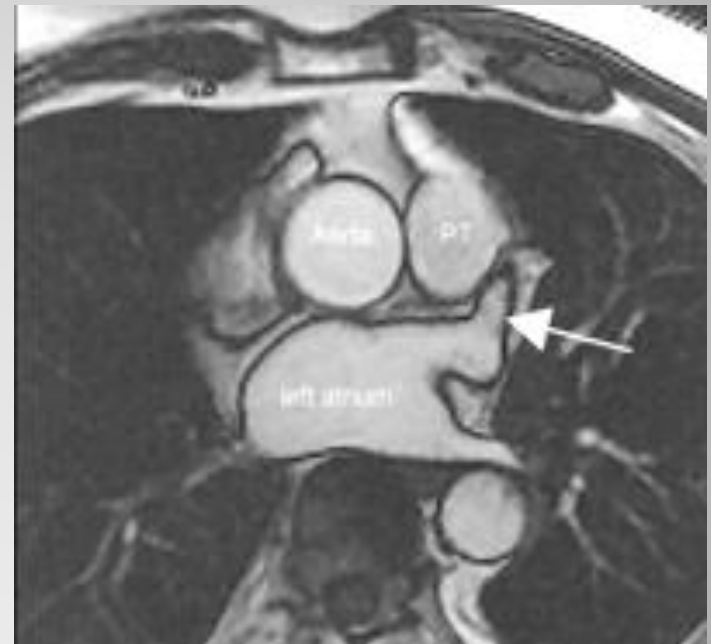
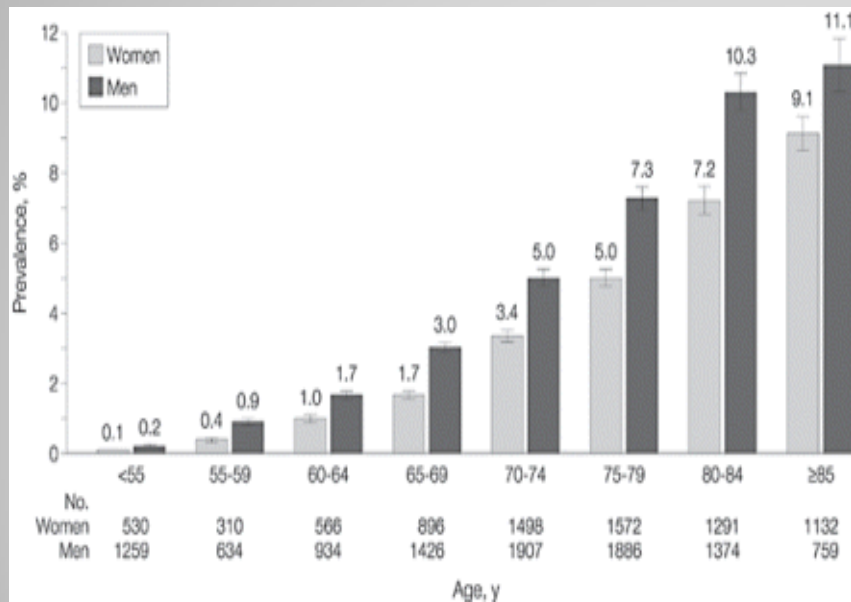
Periprocedurální TEE vyšetření ouška levé síně a navigace u katetrizačních uzávěrů

T. Mráz, P. Henyš, P. Neužil

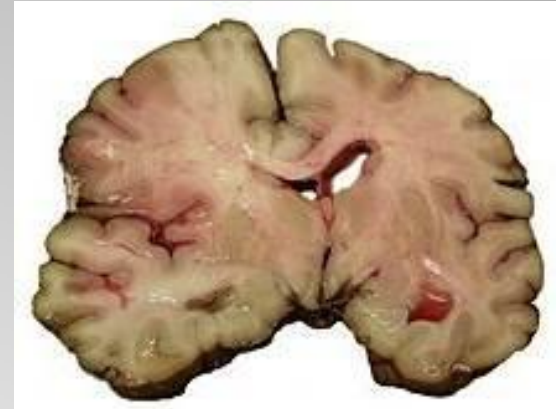


Fibrilace síní

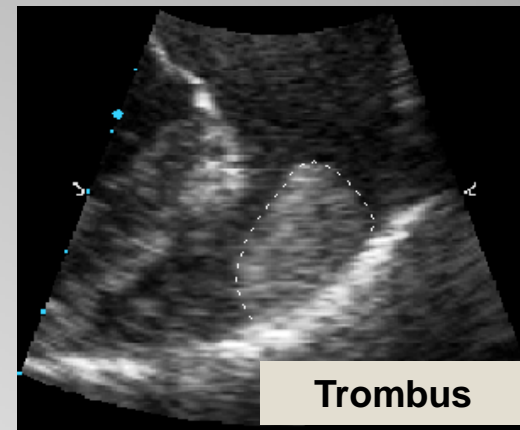
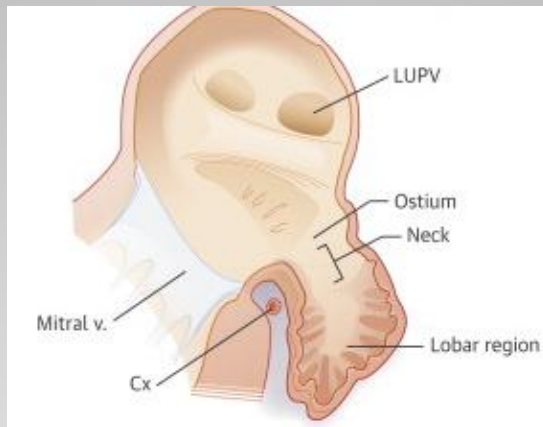
- je nejčastěji se vyskytující arytmií v populaci
- pacienti s fibrilací síní mají až 5x vyšší riziko mozkové příhody
- s věkem se prevalence zvyšuje



Kardioembolizační CMP



Ouško levé síně: nejčastější zdroj tromboembolie



Trombus

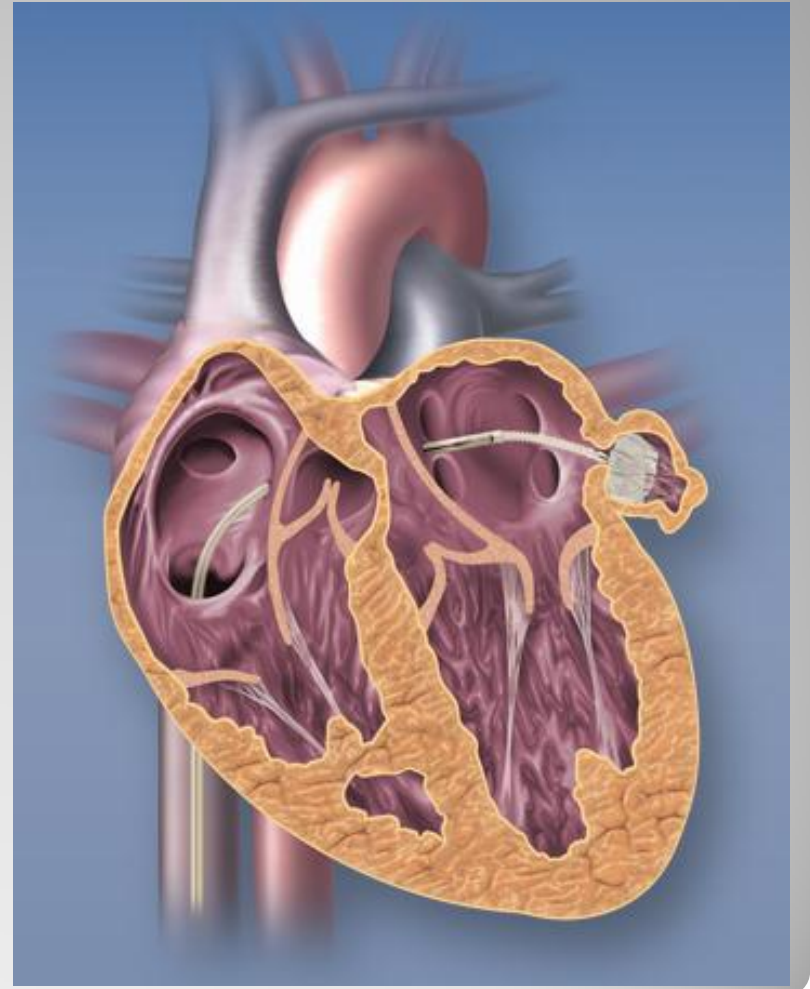
Lokalizace prokazatelných trombů (non-revmatic FA)

Studie	Celkem # trombů LAA a LS	Pouze LAA		Pouze LS		Reference
		Počet	%	Počet	%	
TEE	67	66	99%	1	1.5%	Stoddard, JACC '95
TEE	35	34	97	1	2.9	Manning, Circulation '94
Autopsy	47	35	74	12	25.5	Aberg, Acta. Med. Scan. '69
TEE	4	2	50	2	50.0	Tsai, JFMA '90
TEE	13	12	92	1	7.7	Klein, Int J. Card. Imag. '93
TEE & operation	11	8	73	3	27.3	Manning, Circulation '94
SPAF III ¹ & TEE	20	19	95	1	5.0	Klein, Circulation '94
TEE	19	19	100	0	0.0	Leung, JACC '94
TEE	6	6	100	0	0.0	Hart, S stroke '94
Celkem	222	201	91%	21	9.5%	

ESC Guidelines

Perkutánní okluze ouška levé síně může být zvažena u nemocných s vysokým rizikem CMP a kontraindikací pro dlouhodobou perorální antikoagulační léčbu

**třída indikace IIb
úroveň důkazů B**

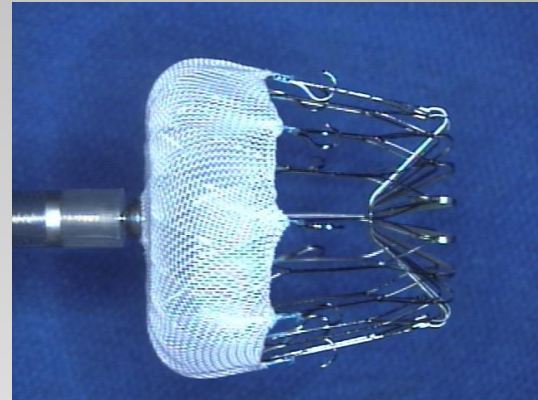


Endoluminární okludéry

PLAATO®



WATCHMAN®



Cardiac Plug®



Coherex WaveCrest®

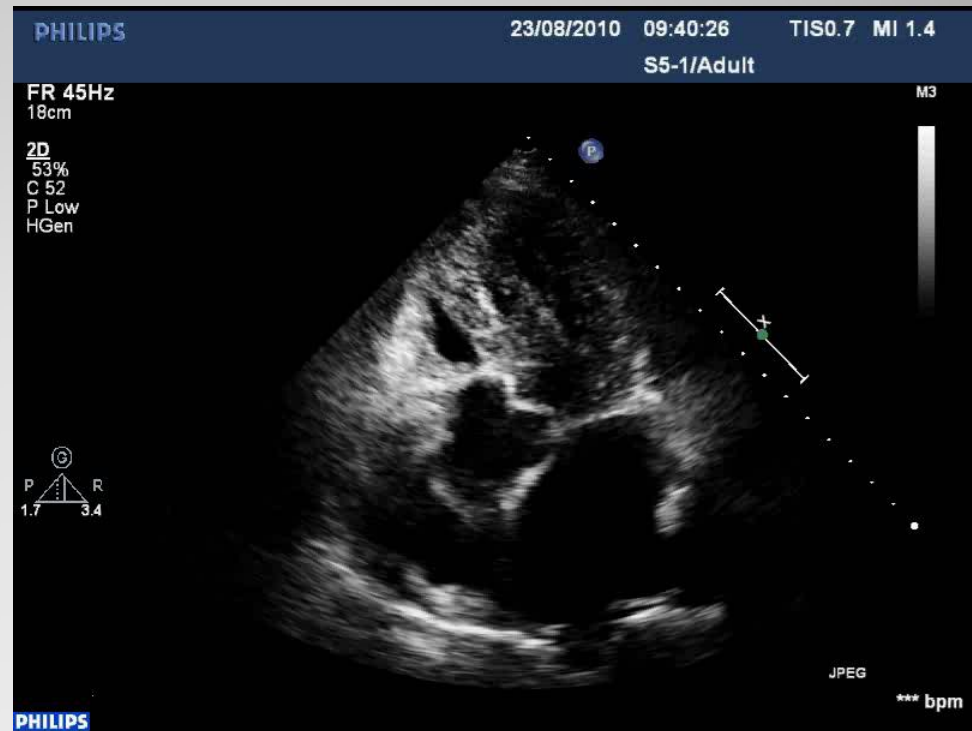


Úloha zobrazovacích metod

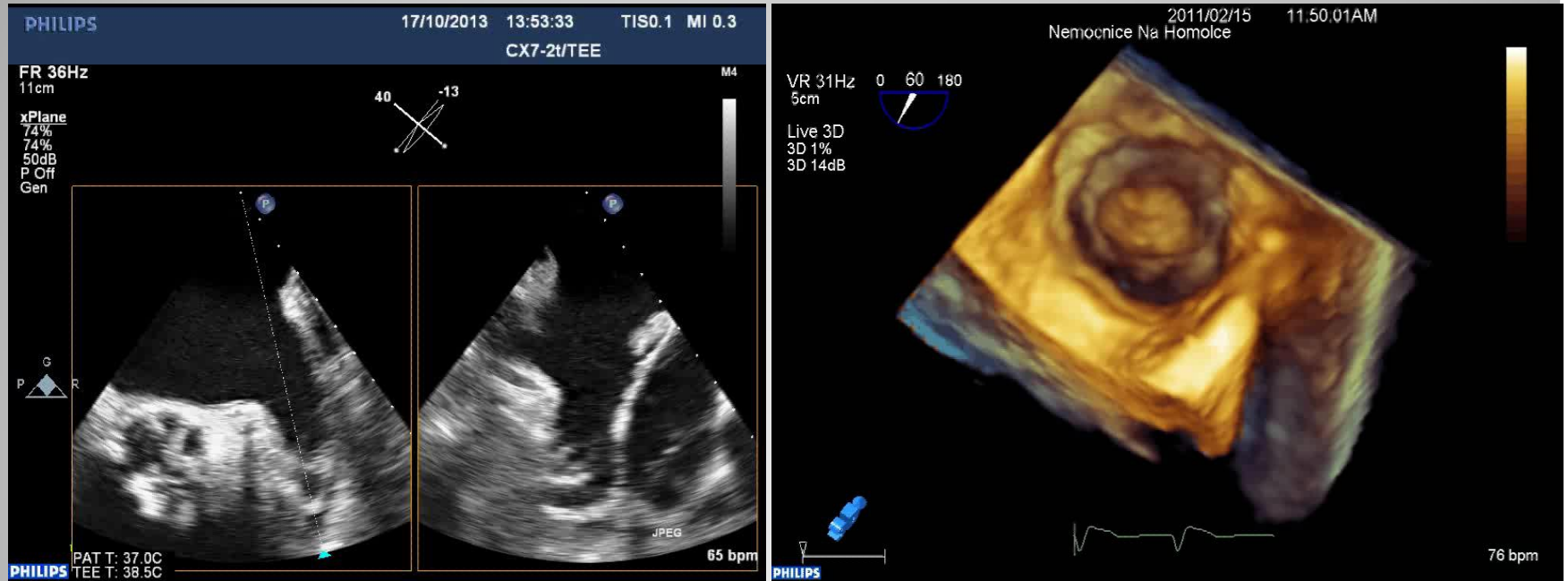
- **Preprocedurální vyšetření**
- **Zobrazení během procedury**
 - **Navigace transseptální punkce**
 - **Zobrazení během implantace okludéru**
 - **Posouzení polohy po uvolnění**
- **Následné sledování po výkonu**

Preprocedurální TTE

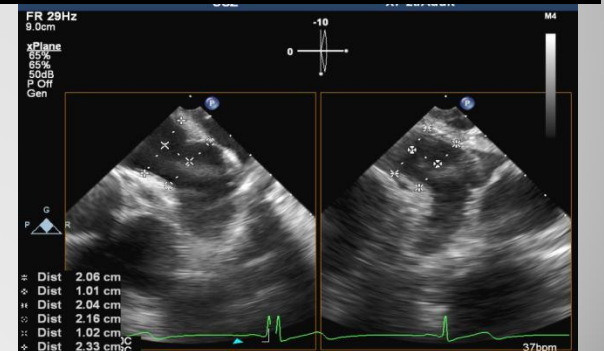
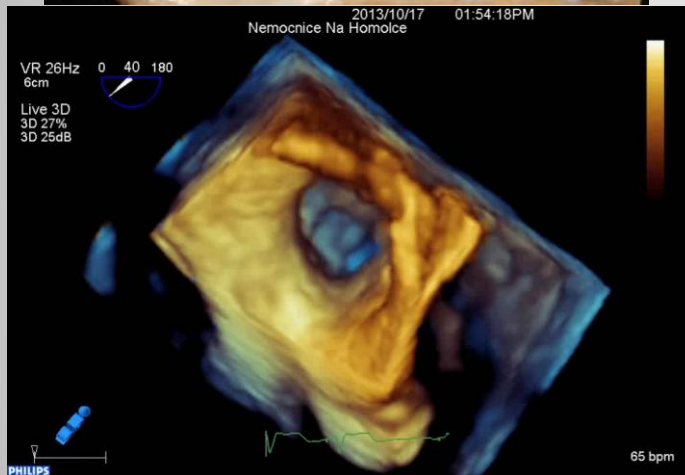
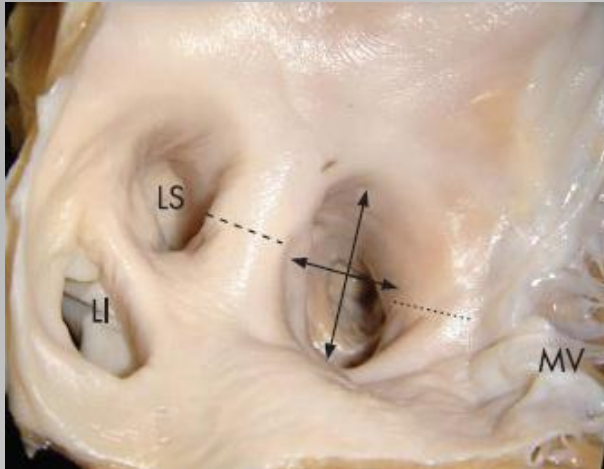
- Systolická funkce levé komory
- Velikost levé síně
- Významnost chlopenních vad
- Přítomnost perikardiálního výpotku



Trombus nebo spontánní echokontrast



Anatomie a měření ouška



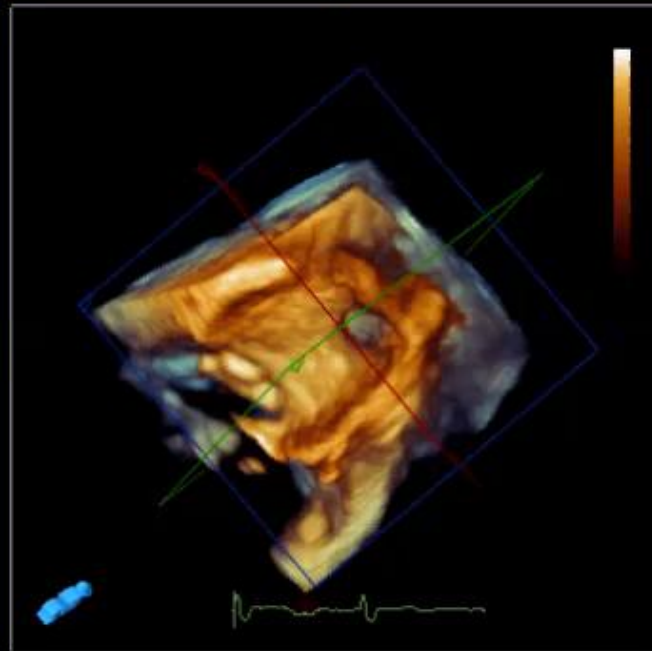
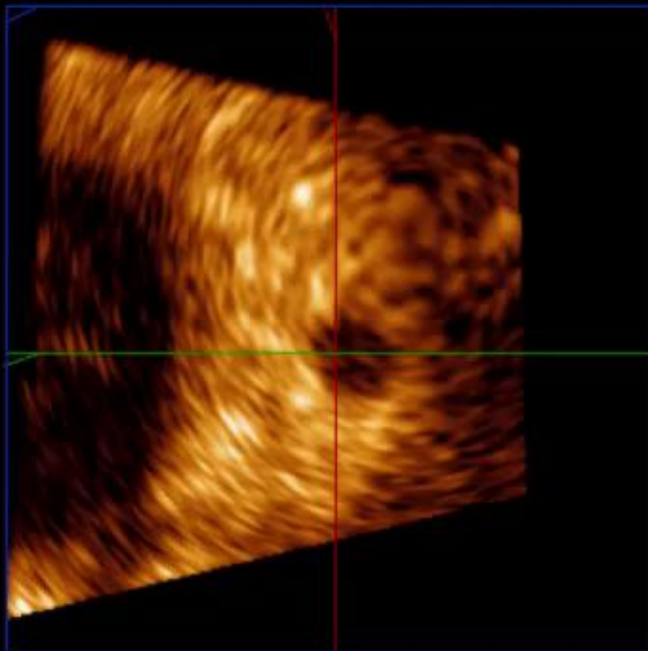
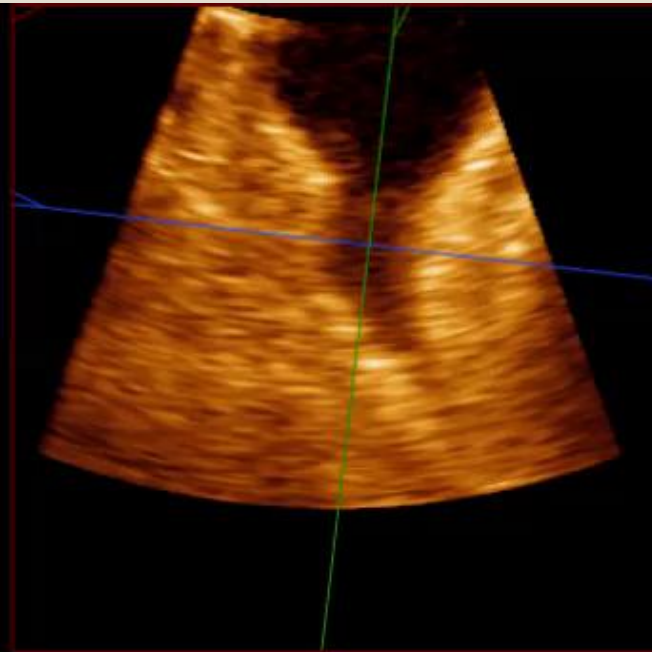
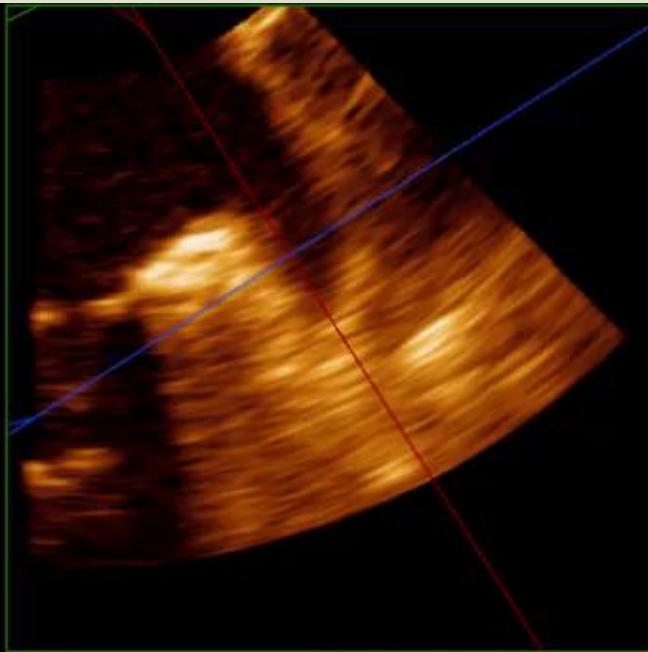
Možné důsledky zvolení špatné velikosti okludéru

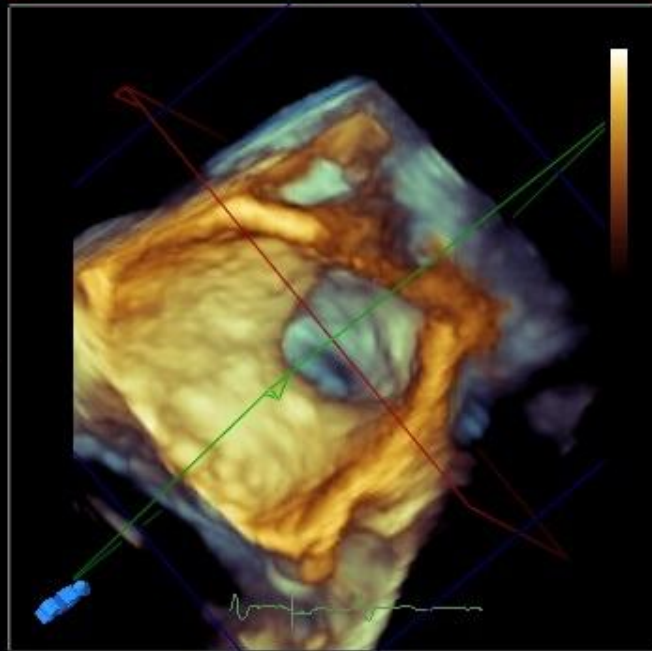
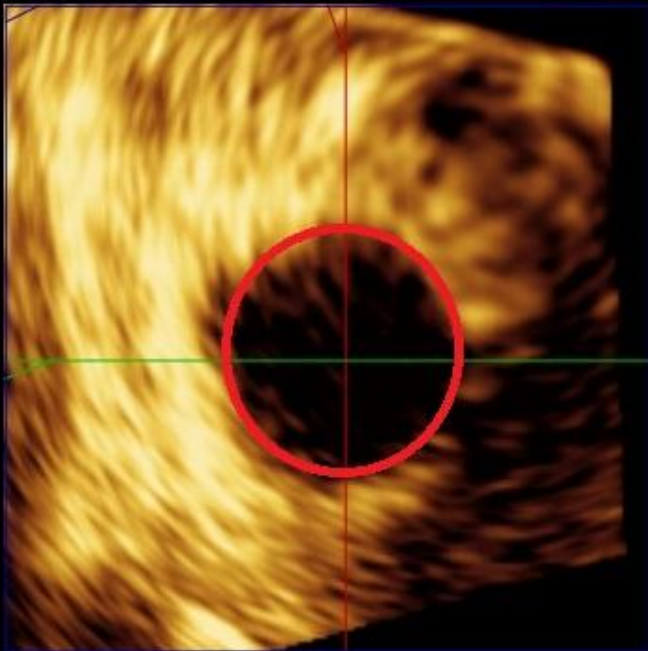
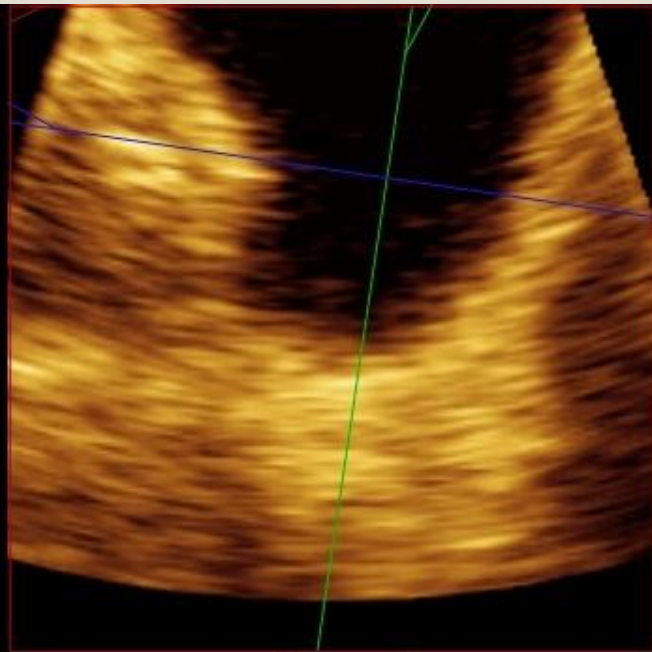
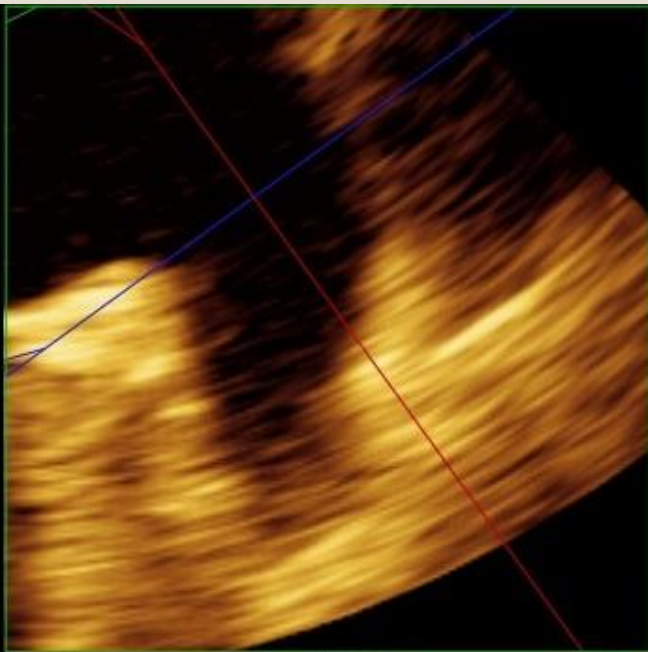
Příliš malý okludér

- Riziko migrace a embolizace okludéru
- Nebezpečí větších leaků podél okludéru

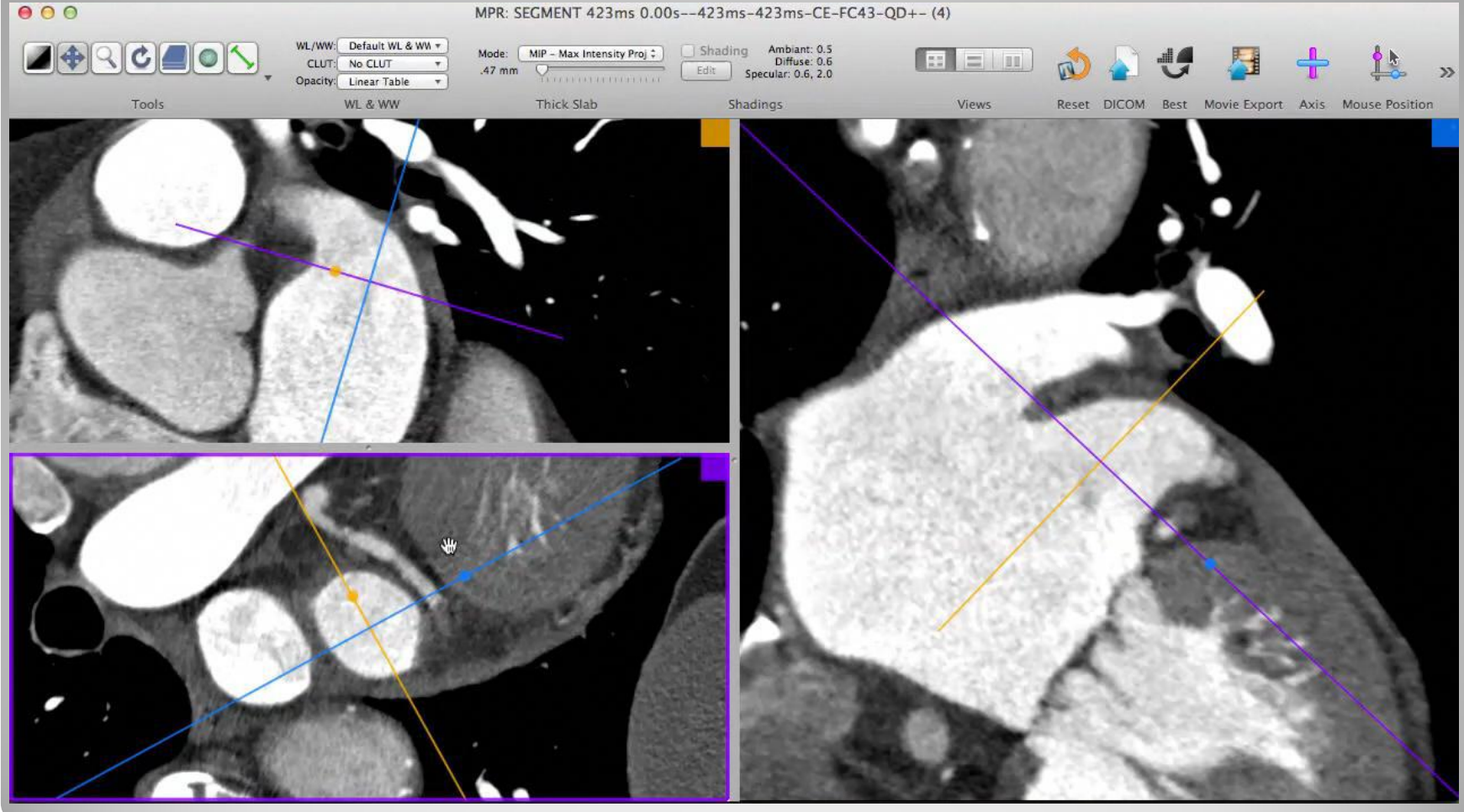
Příliš velký okludér

- Proximální pozice s nedostatečnou kompresí a rizikem embolizace
- Riziko perforace, perikardiálního výpotku a srdeční tamponády

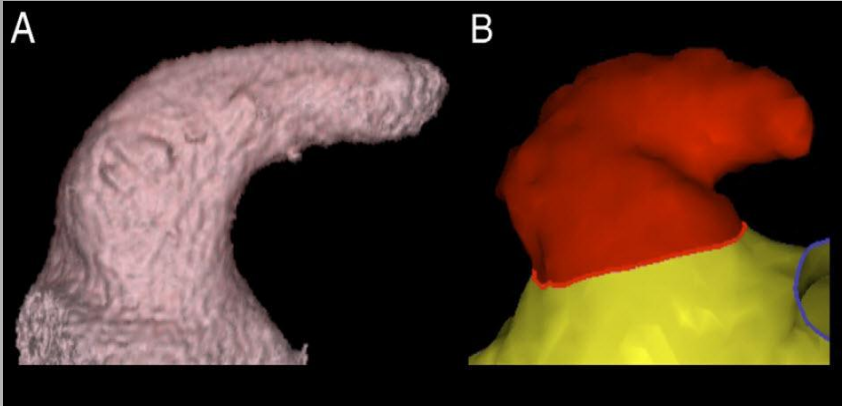




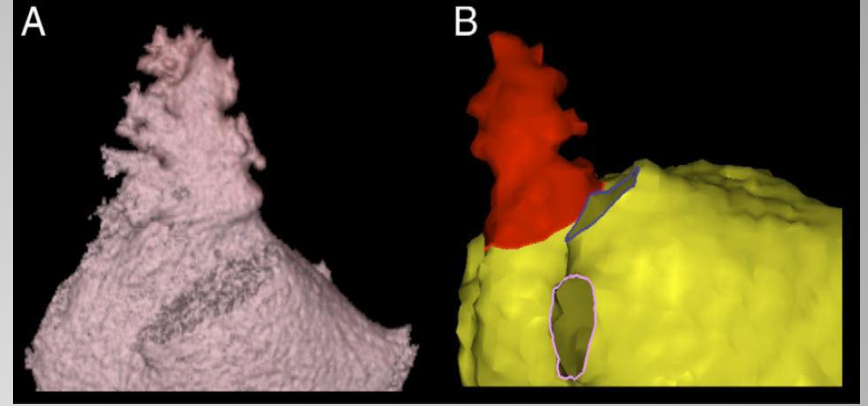
Výpočetní tomografie



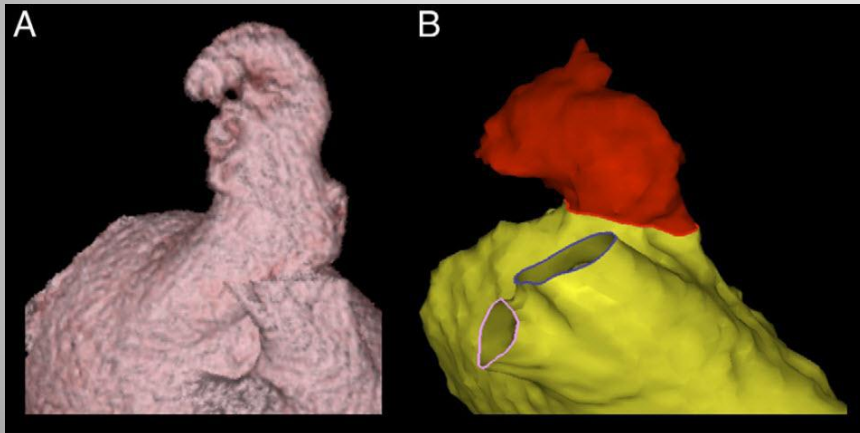
Morfologie oušek



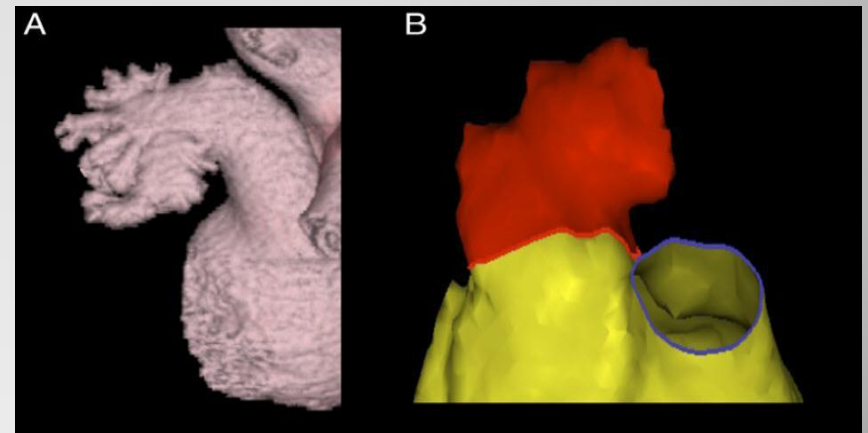
Chicken wing



Cactus

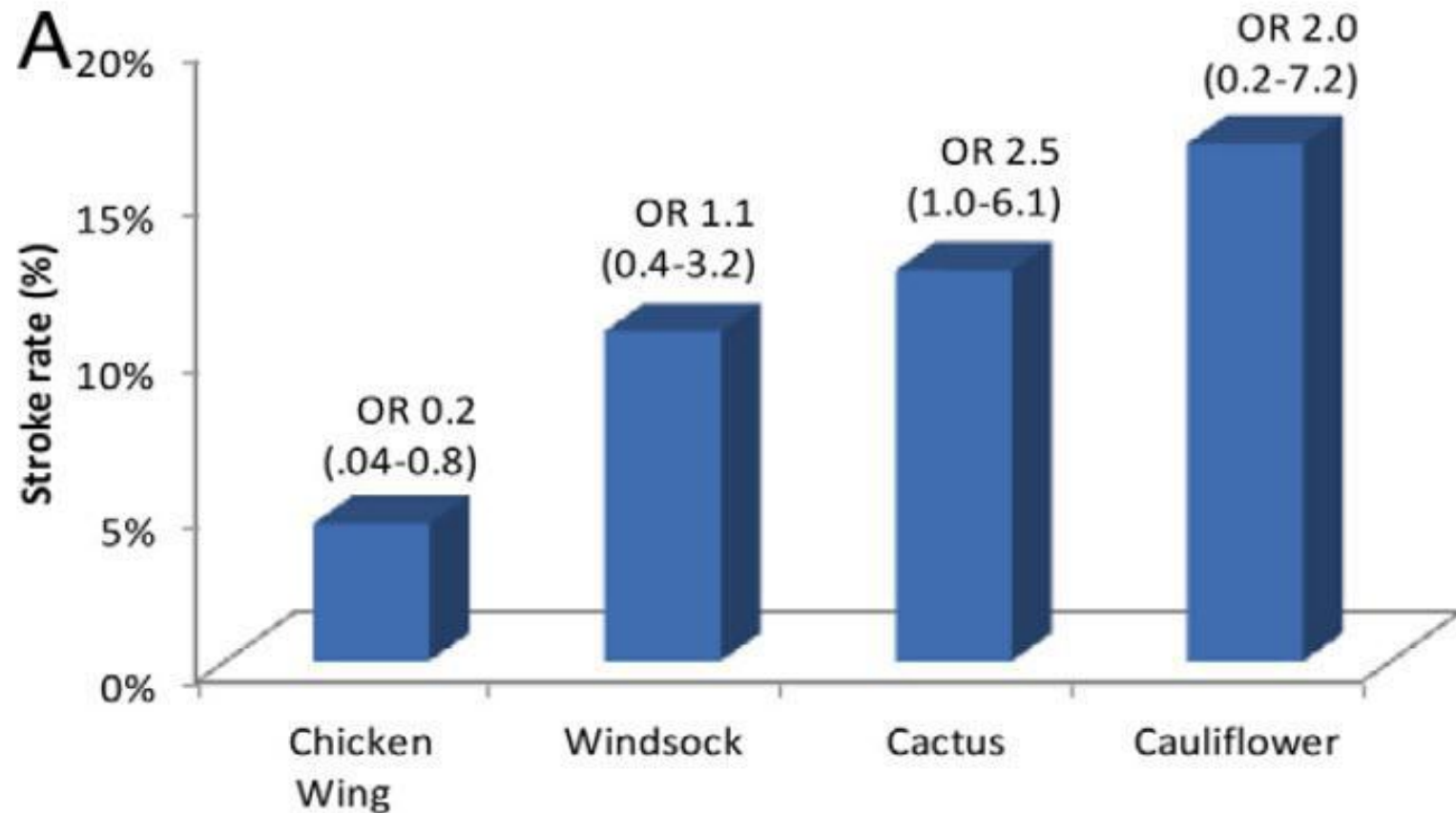


Windsock



Cauliflower

Riziko TIA/CMP dle morfologie



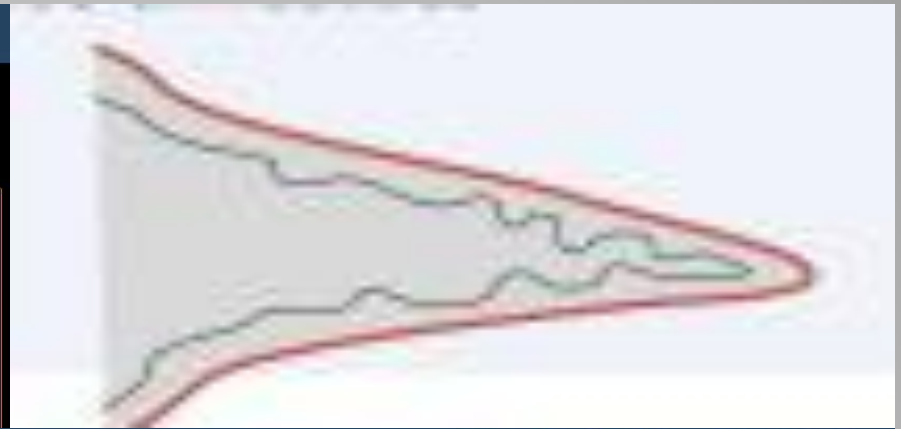
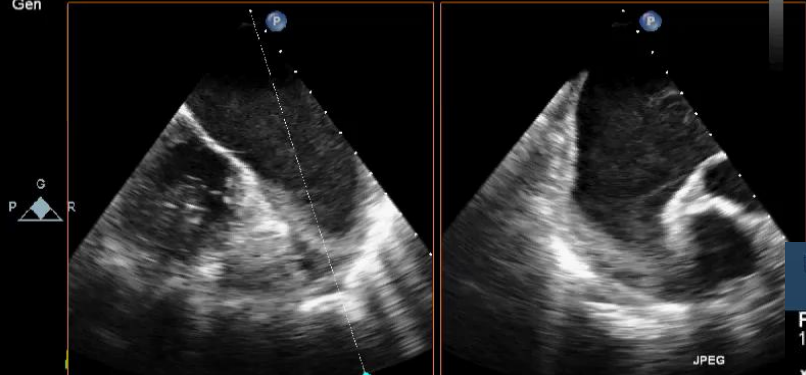
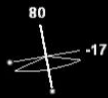
PHILIPS

05/03/2014 13:34:42 TISO.1 MI 0.3

CX7-2t/TEE

FR 36Hz
15cm

xPlane
75%
75%
50dB
P Off
Gen



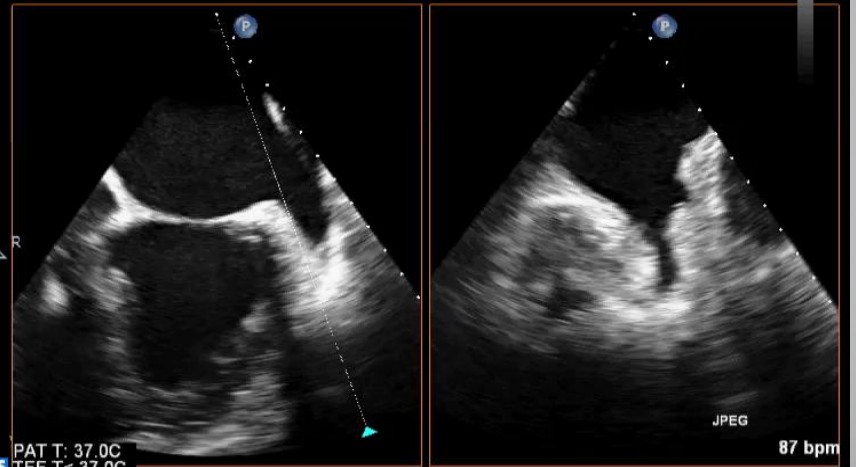
PHILIPS

08/03/2016 11:58:46 TISO.1 MI 0.3

CX7-2t/TEE

FR 36Hz
15cm

xPlane
72%
72%
50dB
P Off
Gen



PAT T: 37.0C
TEE T: 37.0C

87 bpm

PHILIPS



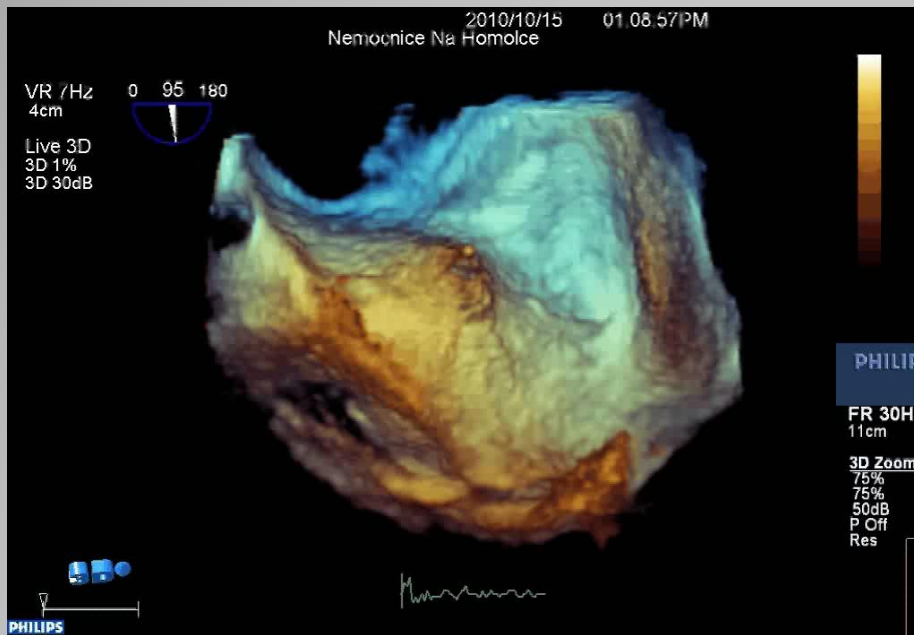
Monitorace výkonu

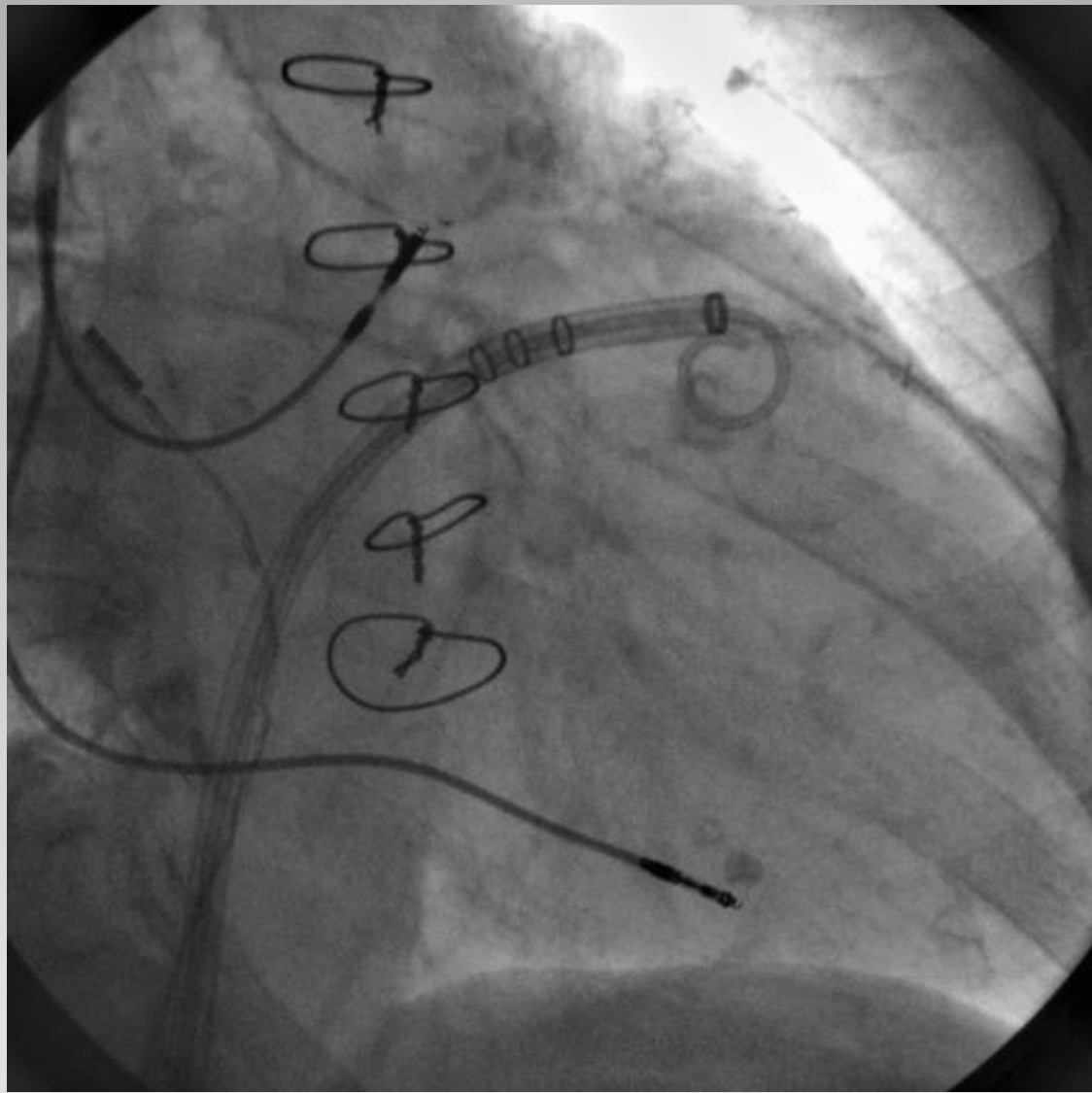
- **Fluoroskopie**
- **Echokardiografie**
 - **Jícnová multiplanární 2D**
 - **Jícnová multiplanární 2D + 3D**
 - **Intrakardiální**

Způsoby zobrazení

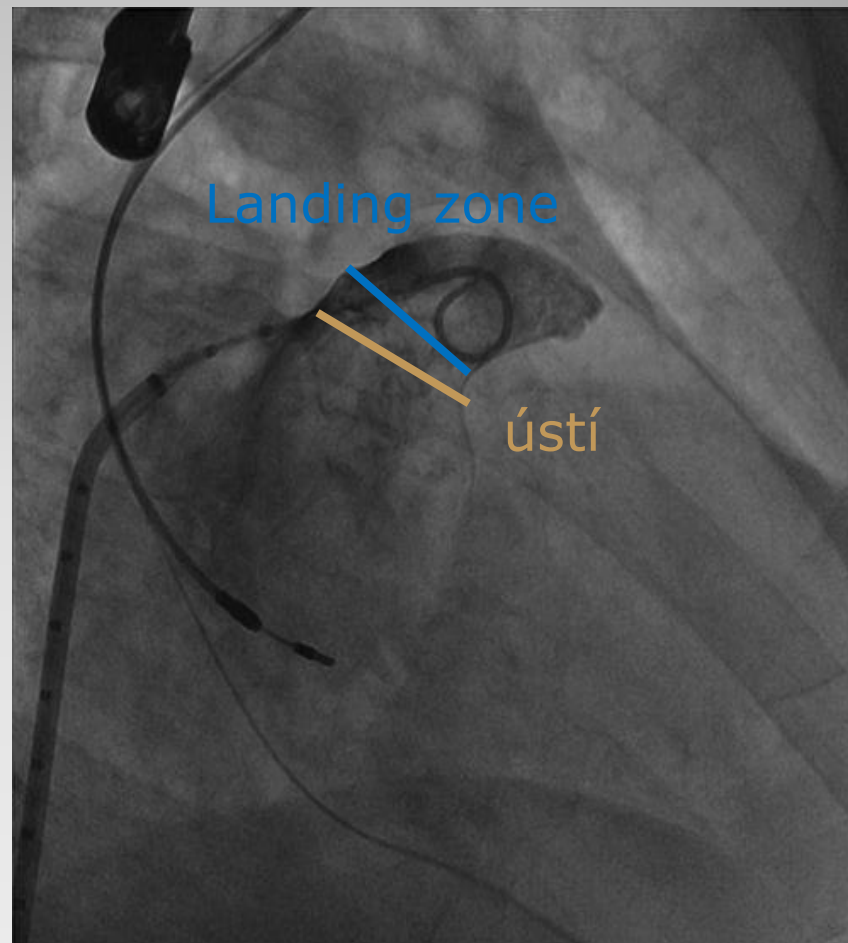
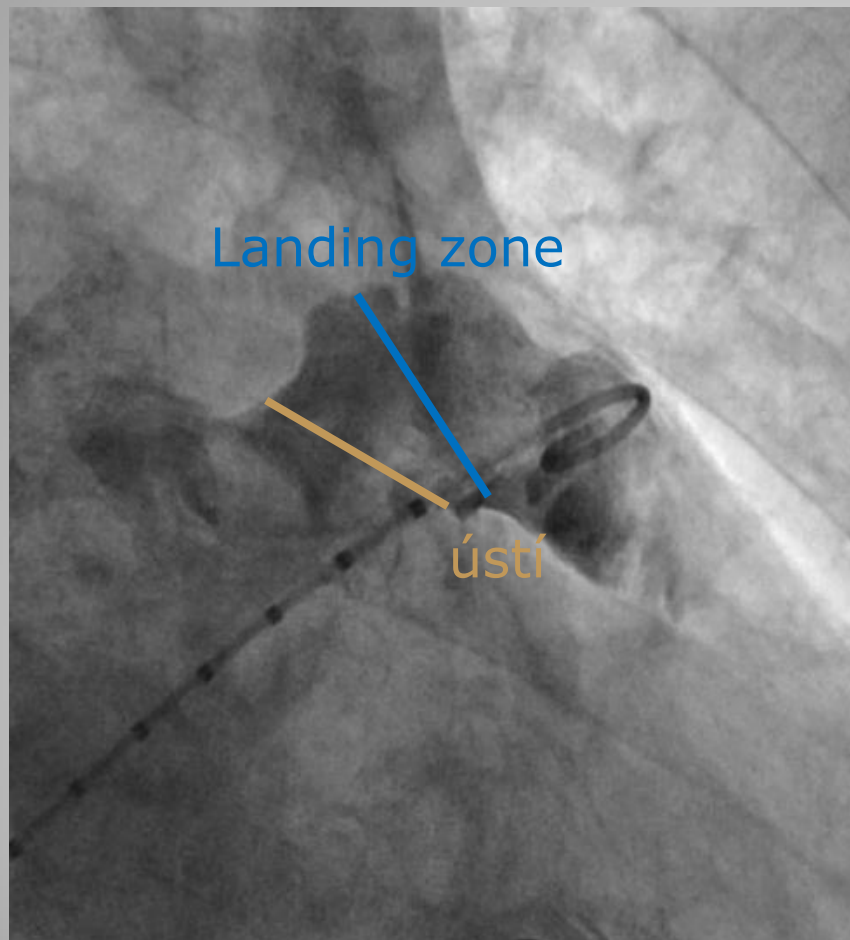
- **2D echokardiografie**
- **3D echokardiografie**
 - **X-plane**
 - **Live 3D**
 - **3D zoom**
 - **Live 3D color**
 - **Full volume**
 - **Full volume color**
- **(Echo navigator)**

Transseptální punkce





Měření ouška- fluoro

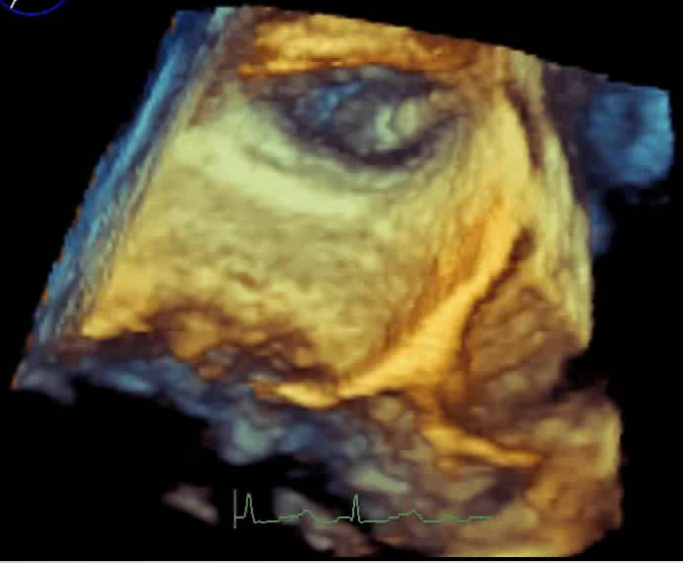


2011/03/26 06:42:52PM
Nemocnice Na Homolce

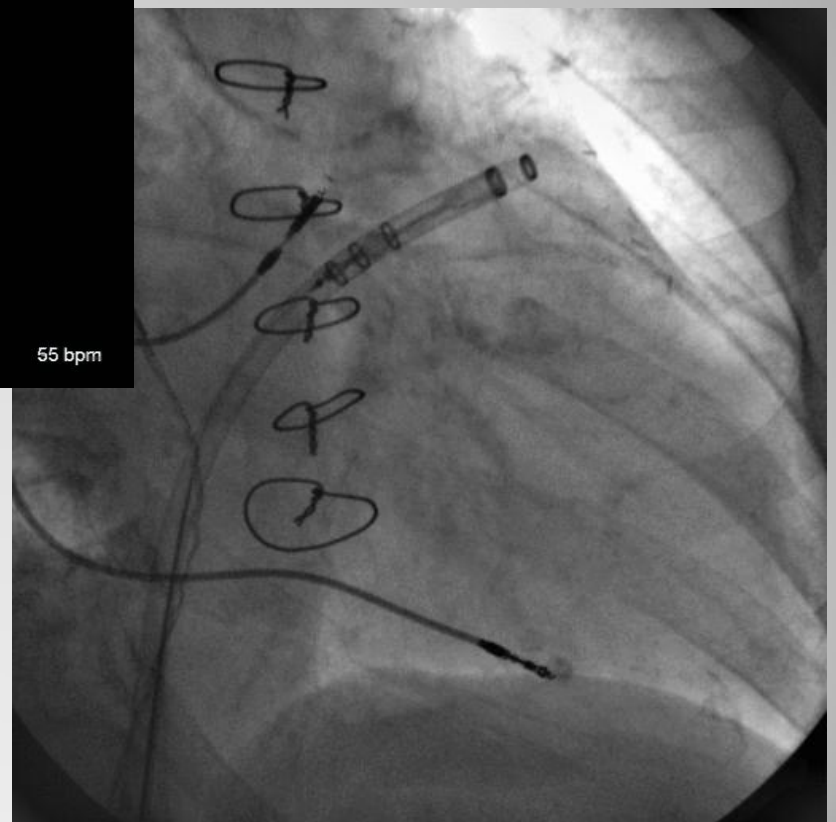
VR 13Hz
5cm

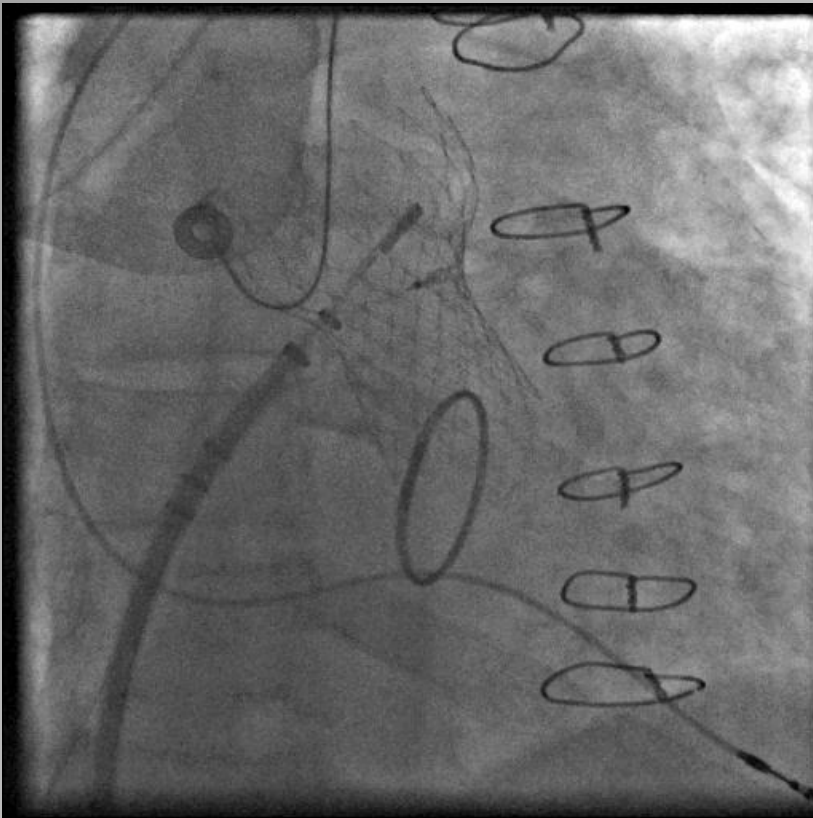


Live 3D
3D 1%
3D 30dB

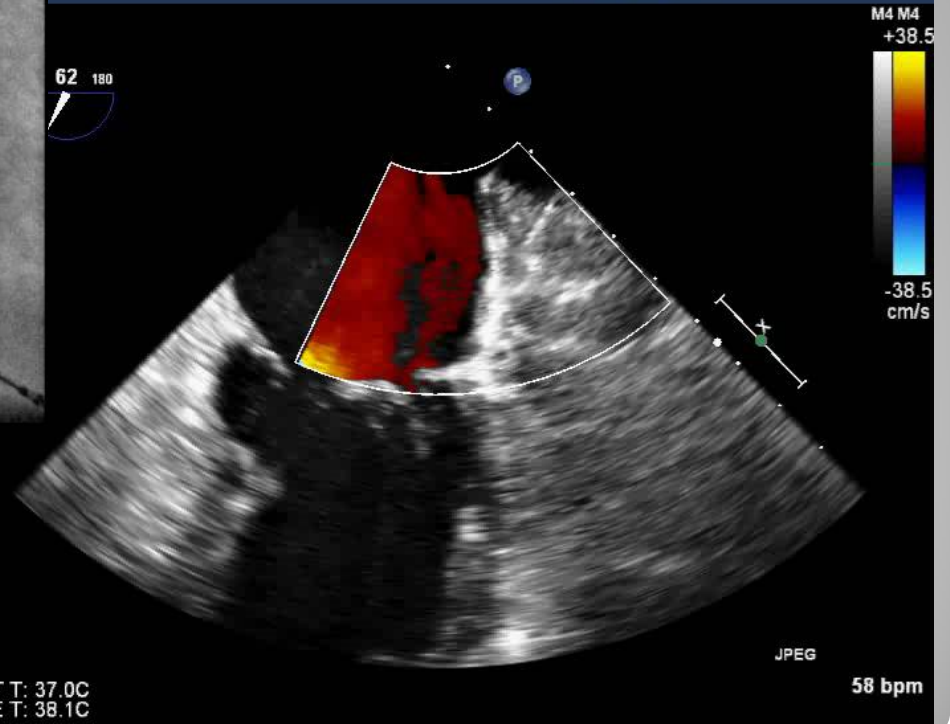


55 bpm





31/05/2011 09:18:10 TIS0.5 MI 0.8
CX7-2t/TEE



62 180

P ▲ R

PHILIPS PAT T: 37.0C
TEE T: 38.1C

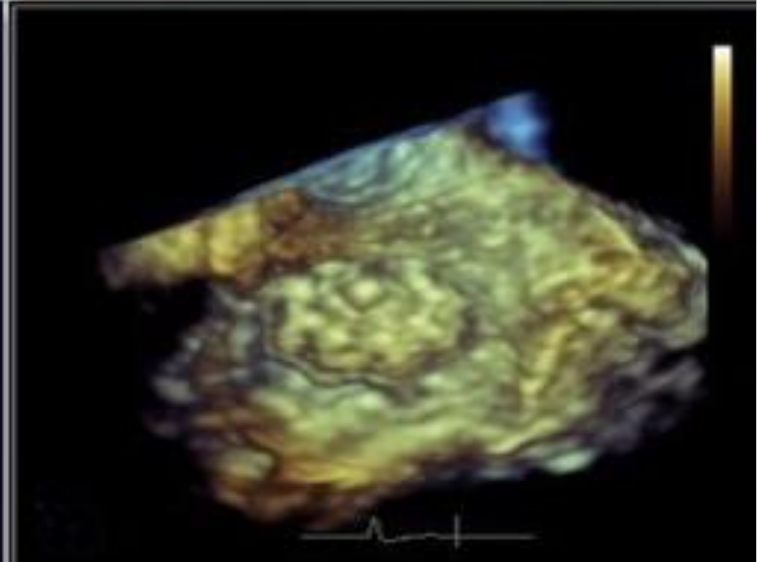
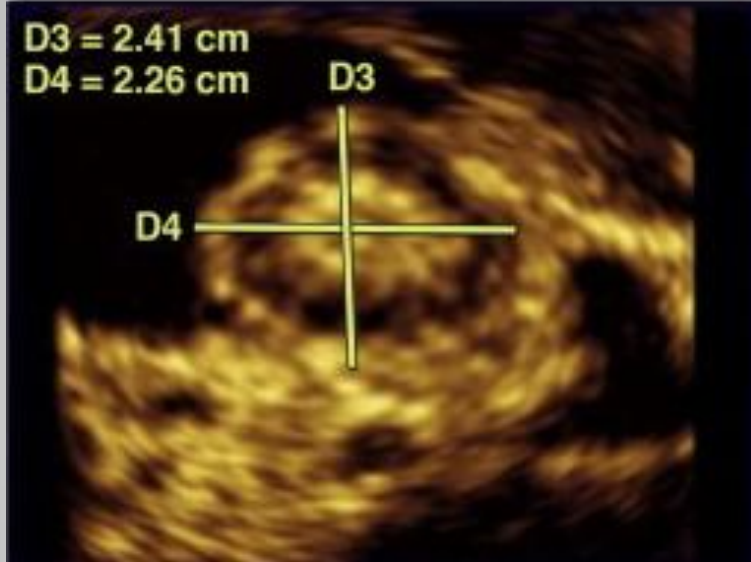
D1 = 2.33 cm



D2 = 2.34 cm



D3 = 2.41 cm
D4 = 2.26 cm



PHILIPS

02/07/2010 12:40:01 TIS0.1 MI 0.4

CX7-2t/TEE

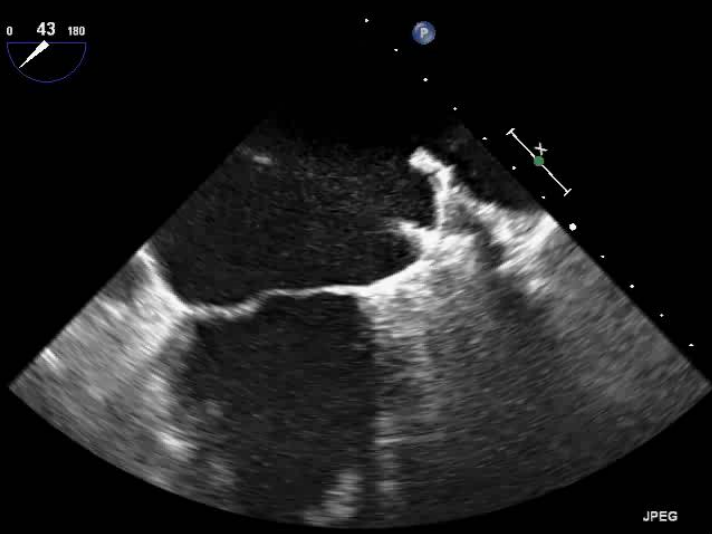
FR 52Hz
12cm

M4

2D
76%
C 50
P Off
Res



G
P R



PAT T: 37.0C
TEE T: 39.0C

2010/07/02 12:39:29PM
Nemocnice Na Homolce

180

JPEG

*** bpm



37

PHILIPS

0 bpm

2011/05/31 09:19:16AM
Nemocnice Na Homolce

VR 13Hz
5cm

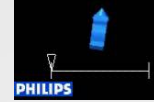


Live 3D
3D 27%
3D 24dB



2011/05/13 10:55:14AM
Nemocnice Na Homolce

60 bpm



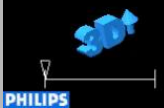
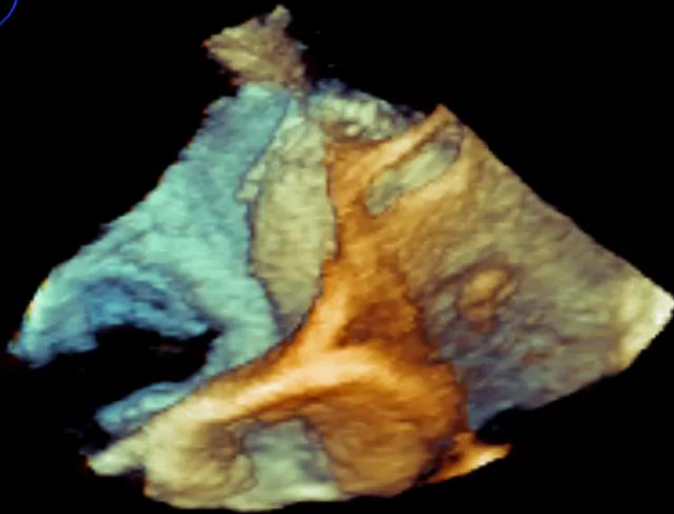
129 bpm

2015/10/15 01:36:00PM
Nemocnice Na Homolce

VR 13Hz
5cm



Live 3D
3D 1%
3D 26dB



PHILIPS

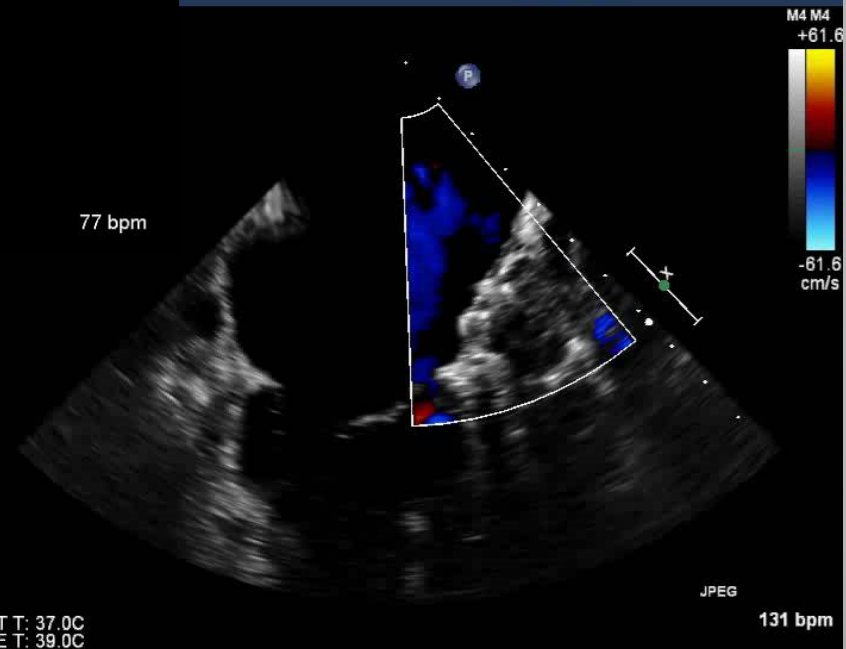
Med



77 bpm

PHILIPS PAT T: 37.0C
TEE T: 39.0C

04/11/2010 12:35:49 TIS0.7 MI 0.4
CX7-2t/TEE



JPEG

131 bpm

PHILIPS

03/05/2016 10:39:47

TISO.7 MI 0.4

CX7-2t/TEE

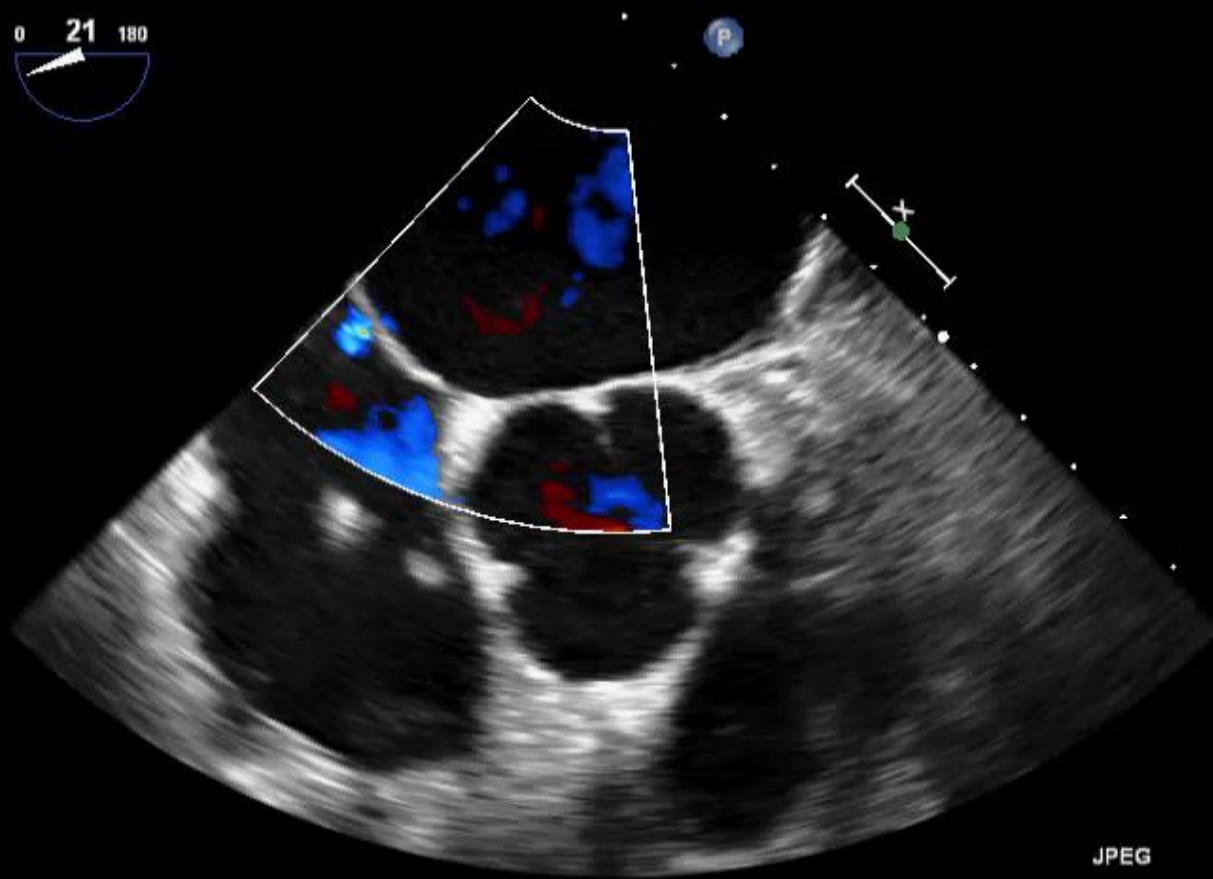
FR 15Hz
12cm

2D
65%
C 50
P Off
Gen



CF
59%
4.4MHz
WF High
Med

M4 M4
+59.3



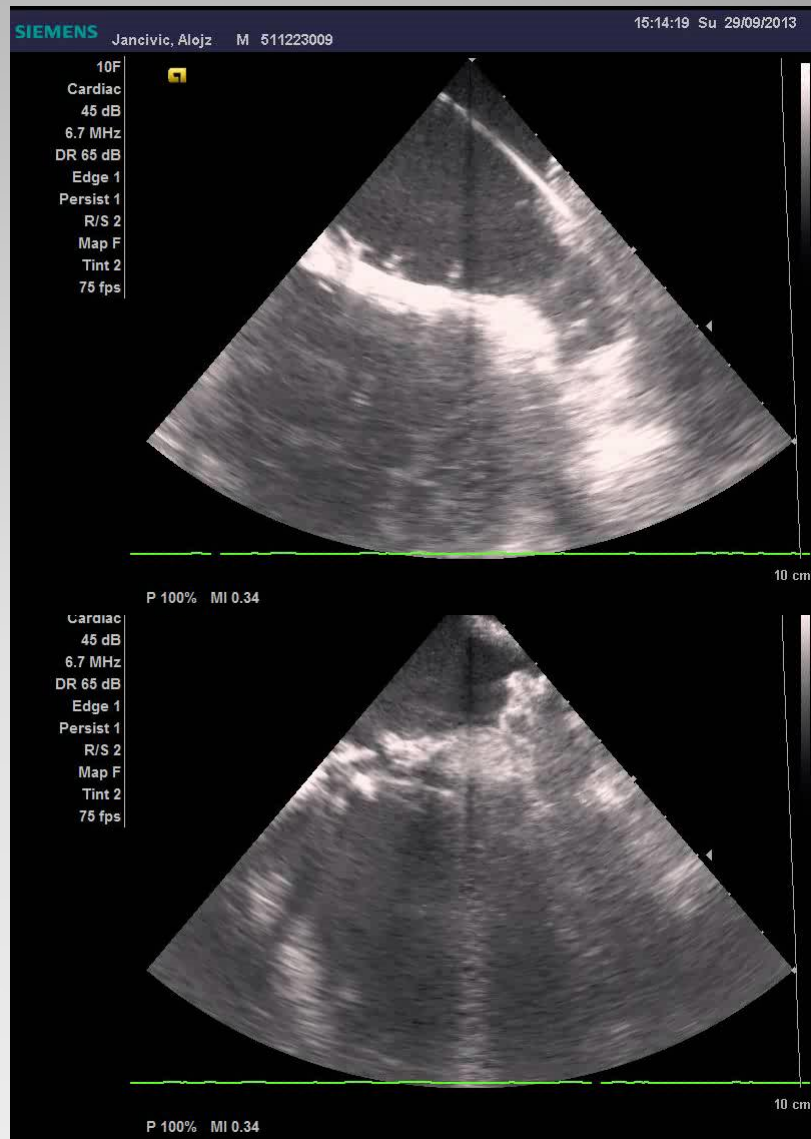
JPEG

93 bpm

PHILIPS PAT T: 37.0C
TEE T: 39.0C

ICE

- **Adekvátní alternativa**
- **Výhodné, pokud není nemocný v celkové anestezii**
- **Chybí možnosti 3D zobrazení**



Detekce suboptimálních výsledků a komplikací

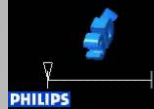
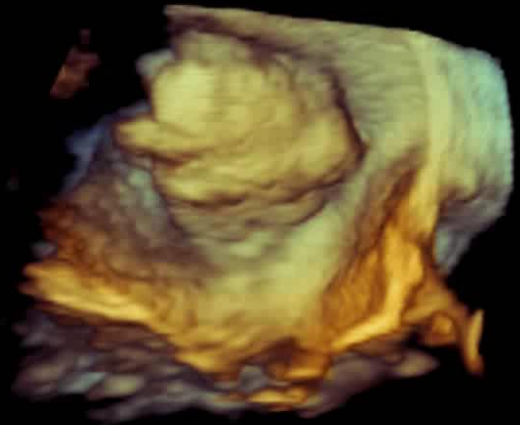
- **Příliš proximální nebo distální pozice**
- **Embolizace okludéru**
- **Leak podél okludéru**
- **Perikardiální výpotek při perforaci stěny síně nebo ouška a srdeční tamponáda**
- **Vznik trombu na okludéru**
- **Interference s mitrální chlopní, levou horní plicní žílou, nebo arterií cirkumflexou**

2011/09/26 10:27:13AM
Nemocnice Na Homolce

VR 17Hz
4cm



Live 3D
3D 1%
3D 25dB

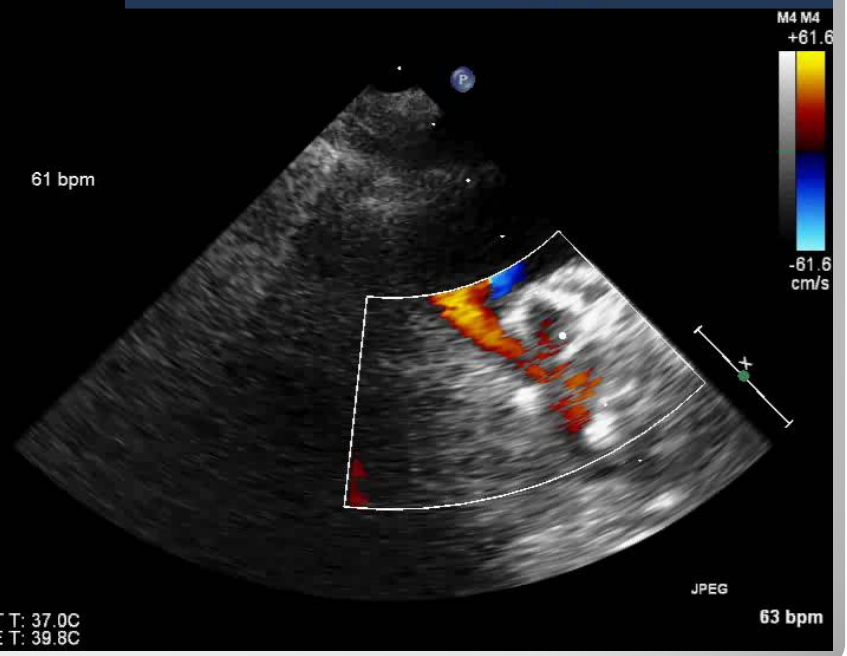


PHILIPS

26/09/2011 10:24:36 TIS0.7 MI 0.4
CX7-2t/TEE

61 bpm

4.4MHz
WF High
Med



M4 M4
+61.6
-61.6
cm/s

JPEG

63 bpm

PHILIPS PAT T: 37.0C
TEE T: 39.8C

PHILIPS

01/06/2012 11:04:39

TIS0.7 MI 0.4

CX7-2t/TEE

FR 20Hz

11cm

2D

63%

C 50

P Off

Gen

CF

59%

4.4MHz

WF High

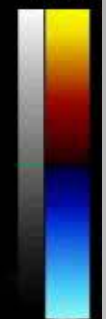
Med

0 88 180

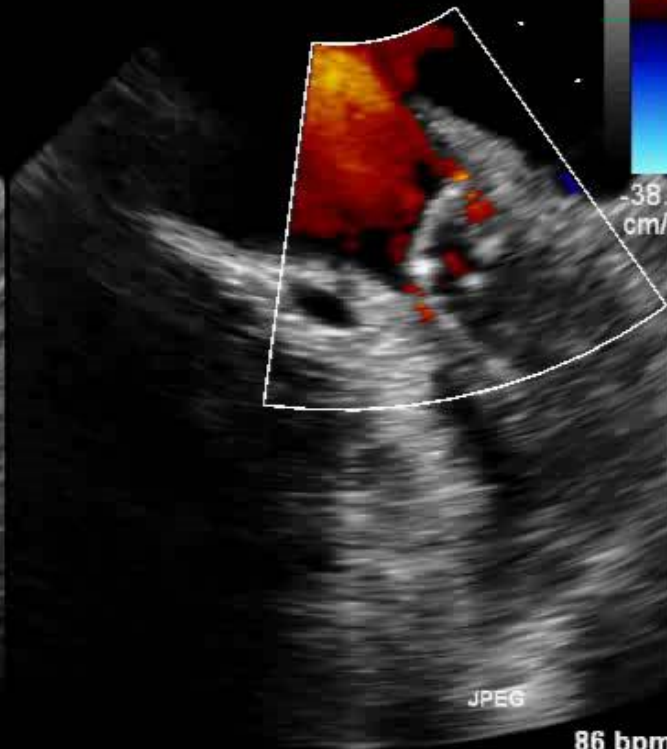


M4 M4

+38.5



-38.5
cm/s



JPEG

PHILIPS

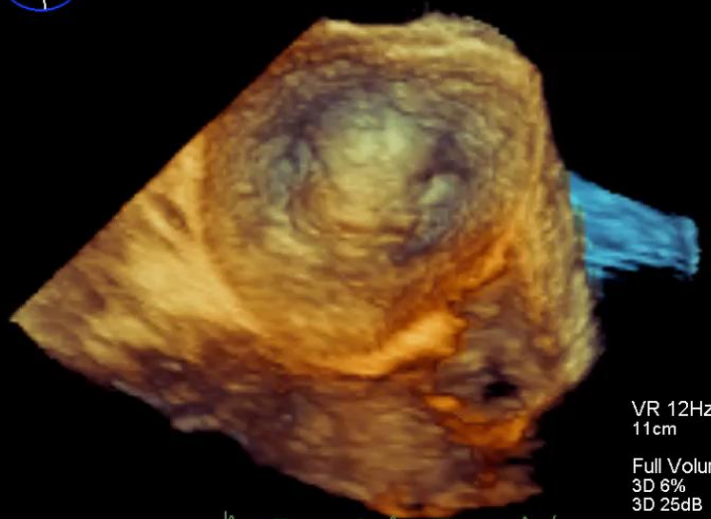
PAT T: 37.0C

TEE T: 39.0C

86 bpm

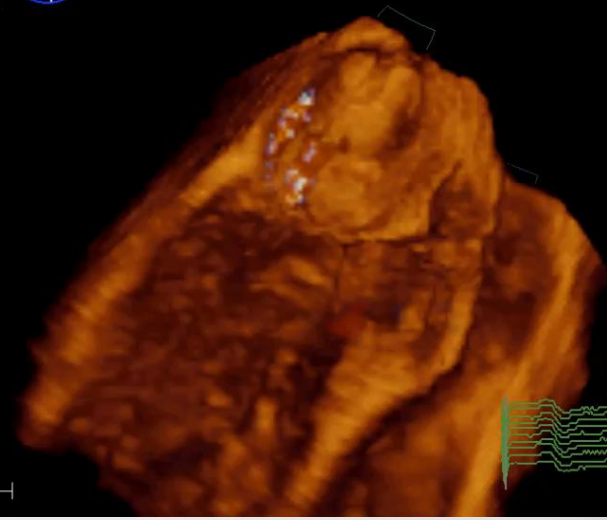
2015/10/08 10:09:51AM
Nemocnice Na Homolce

VR 13Hz
5cm
Live 3D
3D 1%
3D 25dB



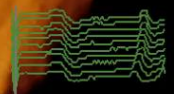
PHILIPS

VR 12Hz
11cm
Full Volume
3D 8%
3D 25dB
CF
62%
4.4MHZ



PHILIPS

2015/10/08 10:12:02AM
Nemocnice Na Homolce



57 bpm

2010/05/06 10:19:35AM
Nemocnice Na Homolce

VR 19Hz
6cm



Live 3D
3D 58%
3D 25dB



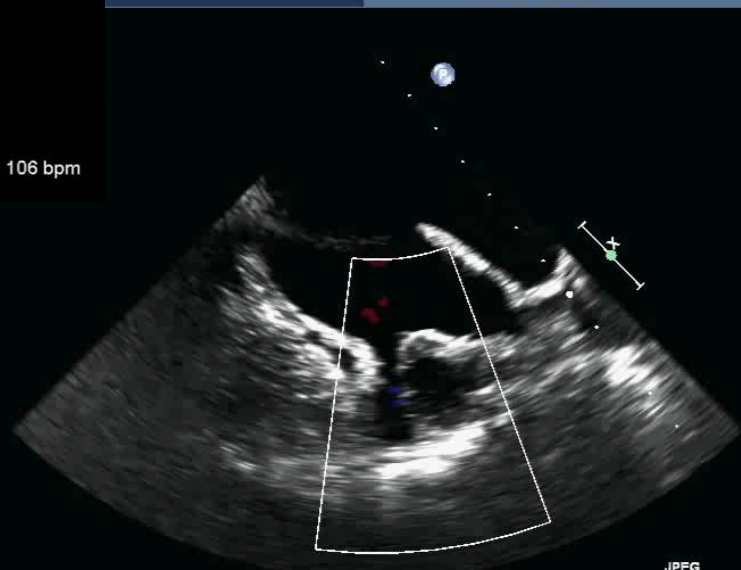
PHILIPS

106 bpm

4.4MHz
WF High
Med



06/05/2010 10:13:10 TISO.6 MI 0.5
CX7-21/TEE

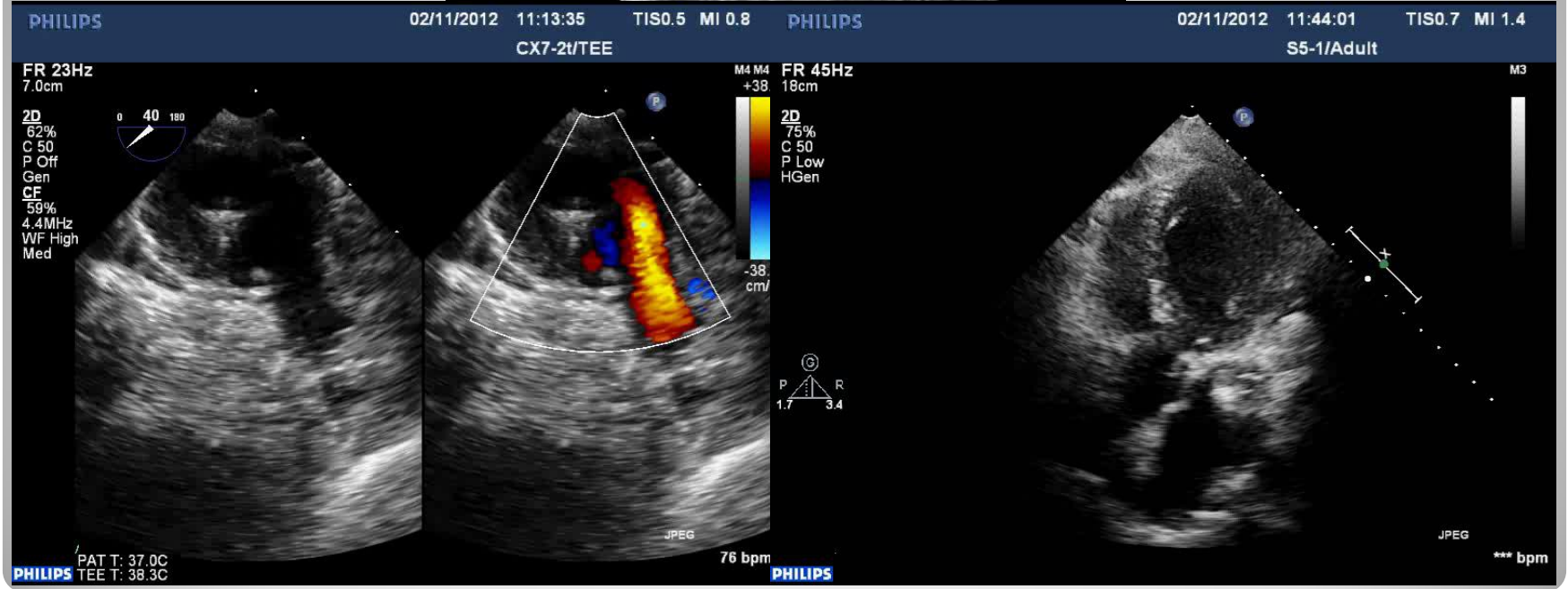


M4 M4
+51.0
-51.0
cm/s

JPEG

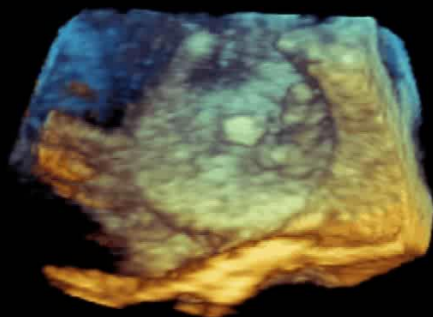
103 bpm

PAT T: 37.0C
TEE T: 39.8C
PHILIPS



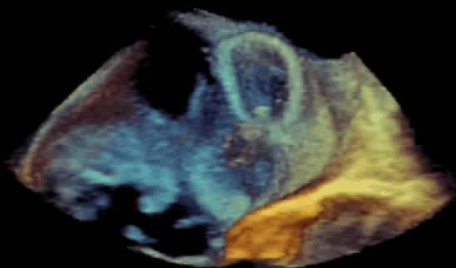
2011/12/05 11:51:39AM
Nemocnice Na Homolce

VR 12Hz 0 45 180
3cm
Live 3D
3D 8%
3D 35dB



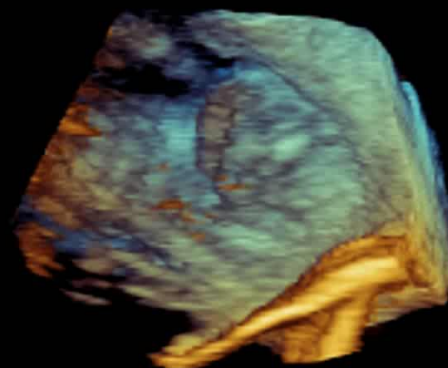
2010/10/12 10:17:54AM
Nemocnice Na Homolce

VR 11Hz 0 75 180
5cm
Live 3D
3D 19%
3D 40dB

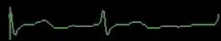


2013/07/09 09:26:25AM
Nemocnice Na Homolce

VR 16Hz 0 55 180
4cm
Live 3D
3D 15%
3D 25dB



3D+
PHILIPS



72 bpm

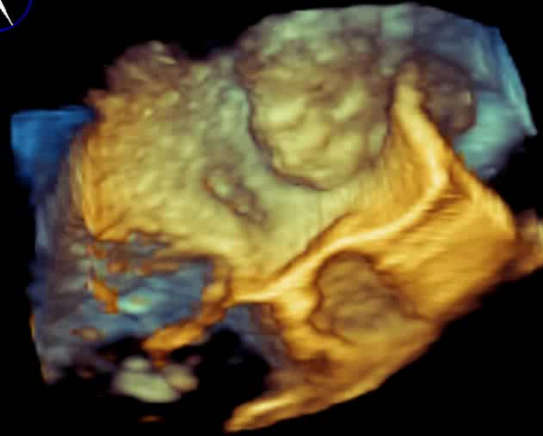
PHILIPS



68 bpm

2013/05/16 10:08:37AM
Nemocnice Na Homolce

VR 14Hz
4cm
Live 3D
3D 34%
3D 40dB



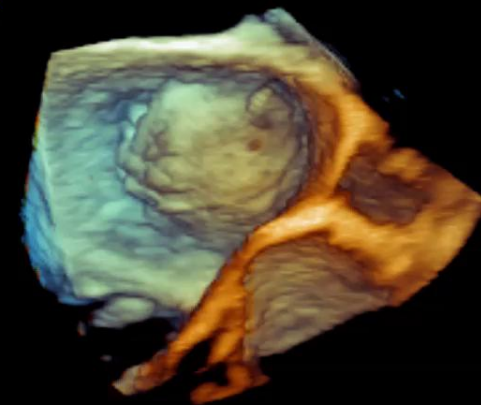
26/07/2007 11:09:27

PHILIPS



Live 3D
3D 20%
3D 22dB

PHILIPS



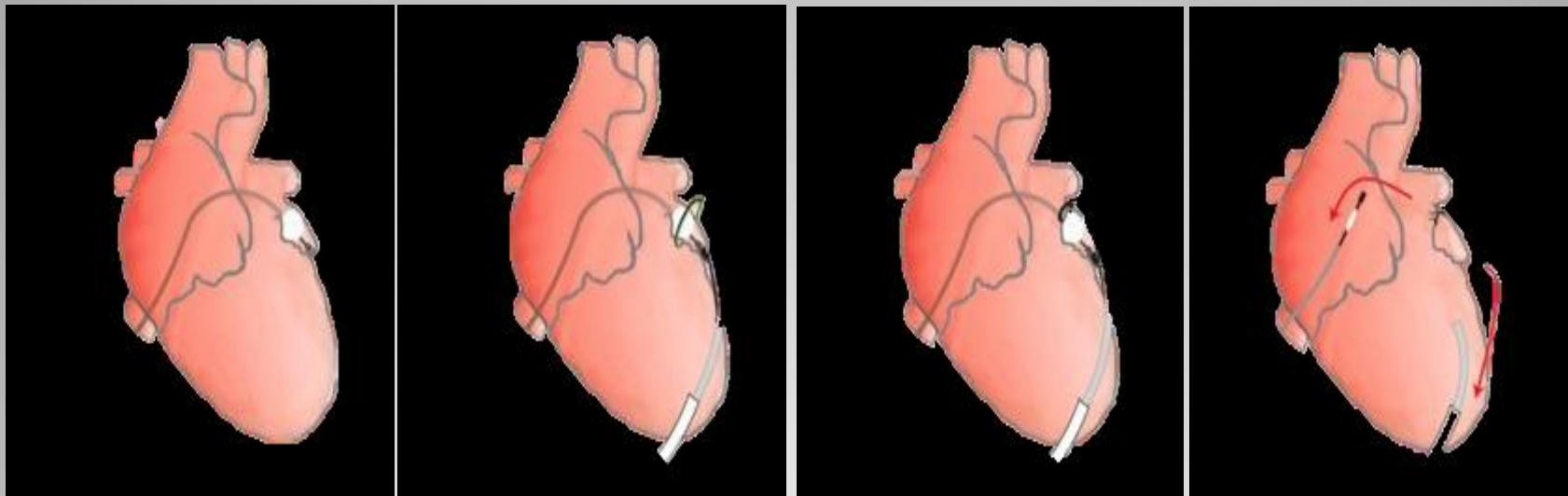
5/04/27 12:05:08PM
olce

55 bpm



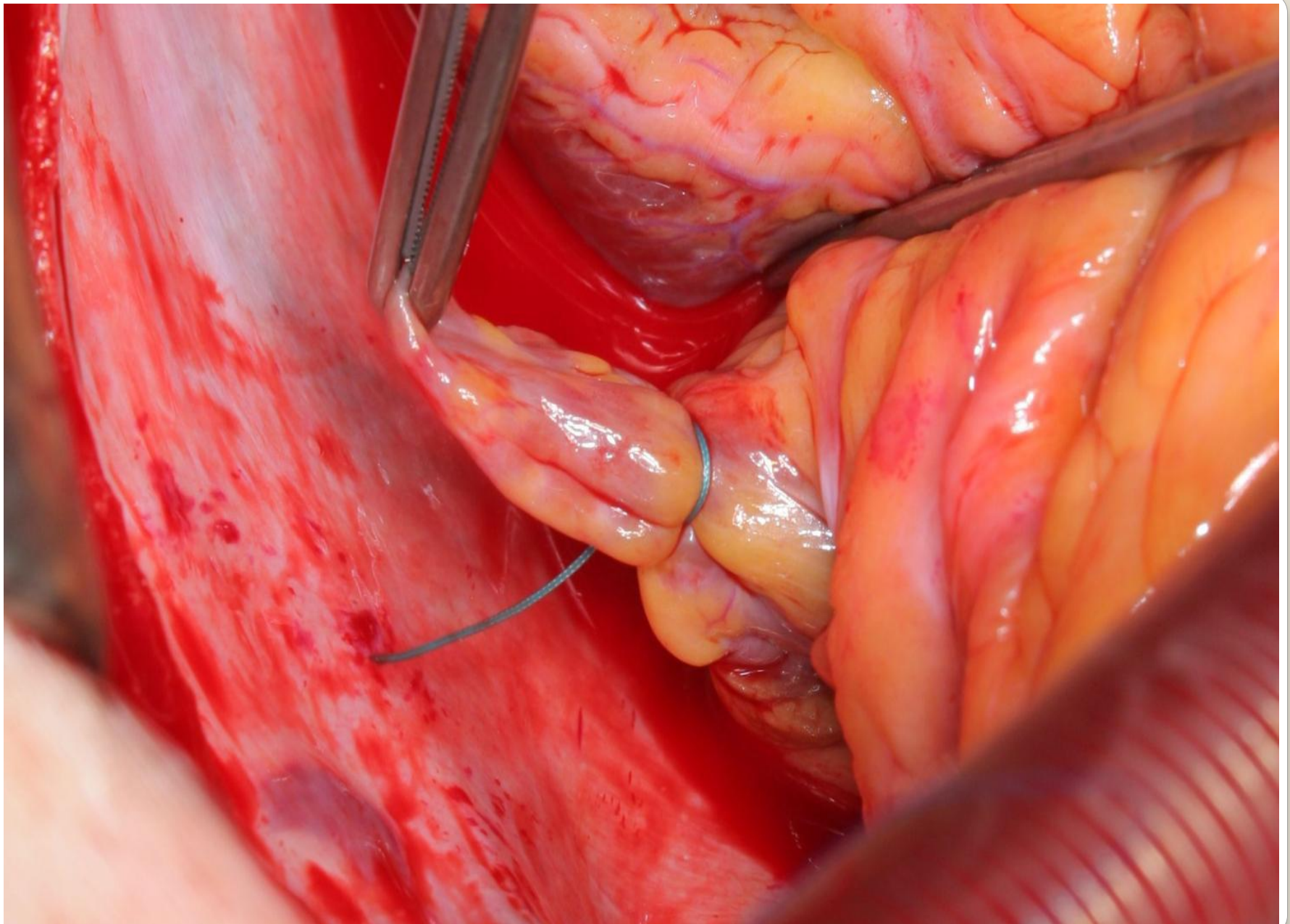
92 bpm

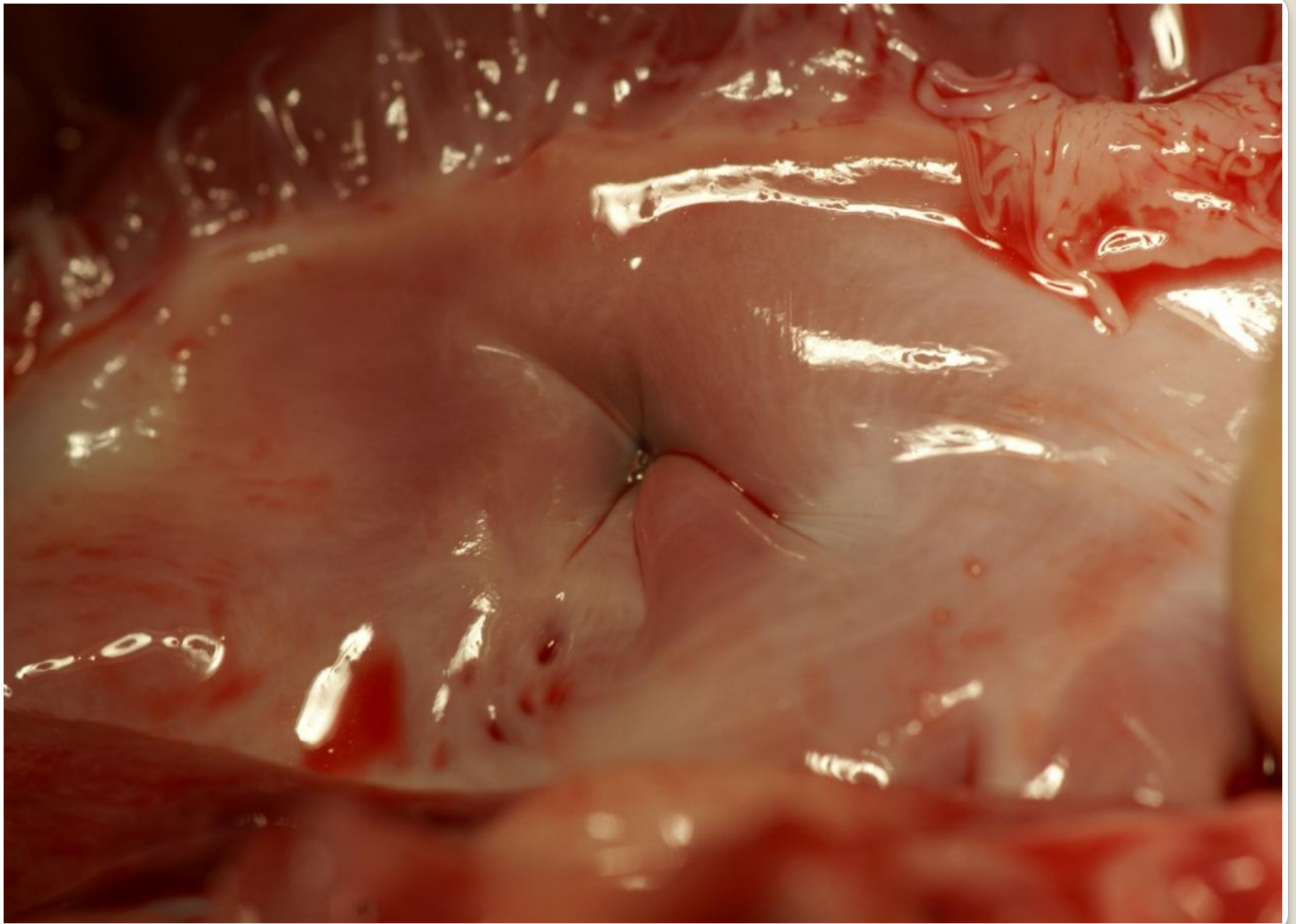
Lariat



**Ligace ouška levé síně
endo-epikardiálním
přístupem**







Kontraindikace pro ligaci

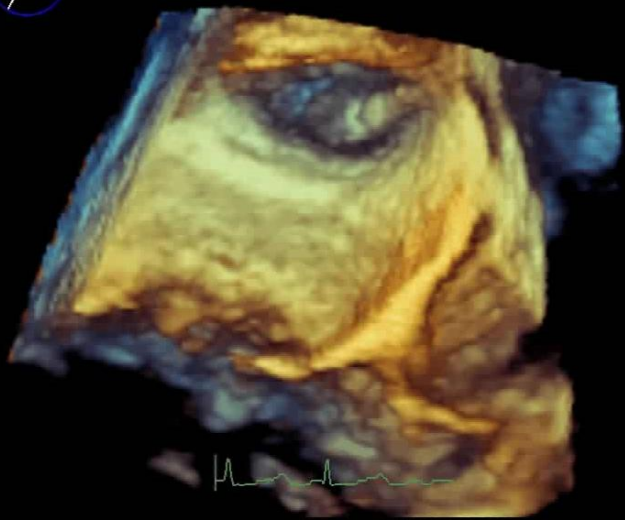
- **Předchozí srdeční operace**
- **Perikarditis v anamnéze**
- **Stav po ozáření oblasti hrudi**
- **Superiorně orientované ouško
s hrotem za arteria pulmonalis**
- **Šíře ouška nad 40 mm**
- **Multilaločnaté ouško**

Nemocnice Na Homolce

VR 13Hz
5cm



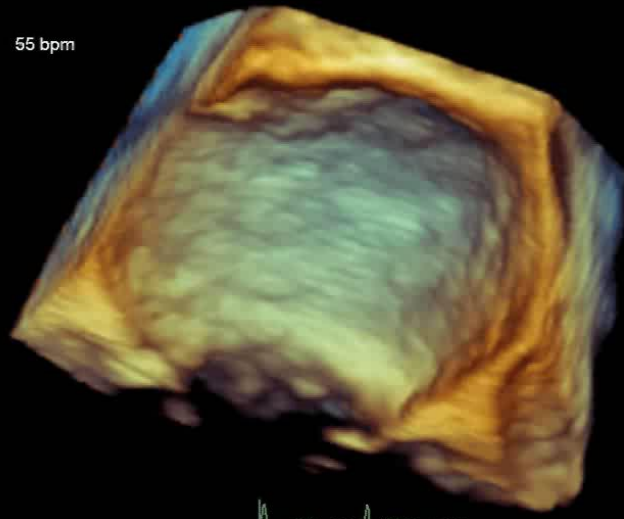
Live 3D
3D 1%
3D 30dB



PHILIPS

2011/10/17 09:21:47AM
Nemocnice Na Homolce

55 bpm



PHILIPS

67 bpm

2011/03/08 03:10:44PM
Nemocnice Na Homolce

VR 17Hz
5cm



Live 3D
3D 41%
3D 21dB



3D



PHILIPS

PHILIPS

28/03/2011 09:33:23 TIS0.7 MI 0.4

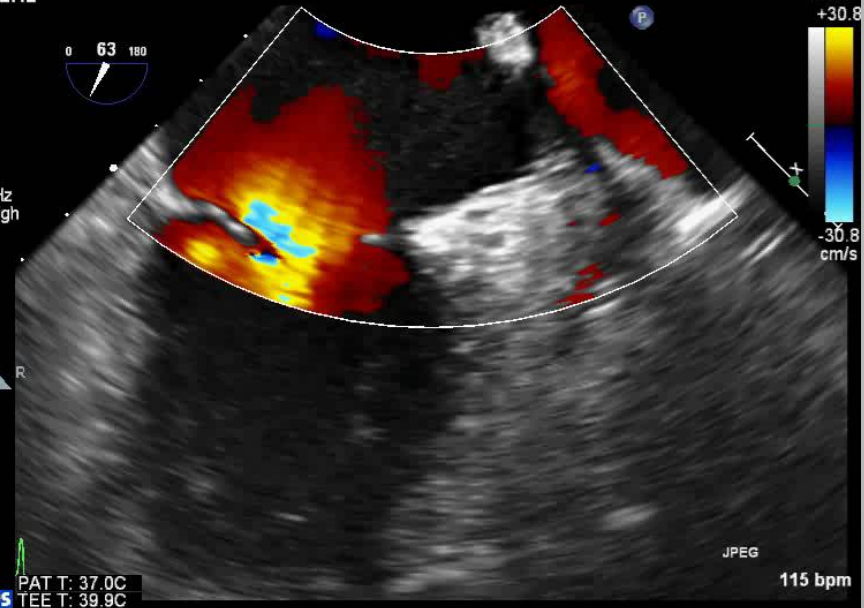
CX7-2t/TEE

FR 12Hz
14cm



2D
72%
C 50
P Off
Res

CF
59%
4.4MHz
WF High
Med



G
P R

PHILIPS PAT T: 37.0C
TEE T: 39.9C

JPEG

115 bpm



Synchronize images

EchoNavigator merges spatial coordinate systems of X-ray image and echo image

Závěr

- Okluze ouška levé síně je relativně nová, ale rychle se rozvíjející léčebná metoda pro prevenci tromboembolických příhod u nemocných s fibrilací síní
- Echokardiografie hraje důležitou roli při výběru vhodných pacientů, periprocedurální monitoraci i při dalším sledování nemocných