Atrial Septal defects: Imaging and device closure

M. Vogt

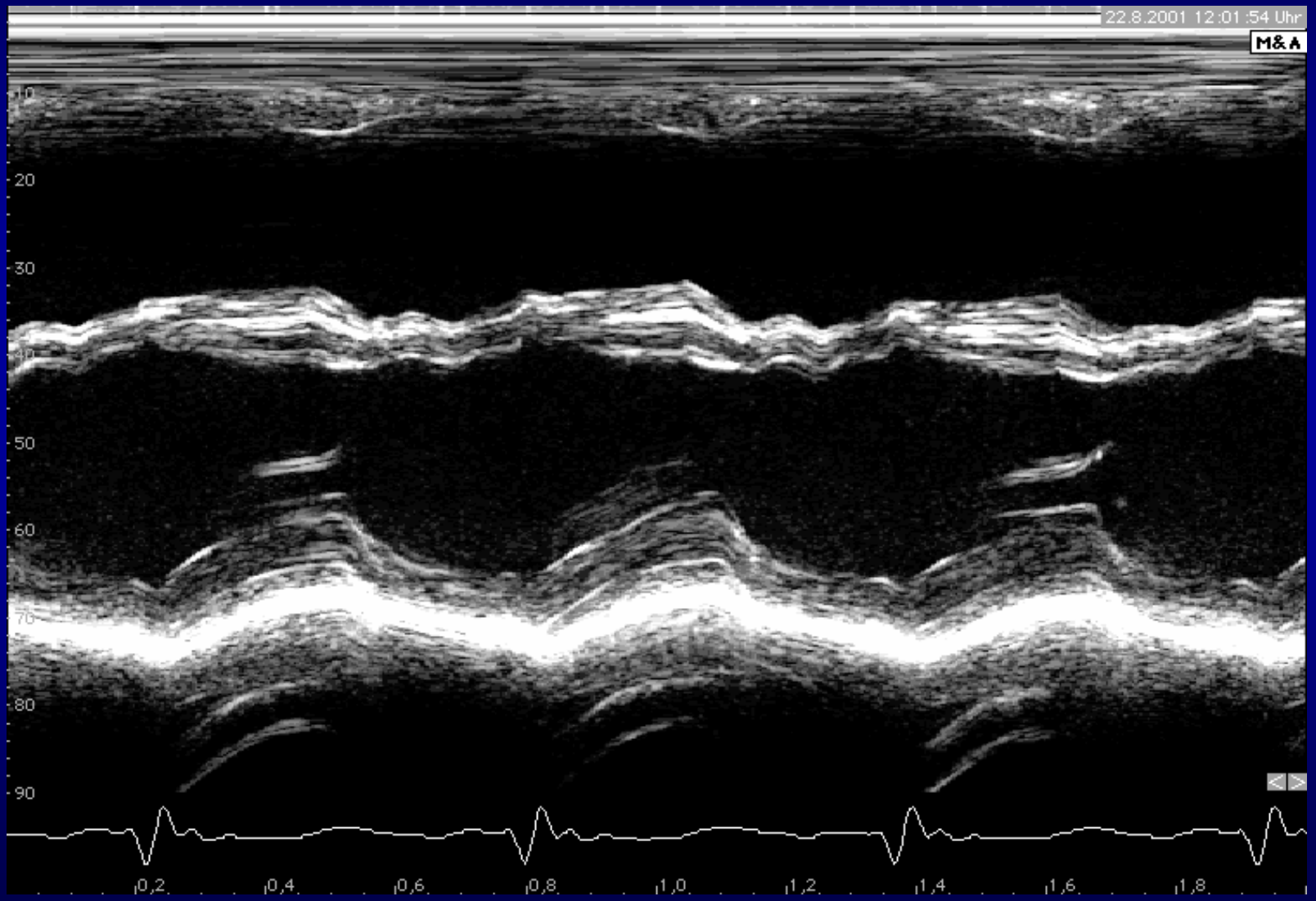
The role of echocardiography

- Indication – RV – volume load (TTE)
- Screening for feasibility of intervention
  - Native ASD size – septal size on LV aspect
  - Number of ASD`s
  - Position of ASD – rims (aorta, AV-valve, SVC/IVC, right pulmonary veins)
- Monitoring of the procedure
- Follow-up echocardiography

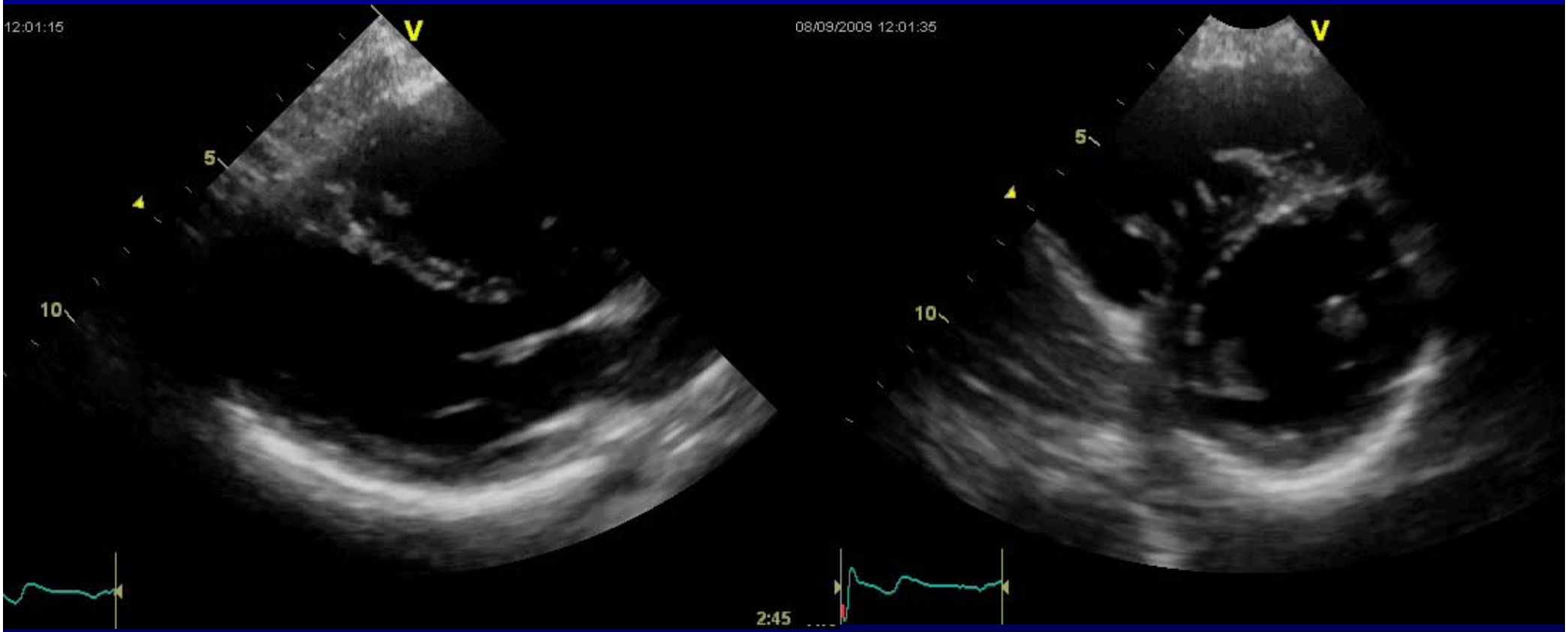
Indications for ASD closure

- ASD II: sign. l/r shunt (Qp / Qs < 1.5)
- Echo: enlarged RA / RV / PA,
  paradoxical septal movement
- ASD II complex: cyanosis r/l shunt

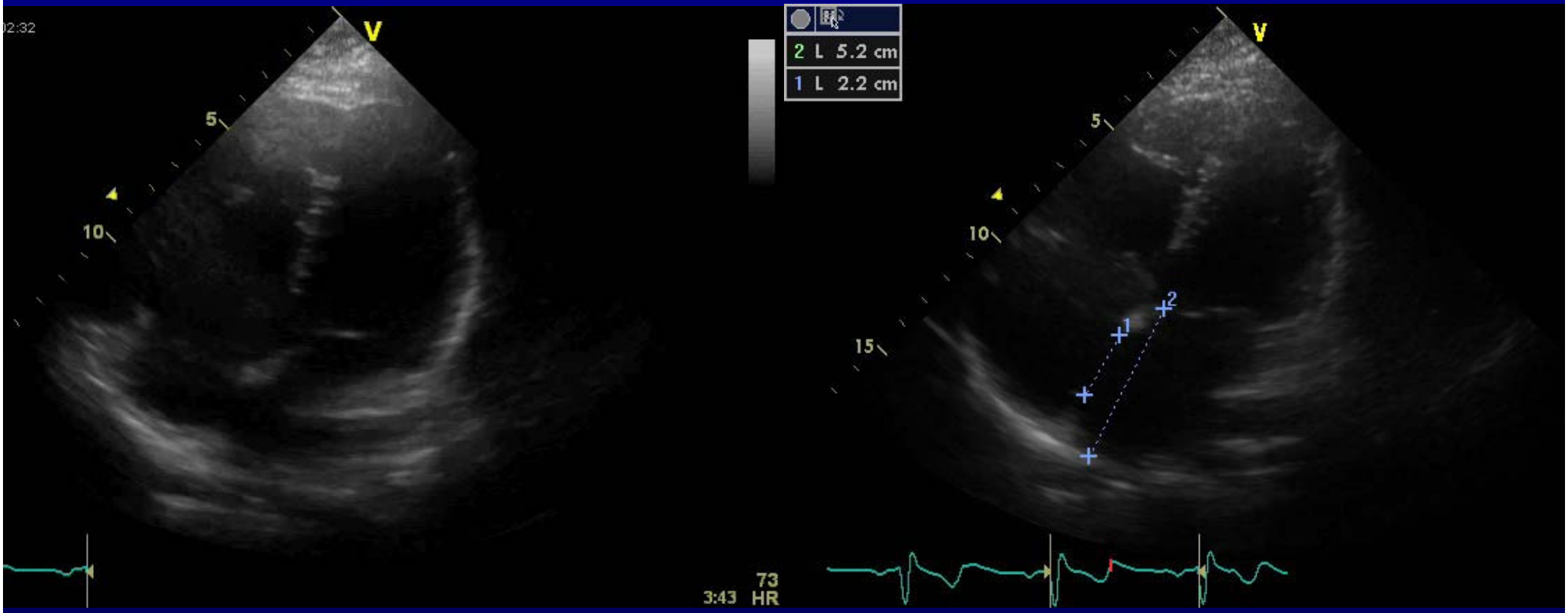
Echo M-Mode


22.8.2001 12:01:54 Uhr
M&A
10
20
30
40
50
60
70
80
90
0,2
0,4
0,6
0,8
1,0
1,2
1,4
1,6
1,8

Echo: RV volume load



ASD: native size

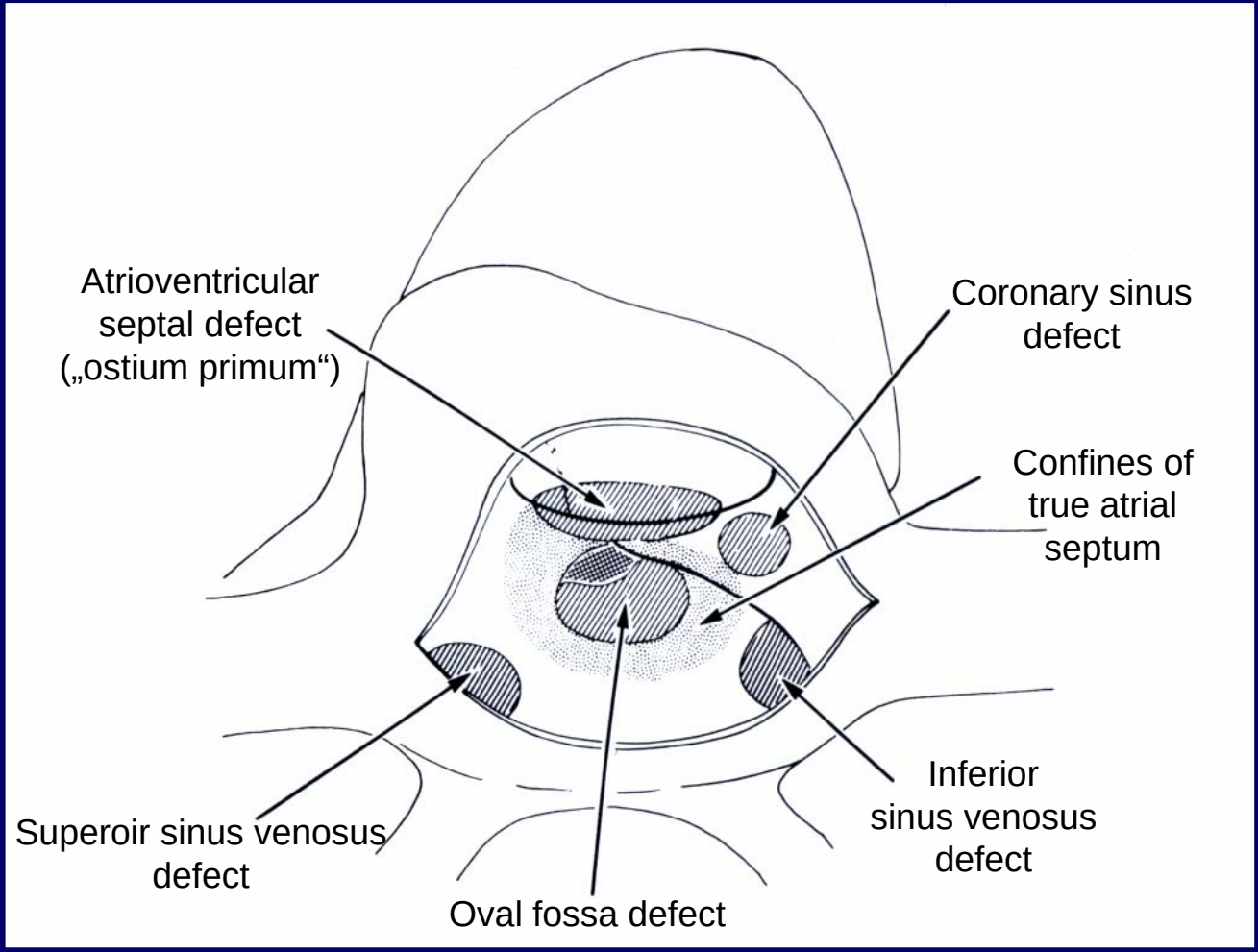


Native size: TTE 22, TEE 14 mm, BOD: 19 mm (BOD= 1.35 x native)

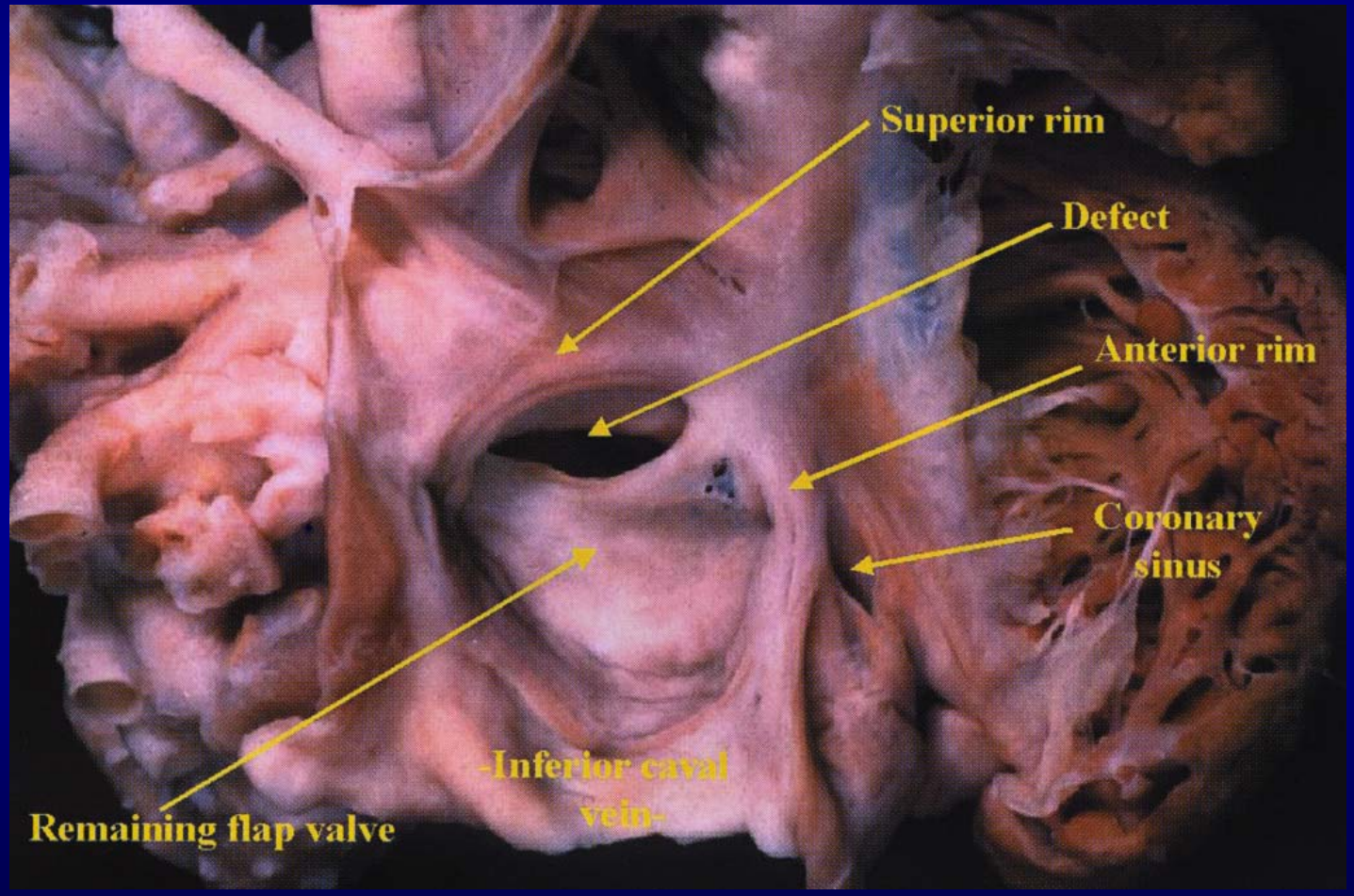
Echo criteria „ideal „ ASD

- Within the middle of the oval fossa
- Native size x 1,5 + 14 mm< septal length (LA)
- Sufficient rims
  - Ant. Inf. -> mitral valve
  - Ant. Sup. -> aortic valve
  - Post. Inf. -> IVC
  - Post. Sup.-> SVC, right pulmonary veins

„Ideal“ ASD

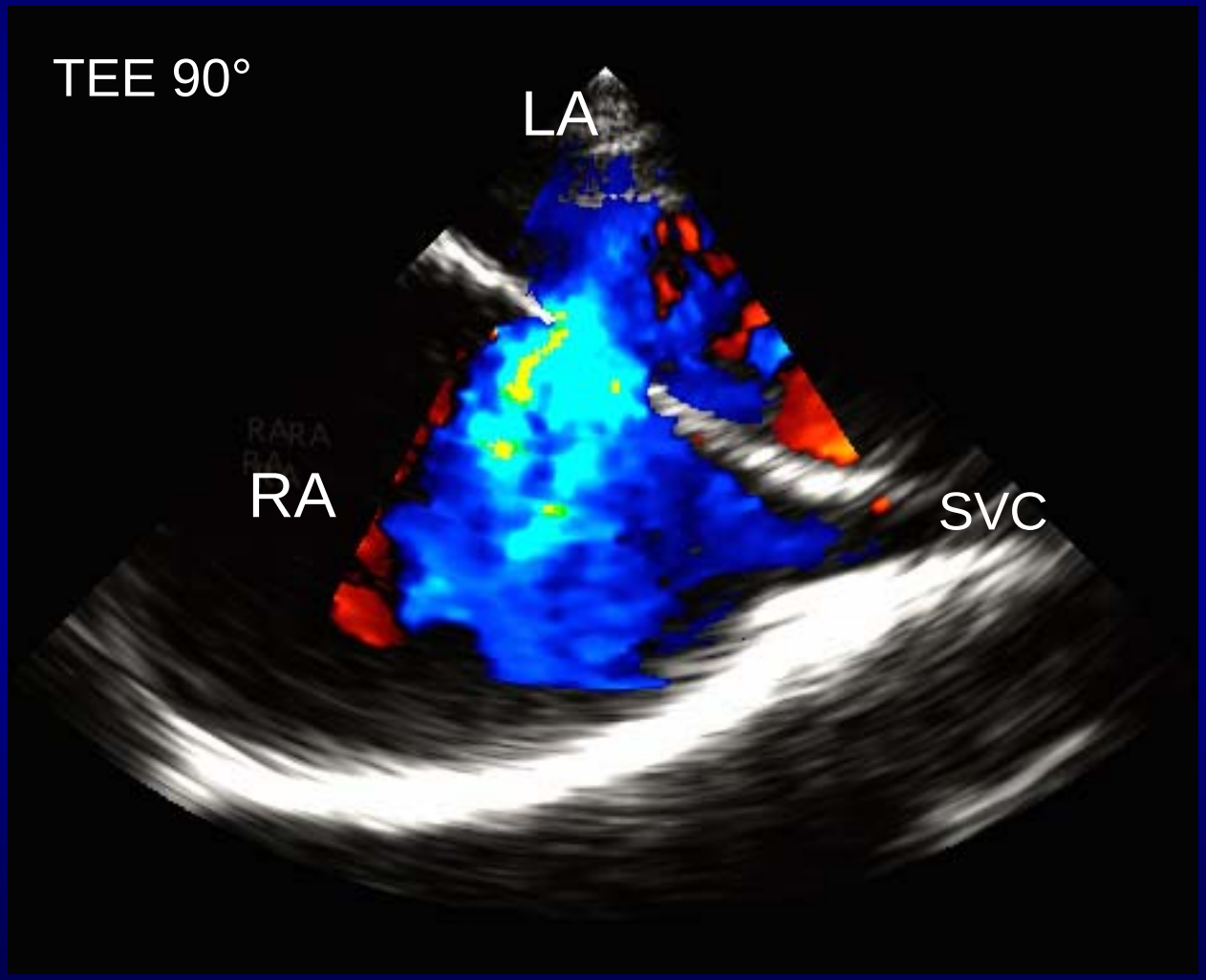

Atrioventricular septal defect („ostium primum“)
Coronary sinus defect
Confines of true atrial septum
Superoir sinus venosus defect
Oval fossa defect
Inferior sinus venosus defect

Anatomy

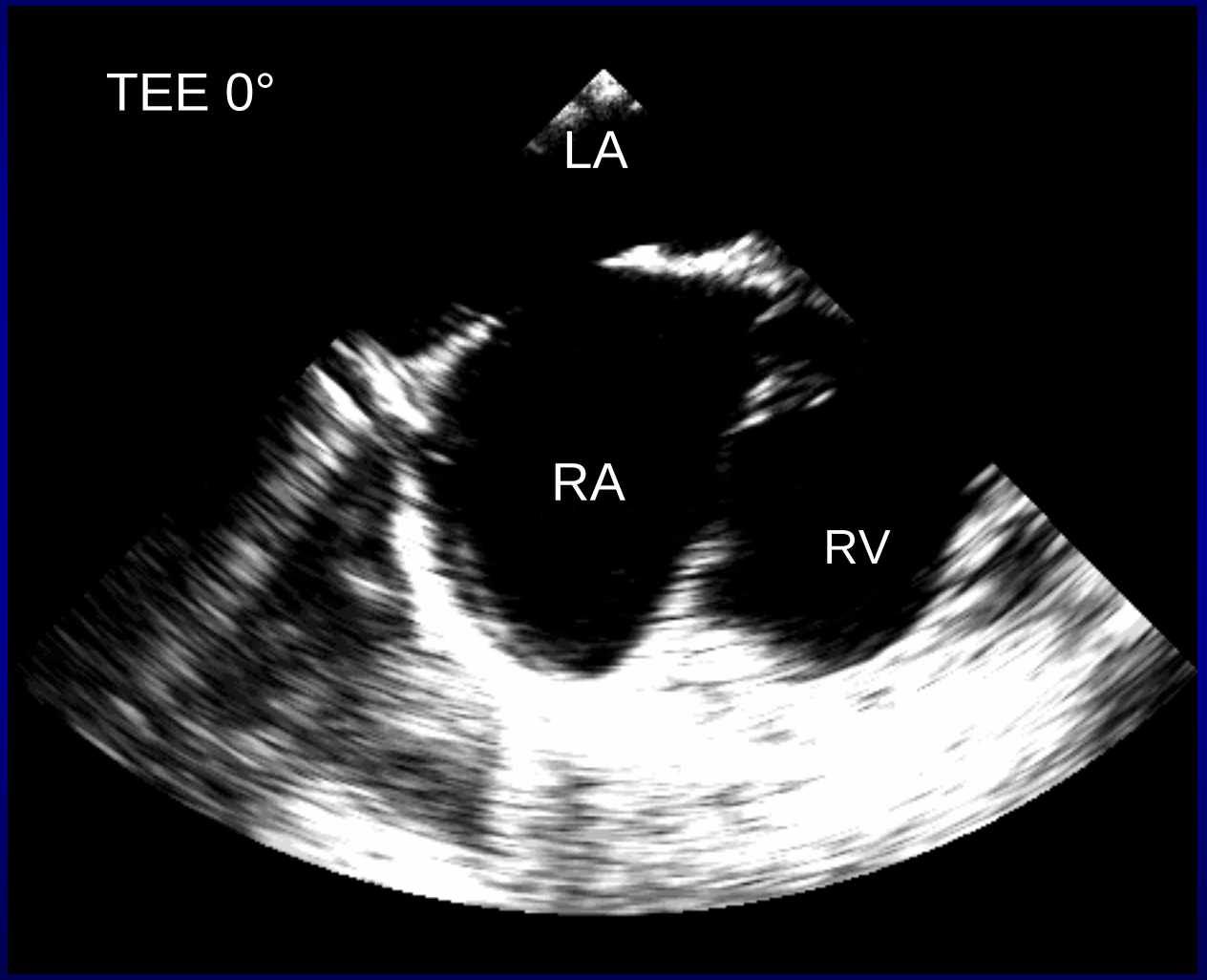


Thanks to Bob Anderson

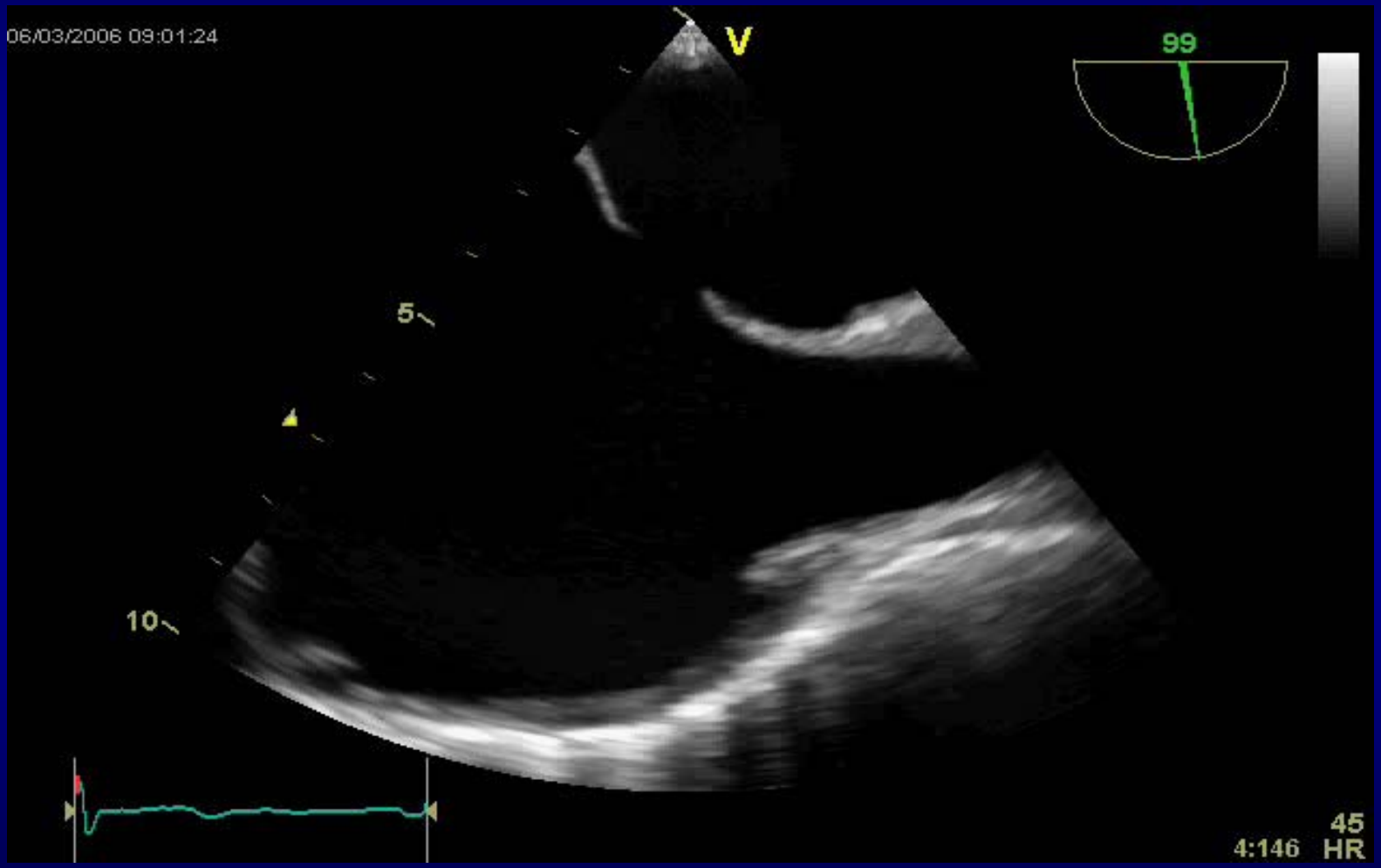
Echo: „ideal“ ASD



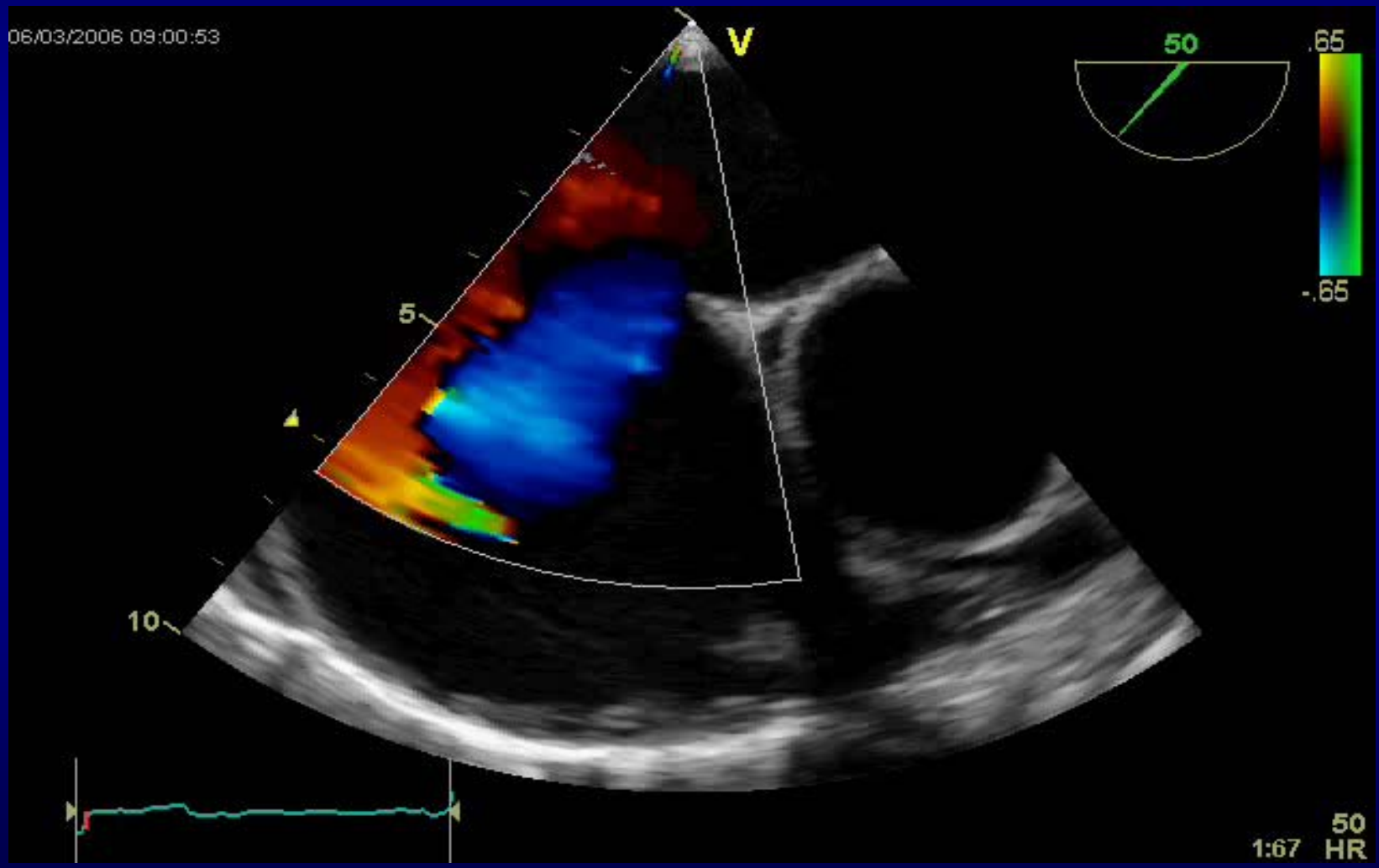
Echo: „ideal“ ASD



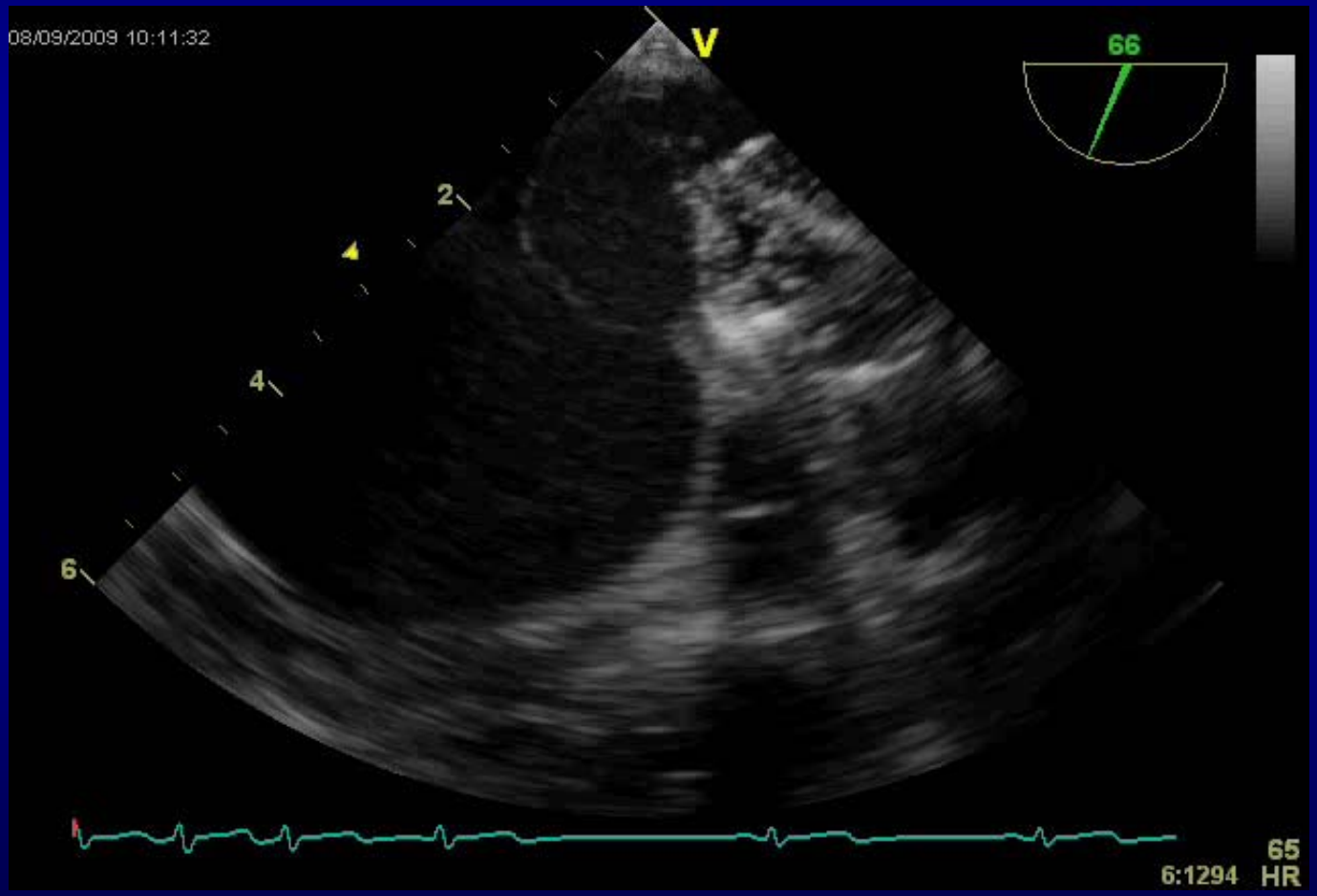
„Ideal ASD“



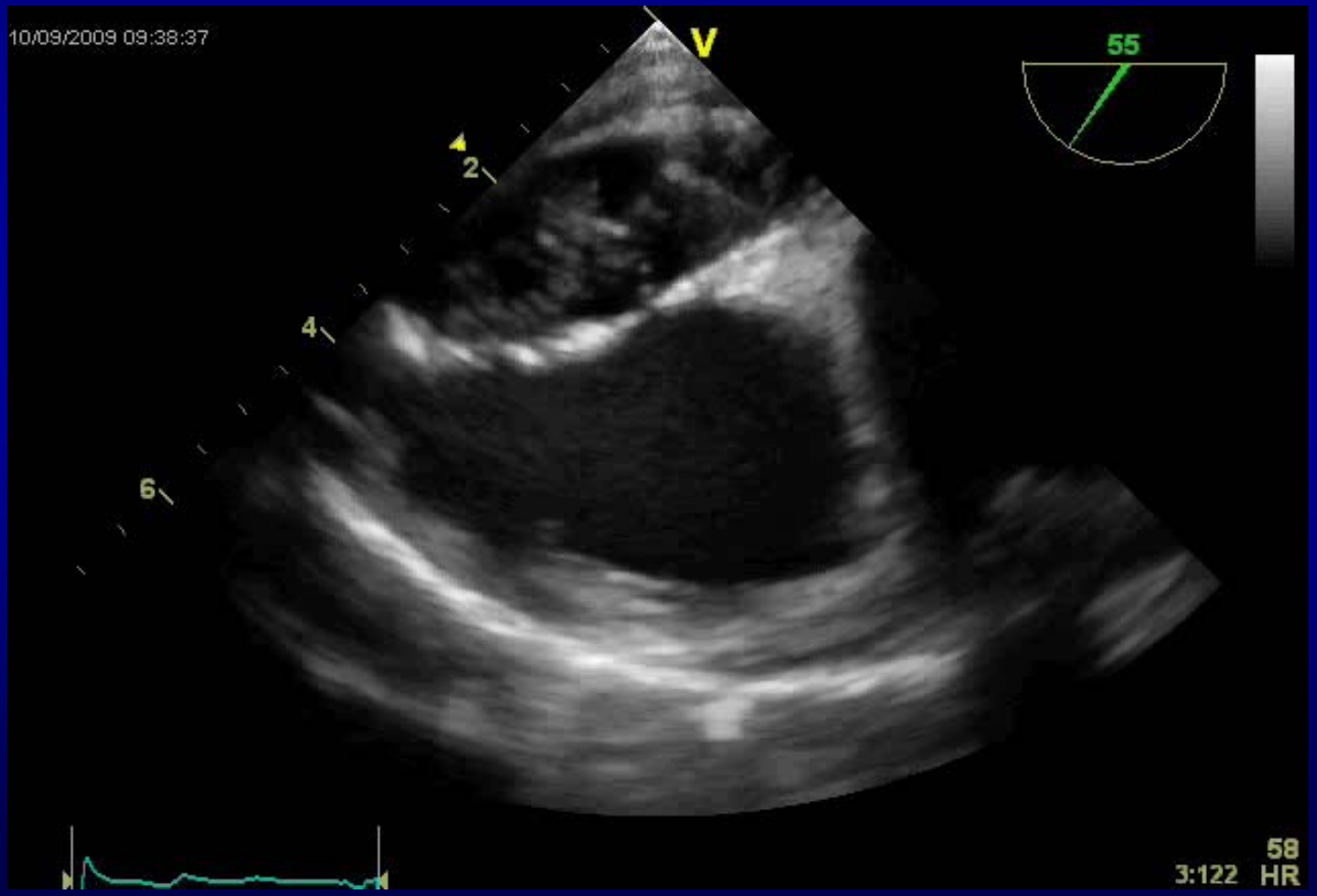
„Ideal ASD“



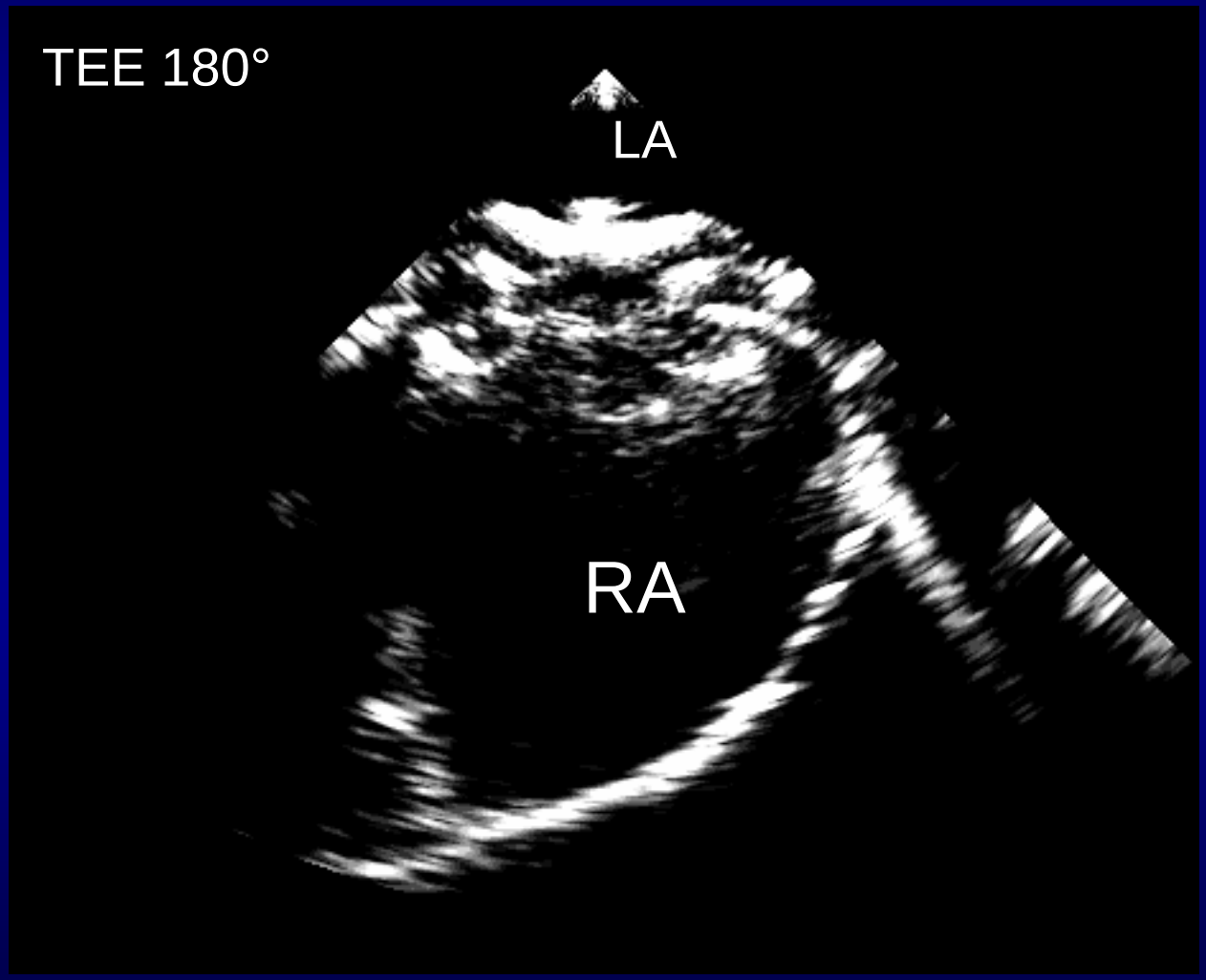
Procedure: Ballon sizing



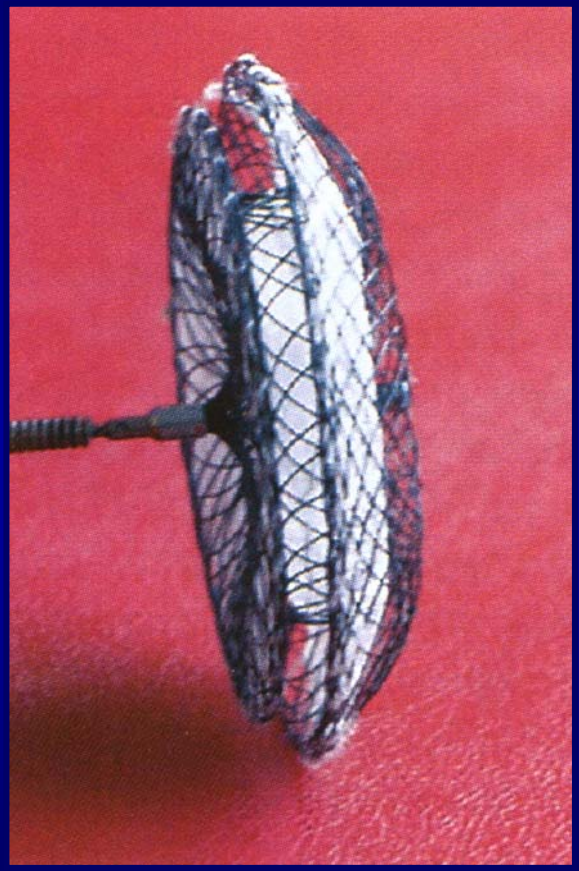
Procedure: Ballon sizing



Echo: Amplatzer



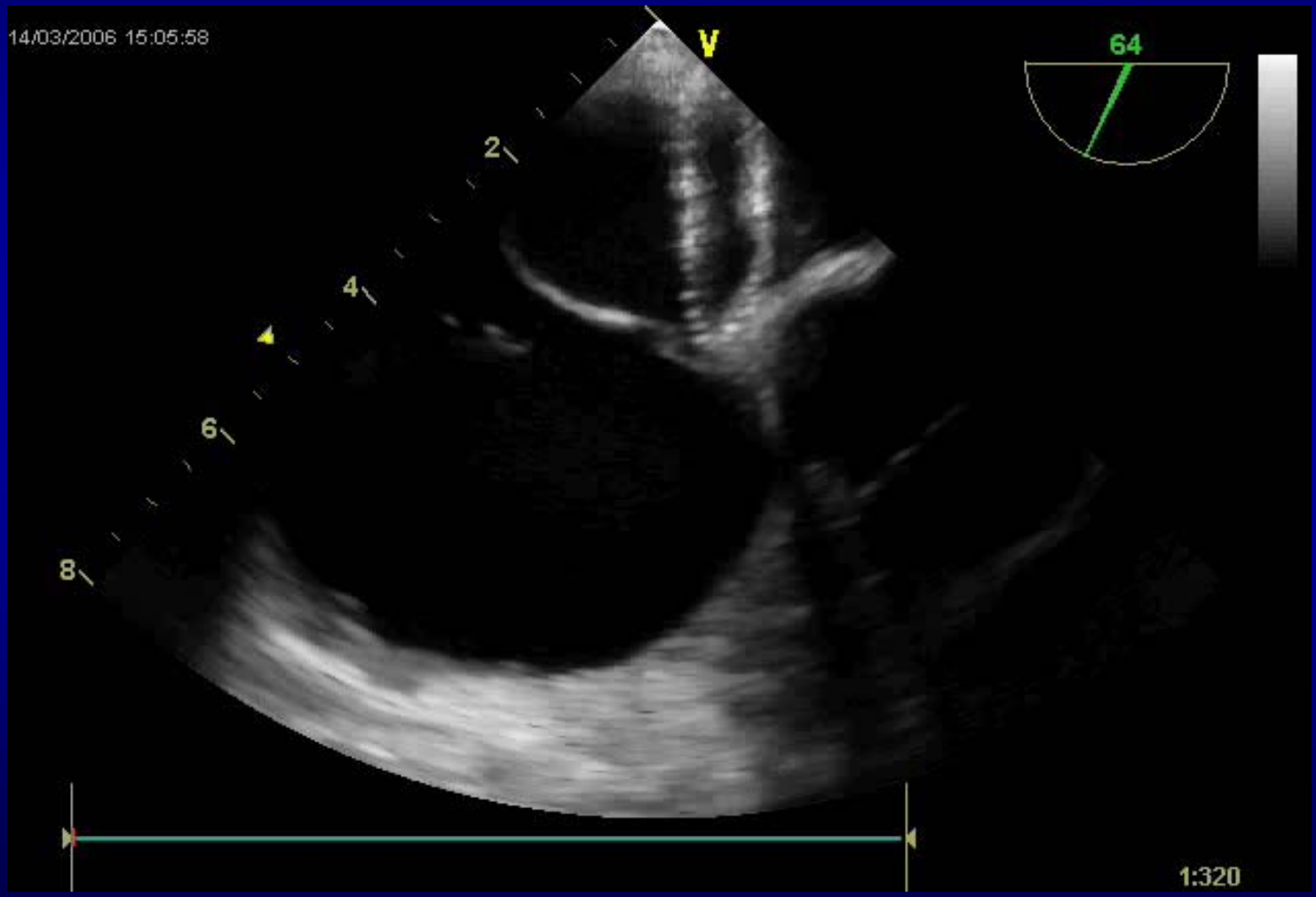
Amplatzer



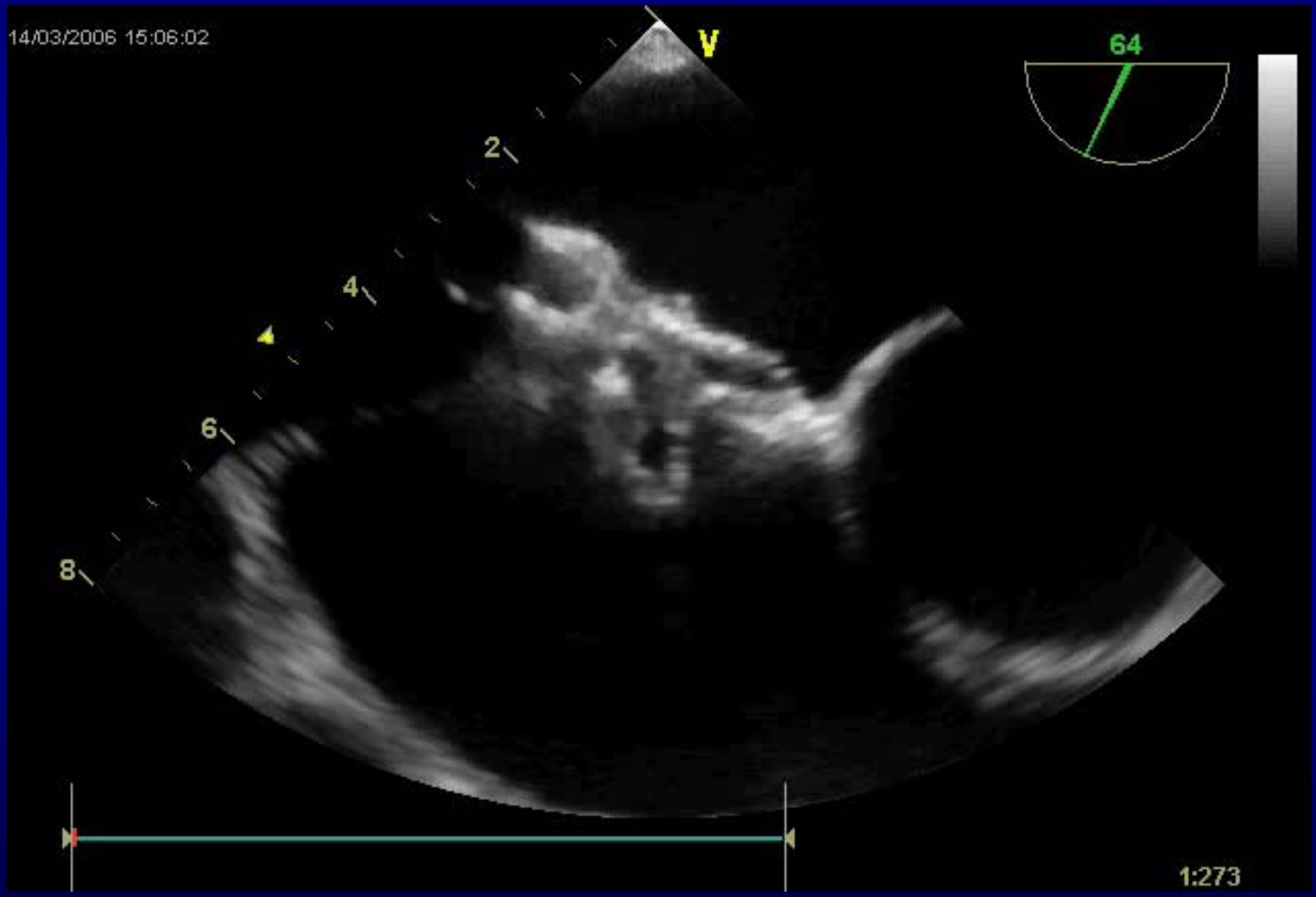
Grösse : 4 - 38 mm

Material : 3 Polyestermembranen

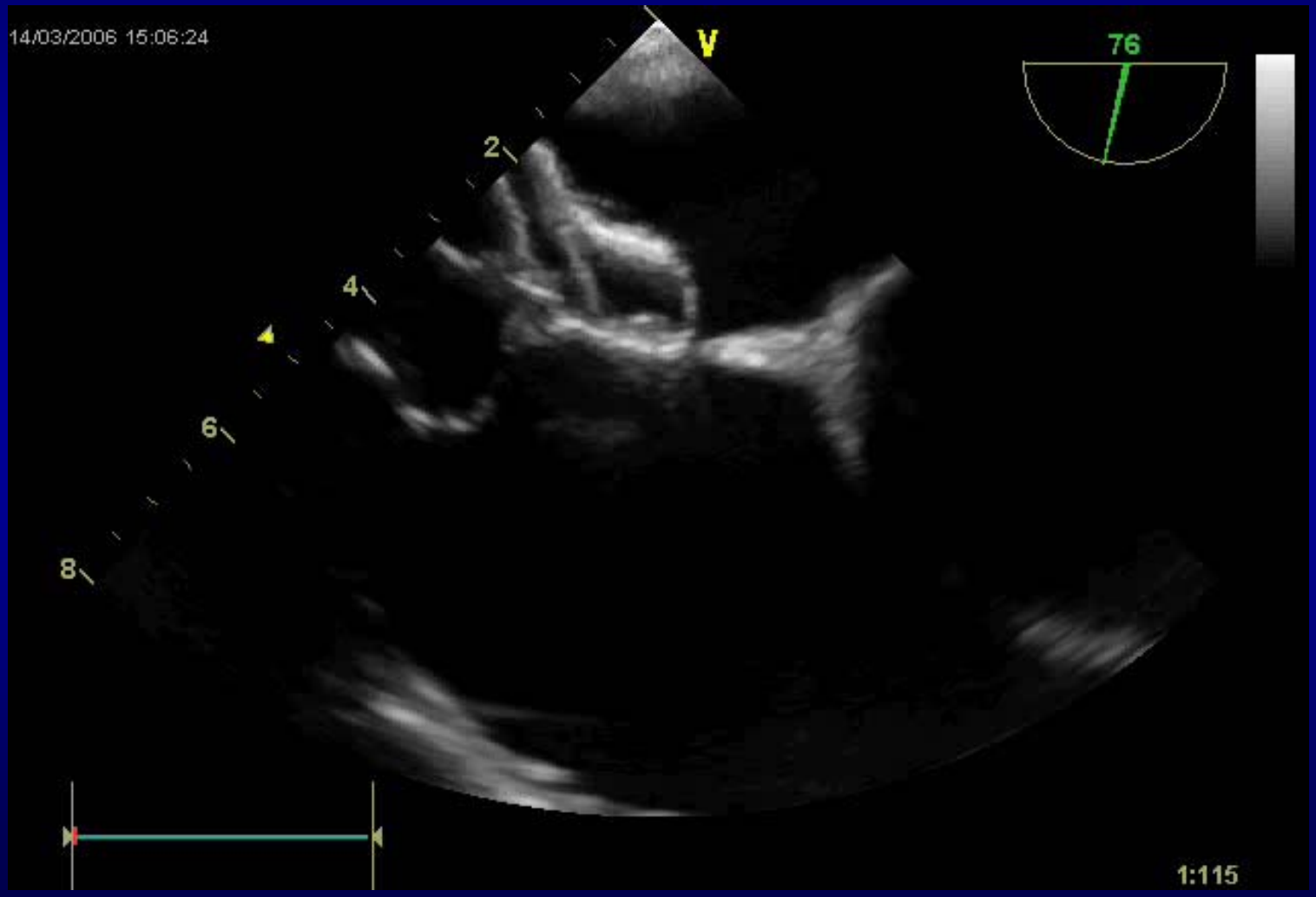
Procedure: „simple“ ASD



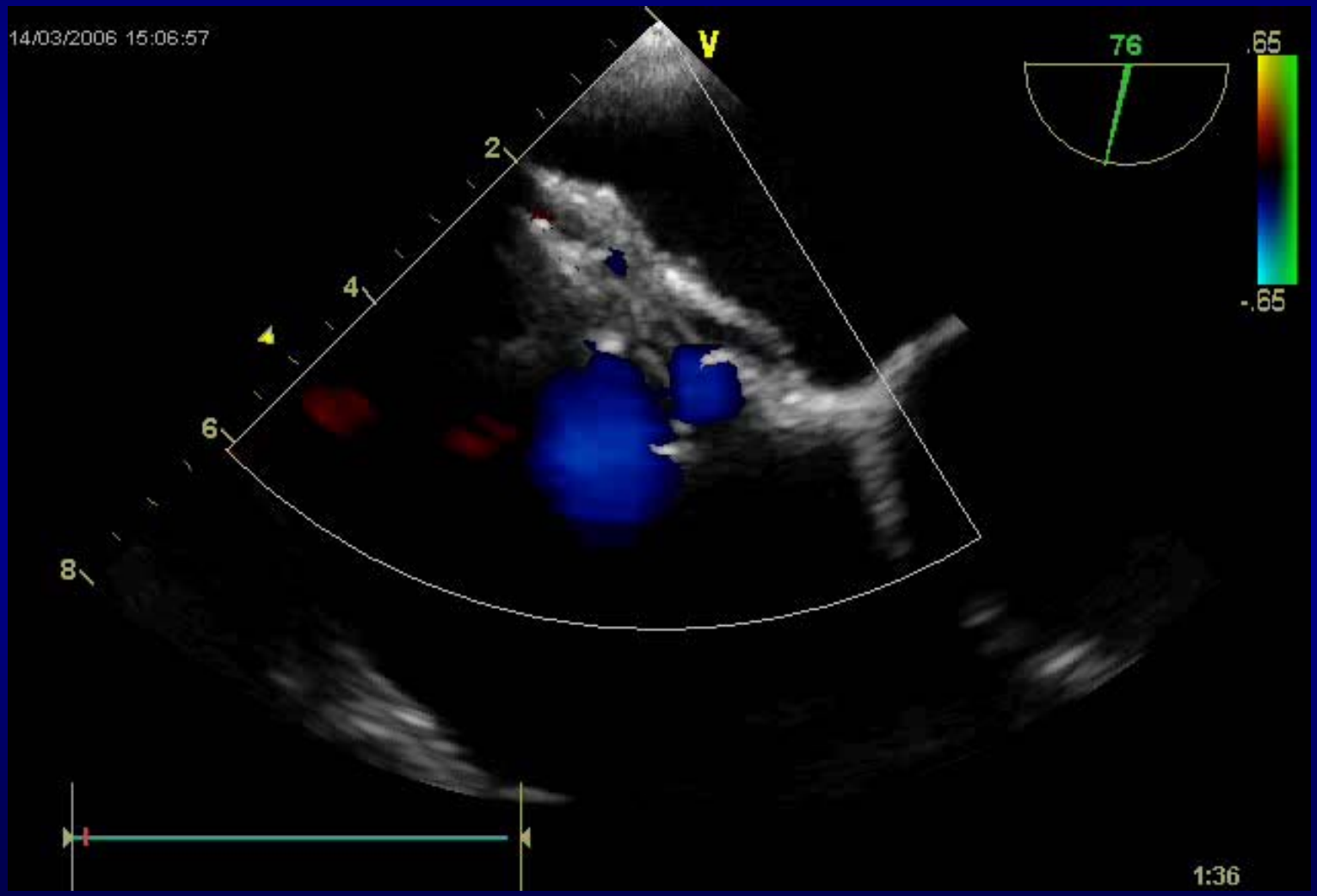
„simple“ ASD



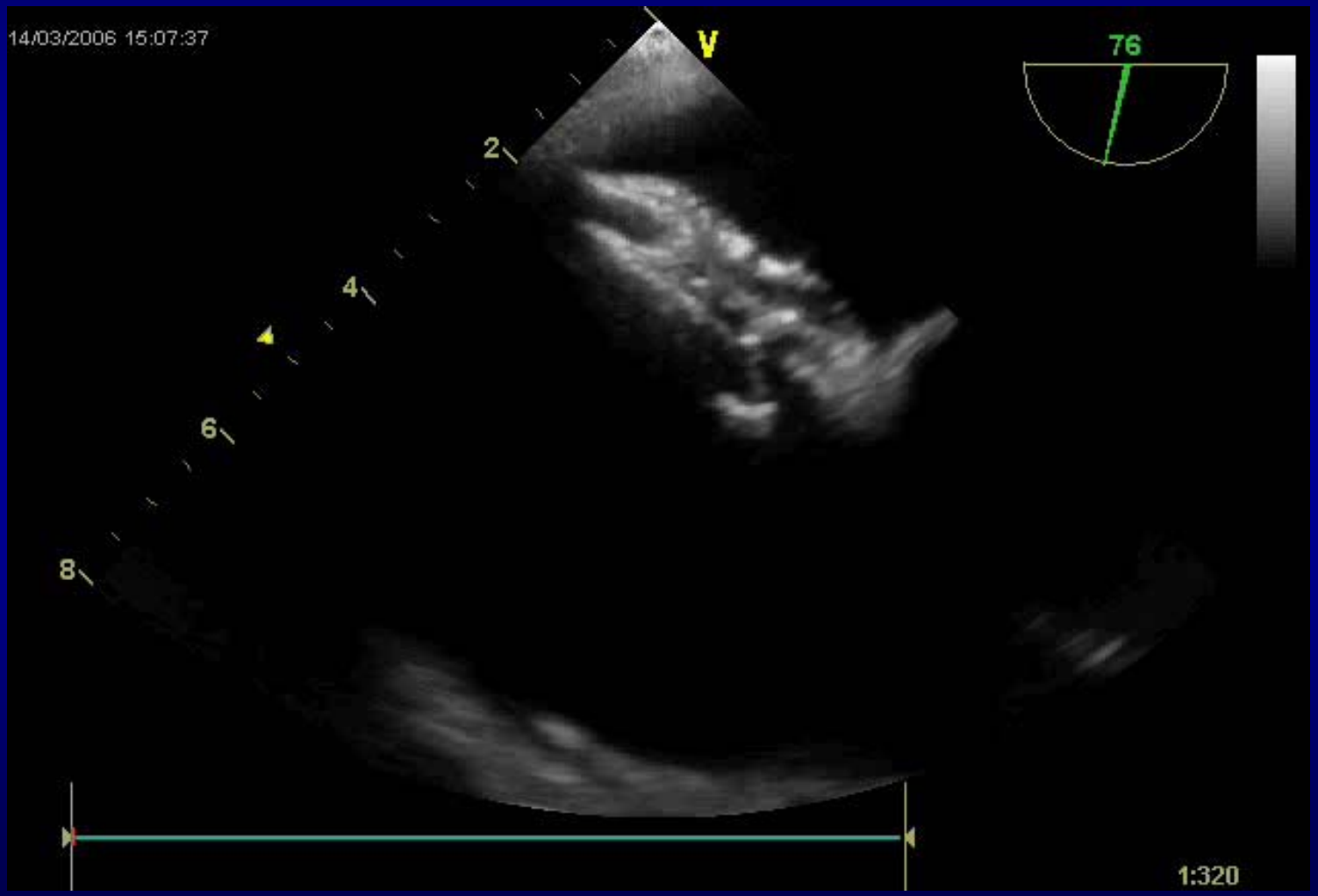
„simple“ ASD



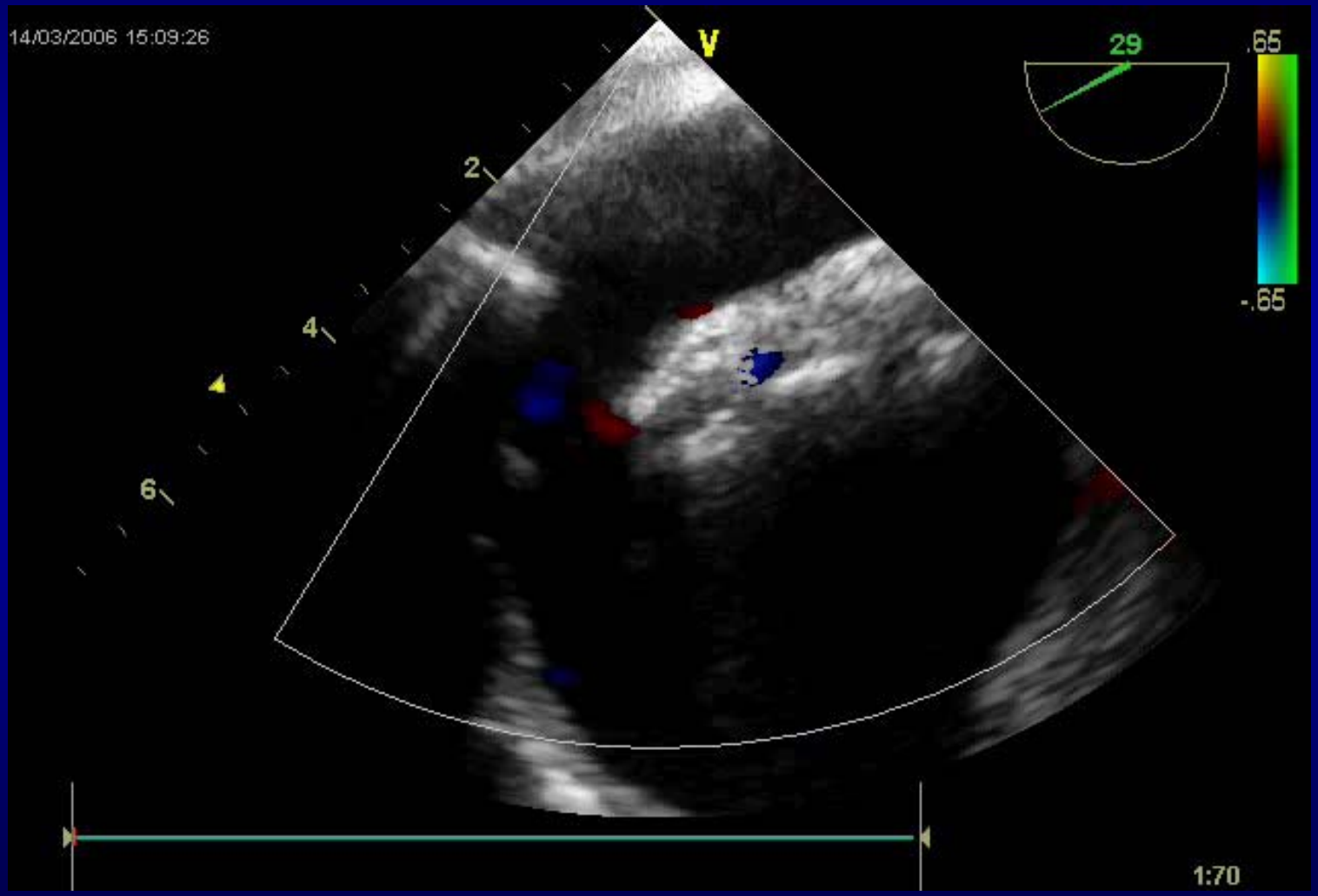
„simple“ ASD



„simple“ ASD



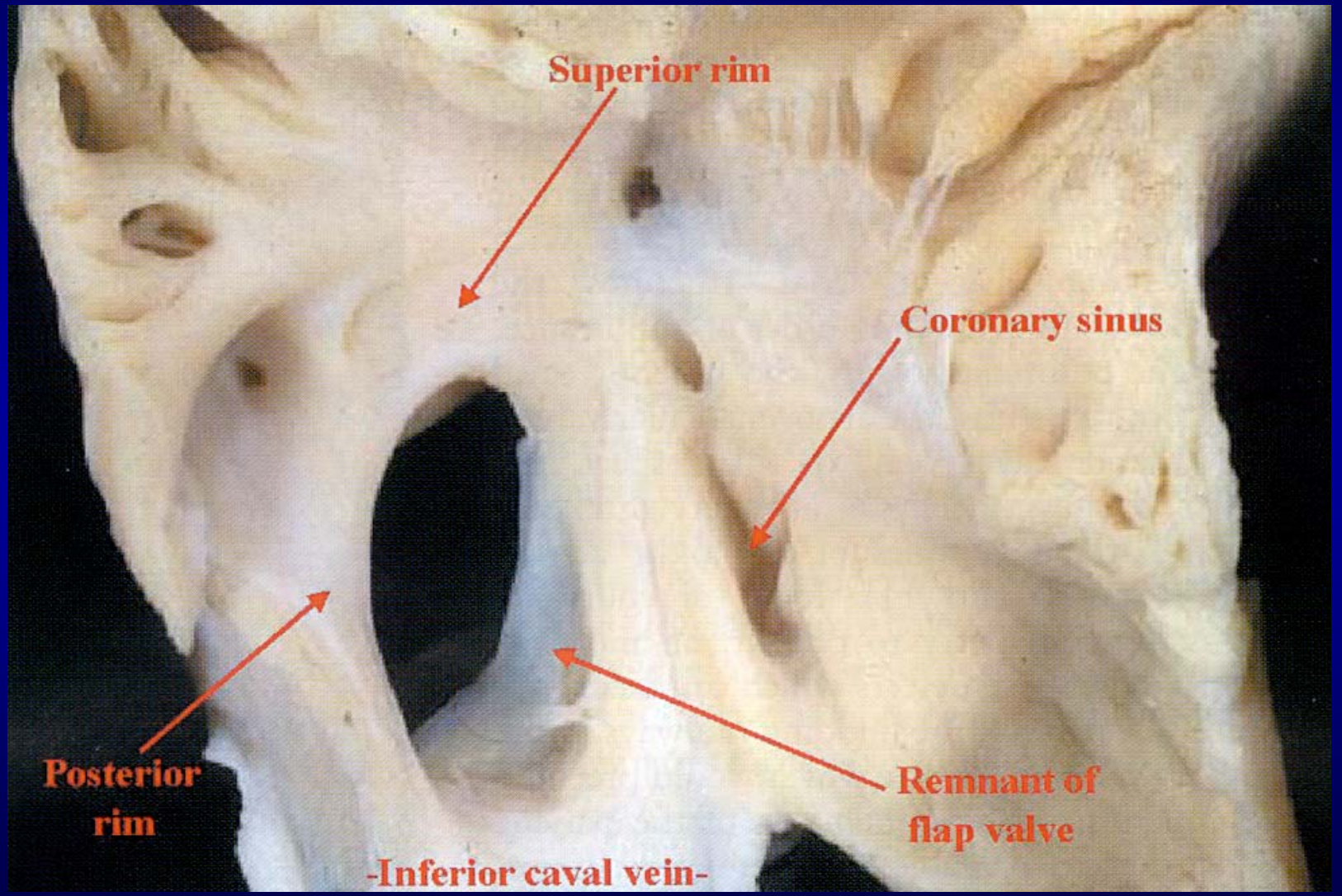
„simple“ ASD



Unsuitable Anatomy

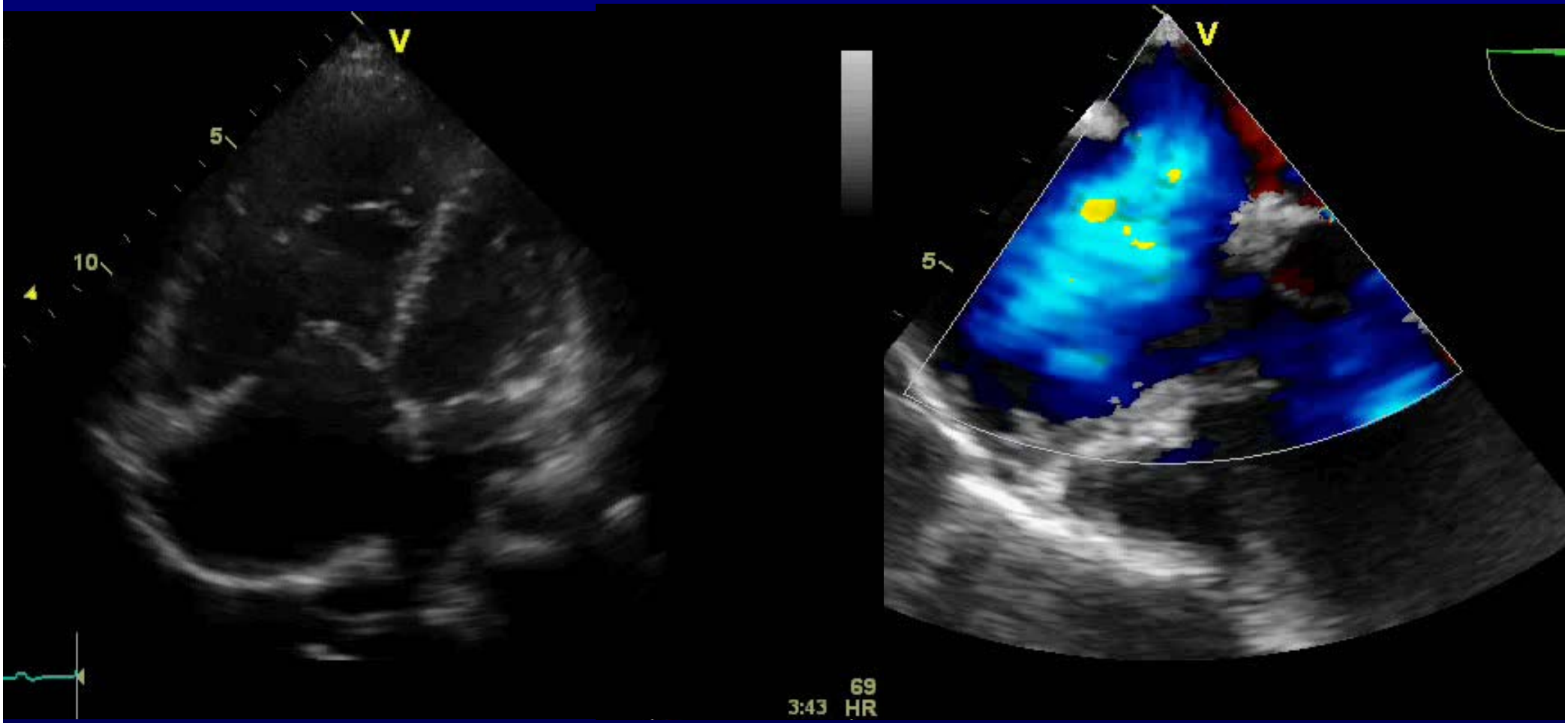
- Defekt too big (46% of abandoned procedure):
  nativ Diameter x 1,5 + 14 mm < lenght of IAS
- No adaequate rims
  - Ant. Inf. -> mitral valve
  - Ant. Sup. -> aortic valve
  - Post. Inf. -> IVC
  - Post. Sup.-> SVC, right pulmonary veins

Anatomy of big ASD II



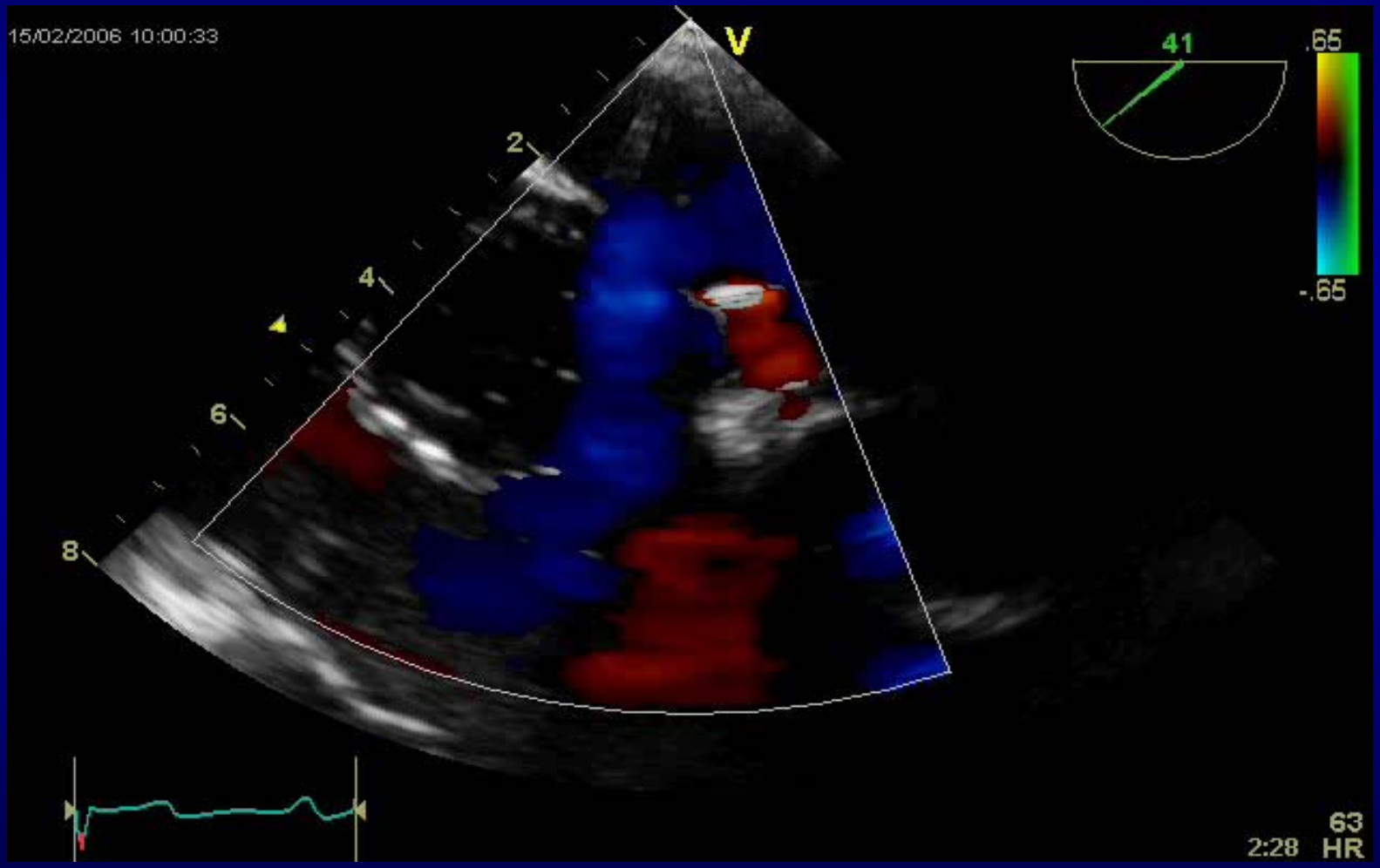
Thanks to Bob Anderson

Large ASD



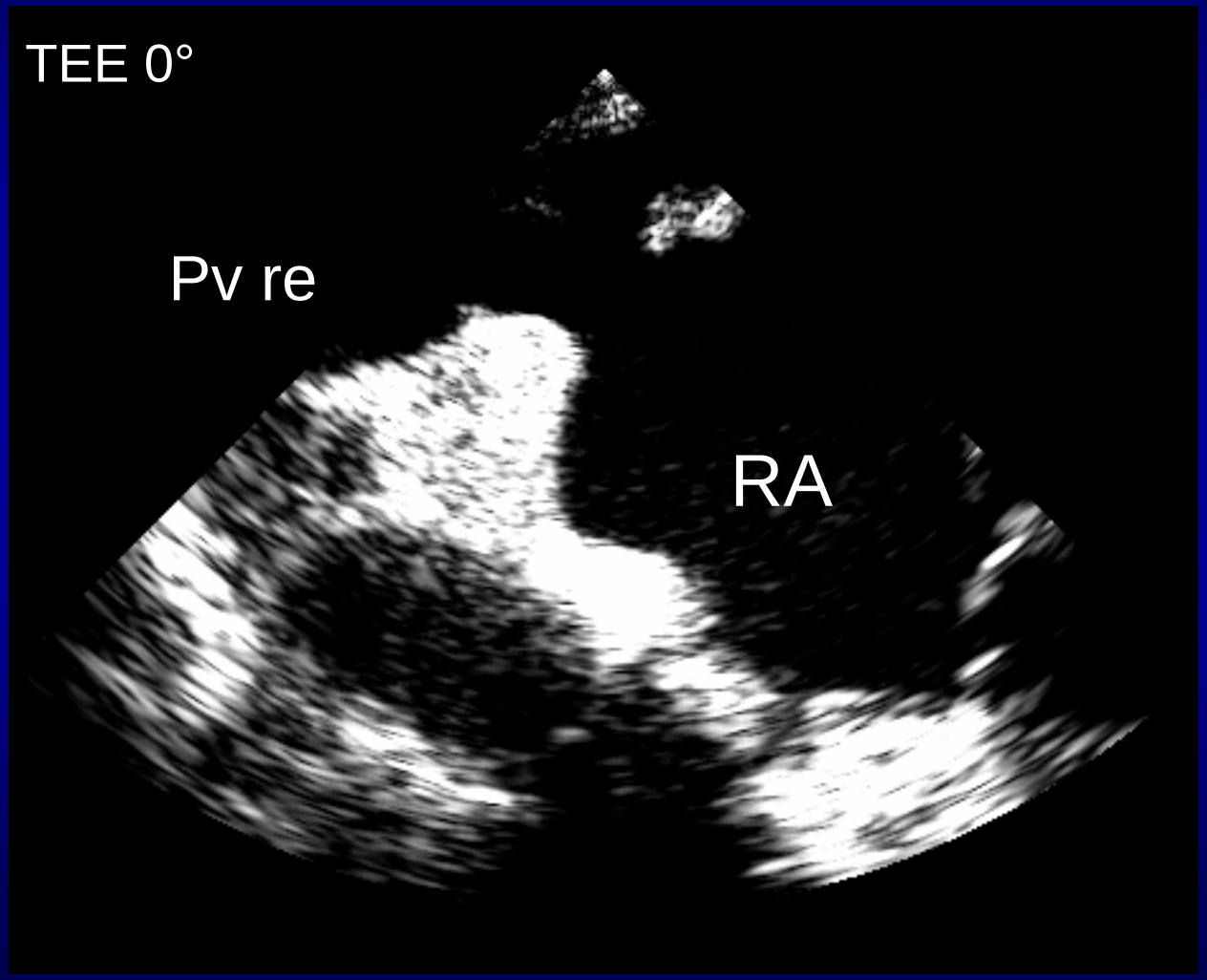
TTE native 31; Septum 50 mm, TEE 26 mm

Large ASD

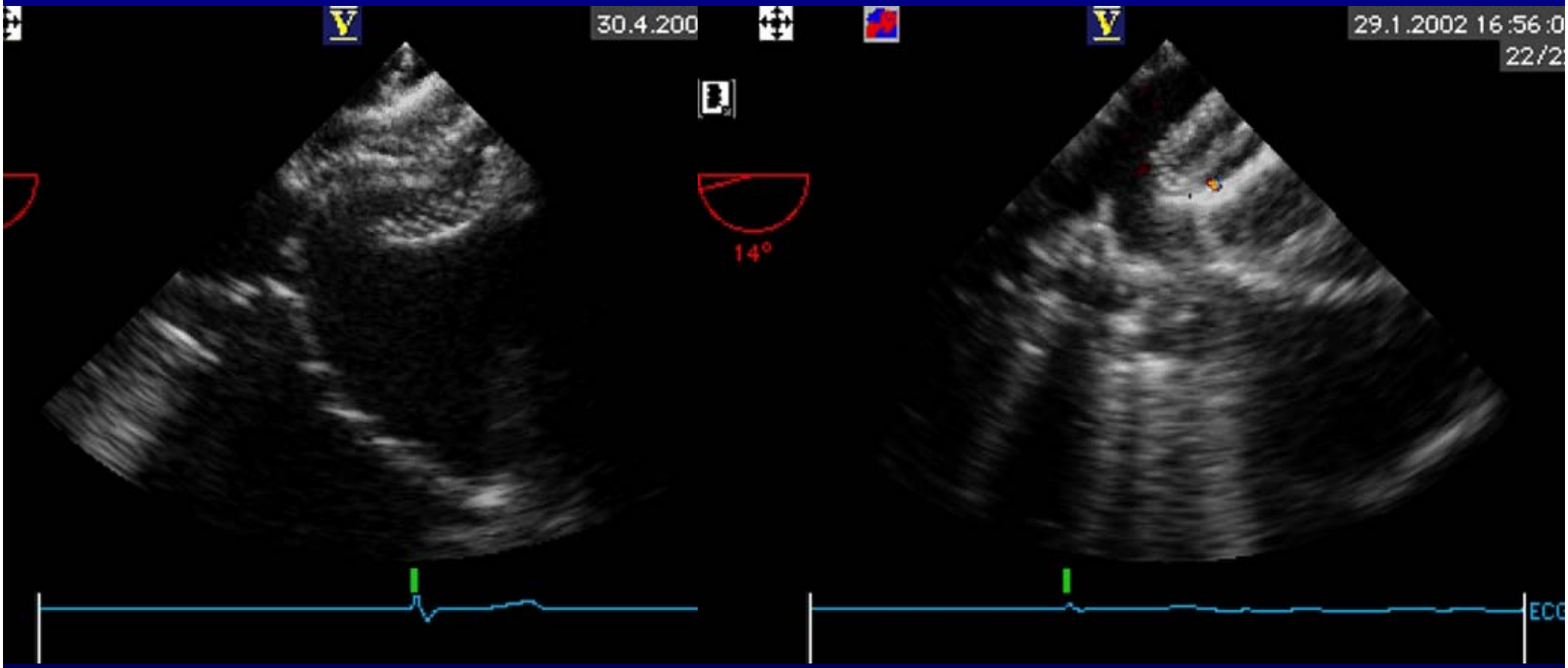


BOD: more than 32 mm: OP-indication

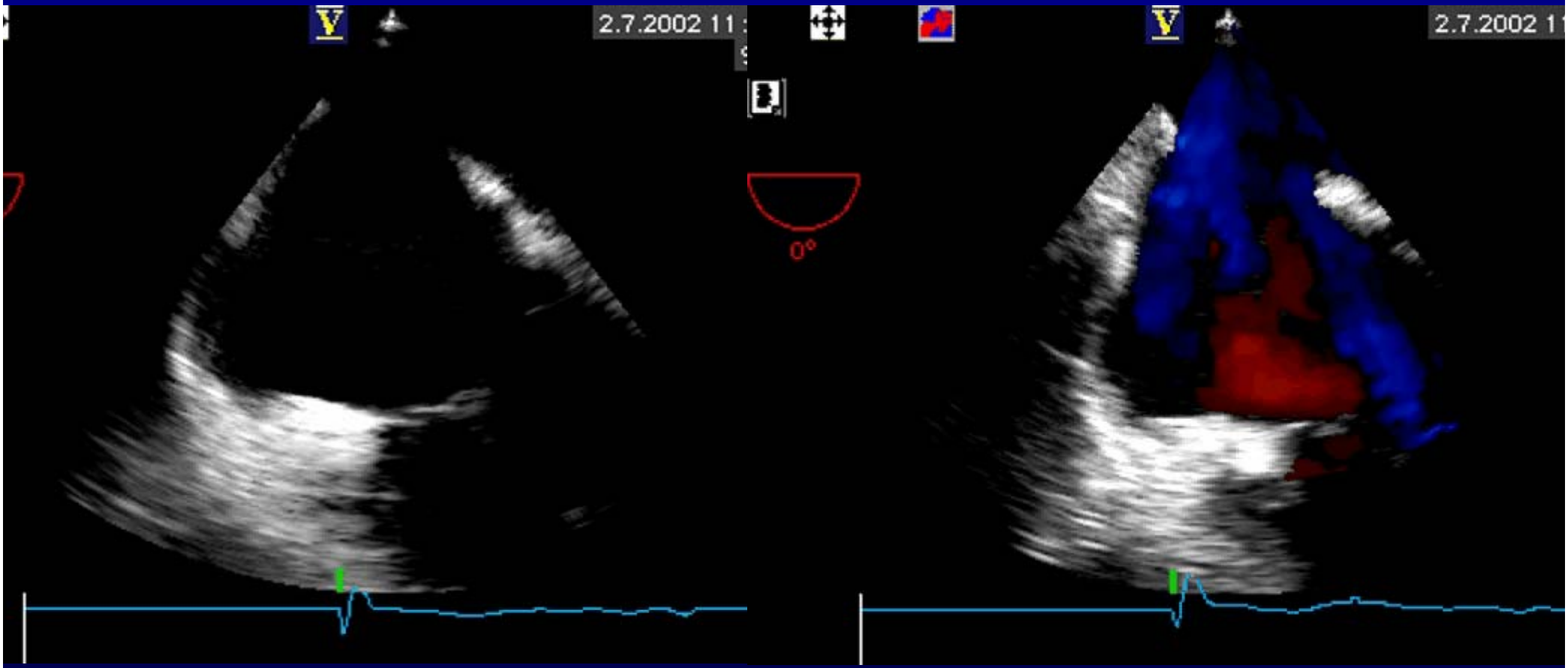
Echo: posterior ASD



TEE: post rim

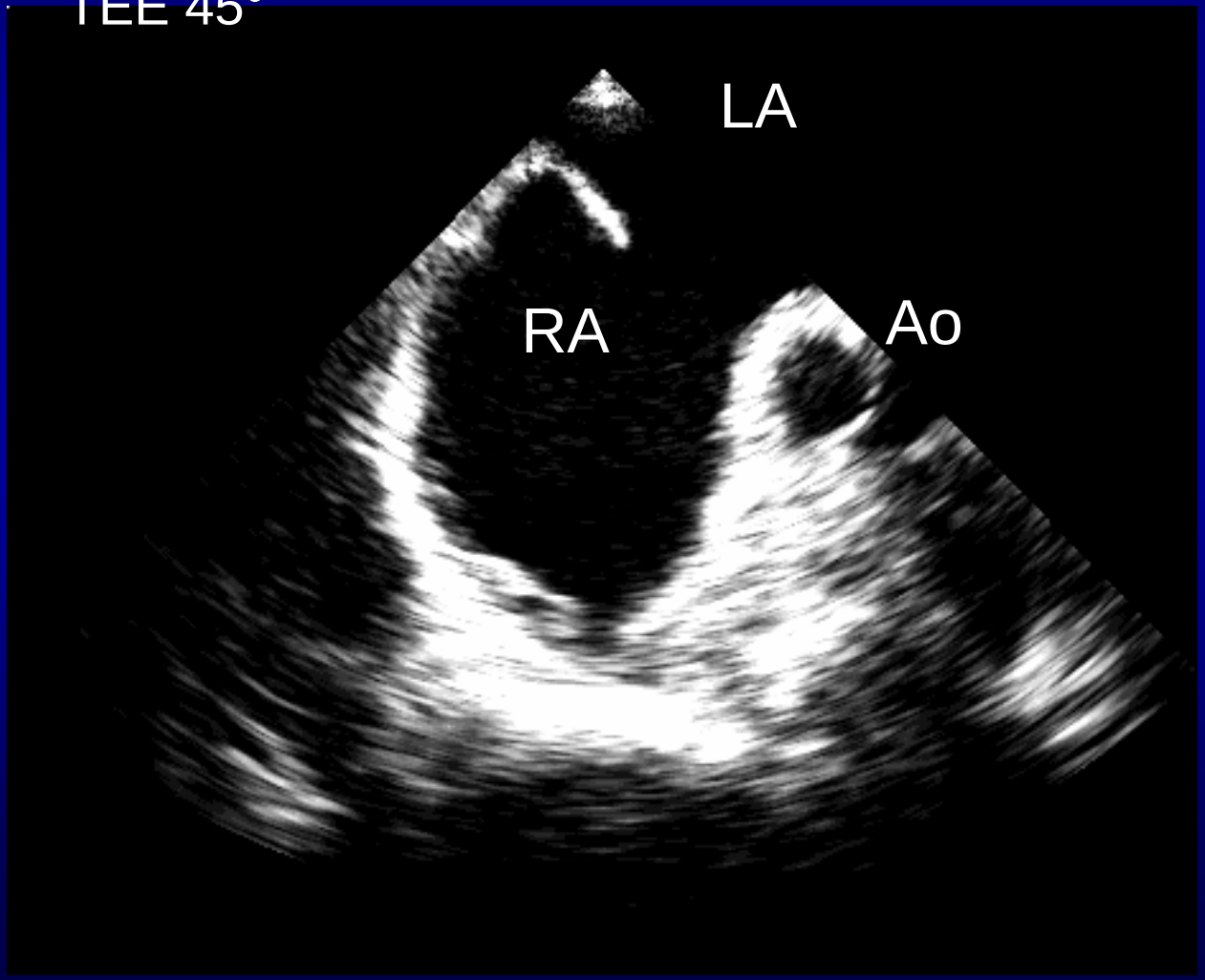


Lack of posterior rim

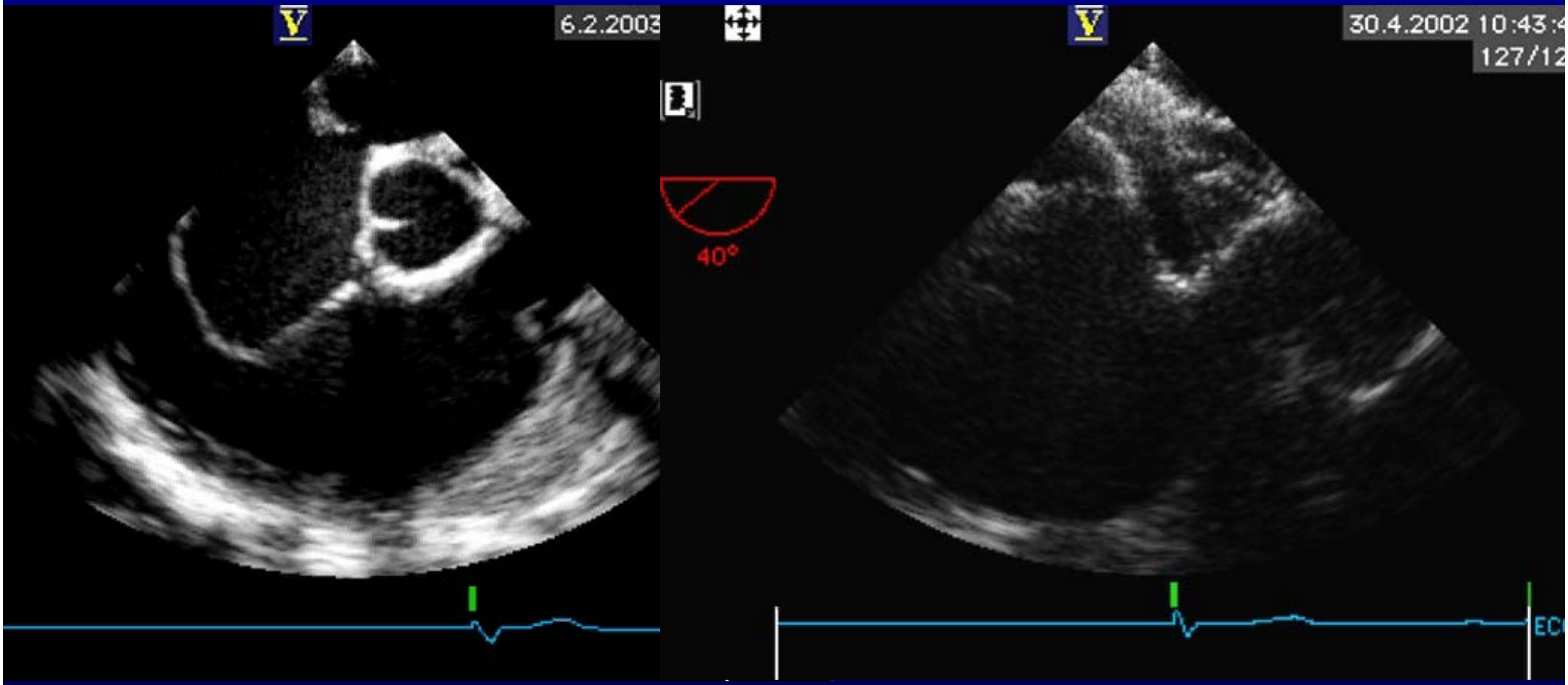


Echo: anterior - sup ASD

TEE 45°

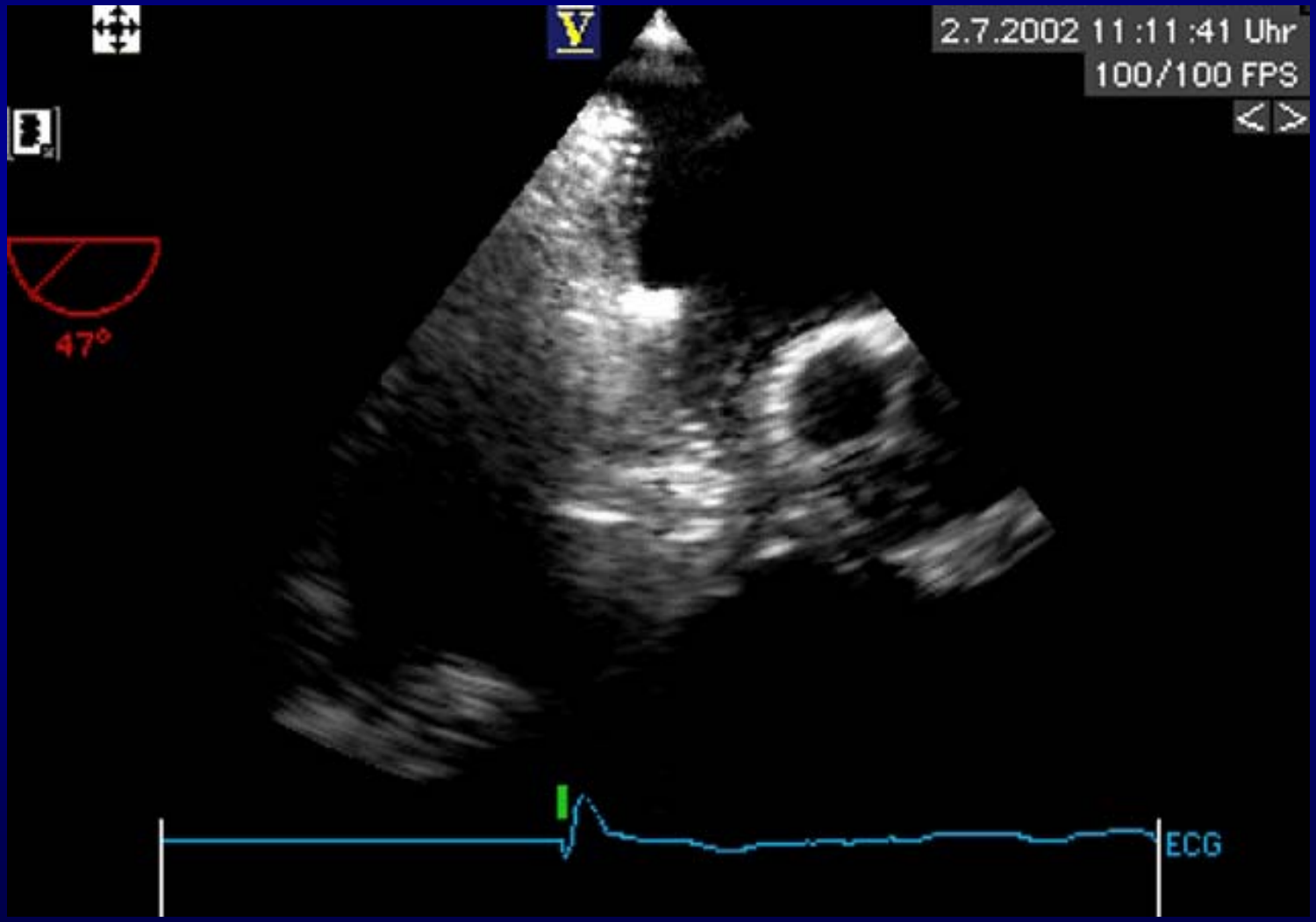


Lack of ant. sup. rim

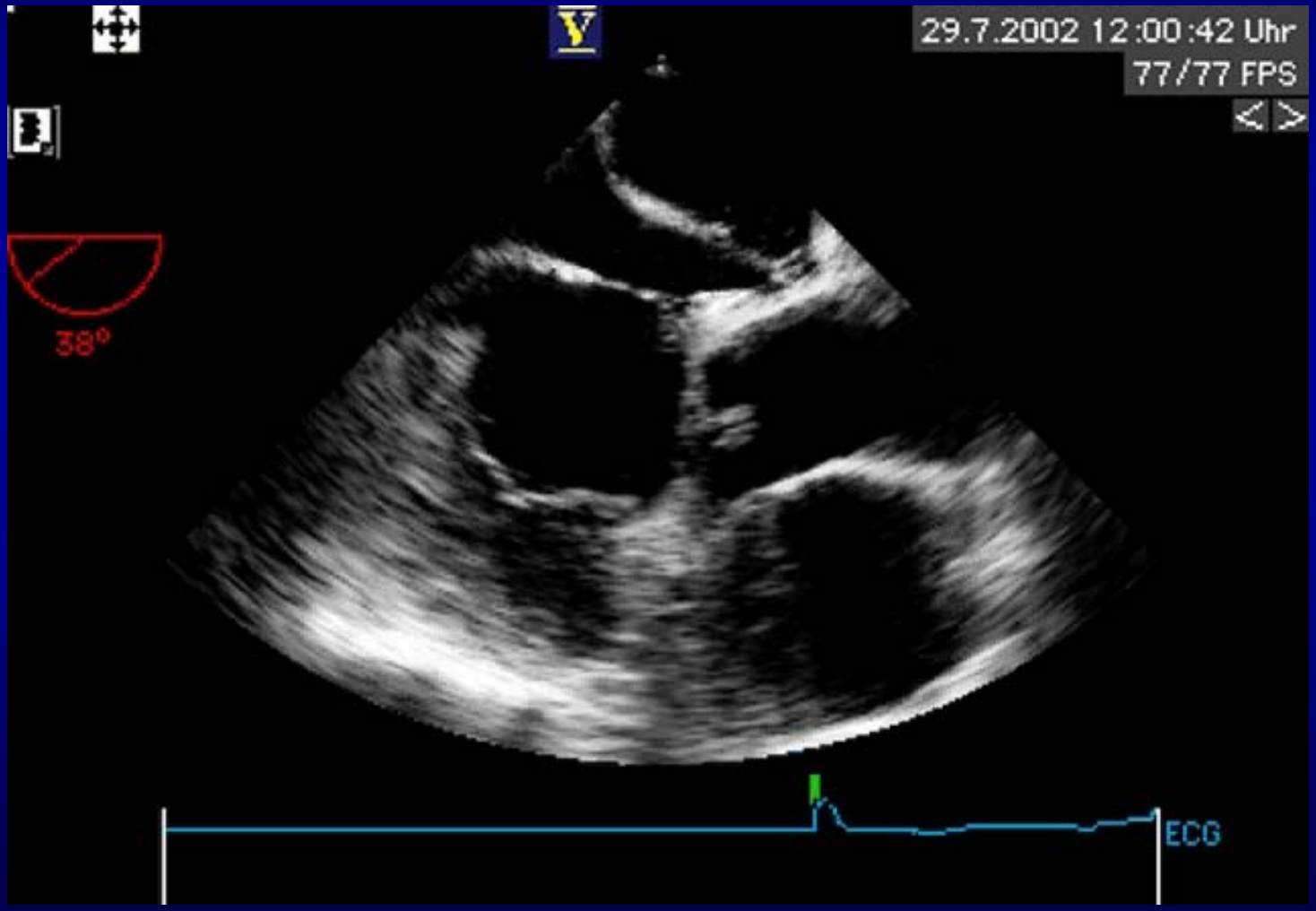


JACC 2005:45;1213-8

Lack of ant. sup. rim:

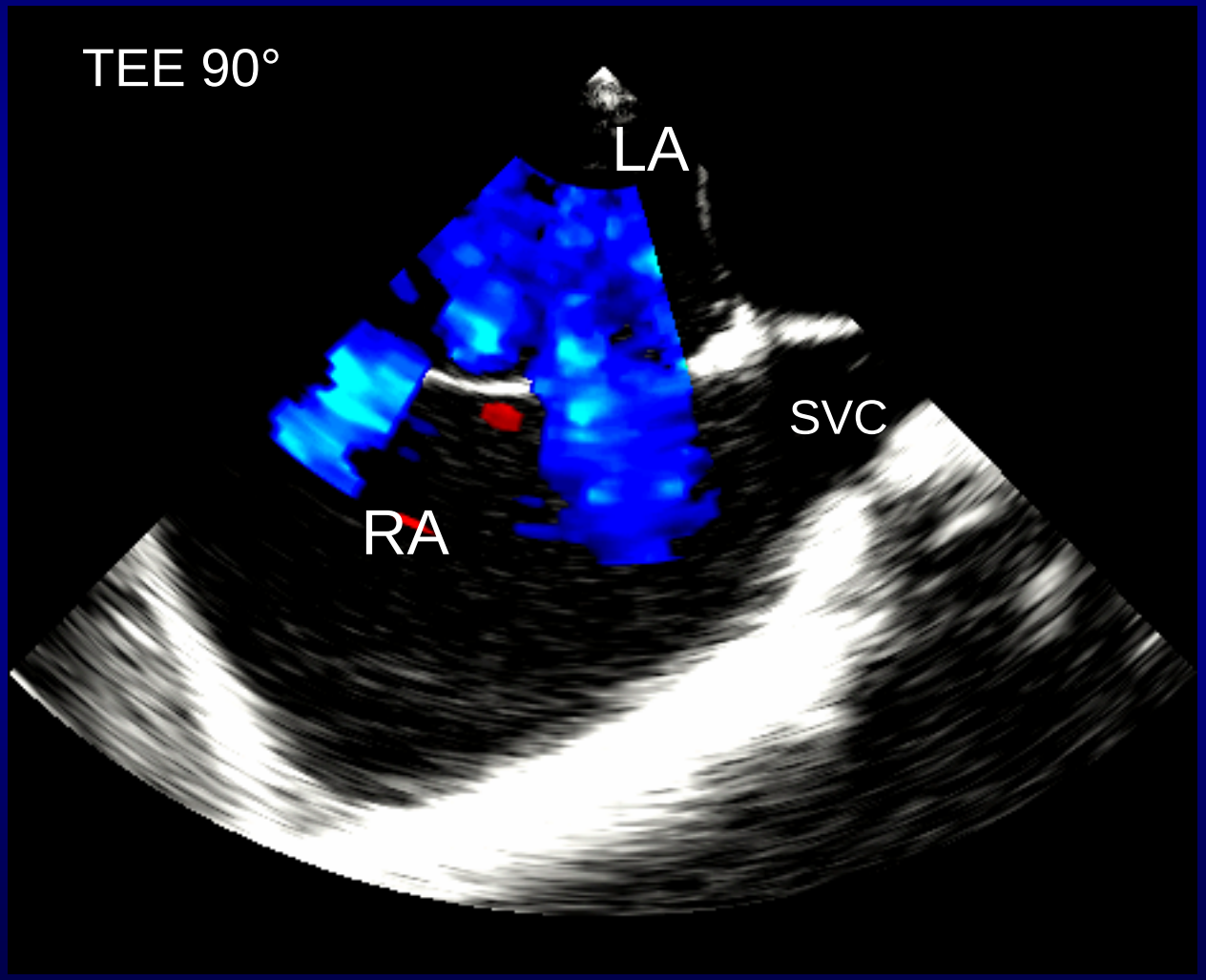


Difficult anatomy

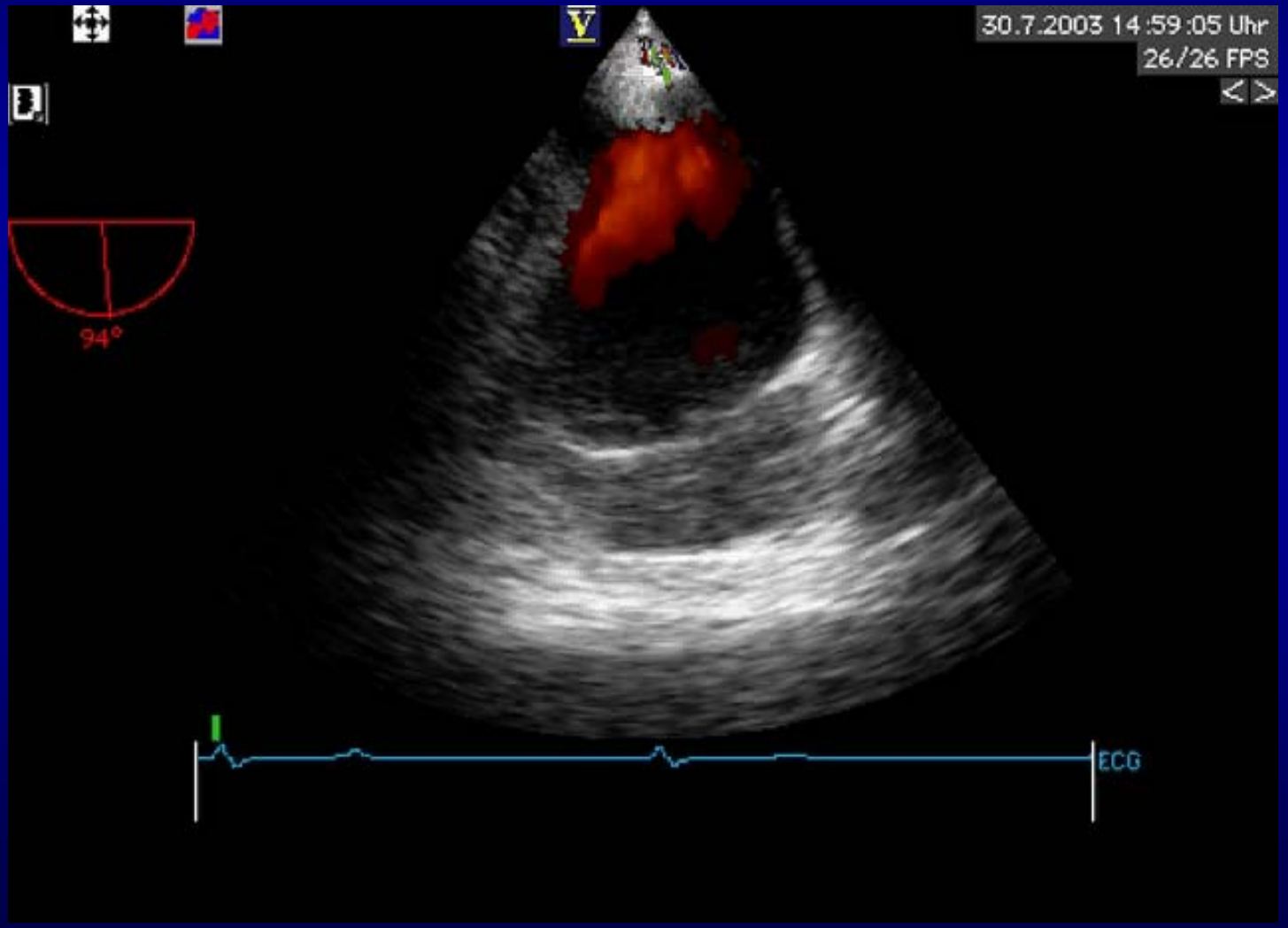


What´s the right hole??

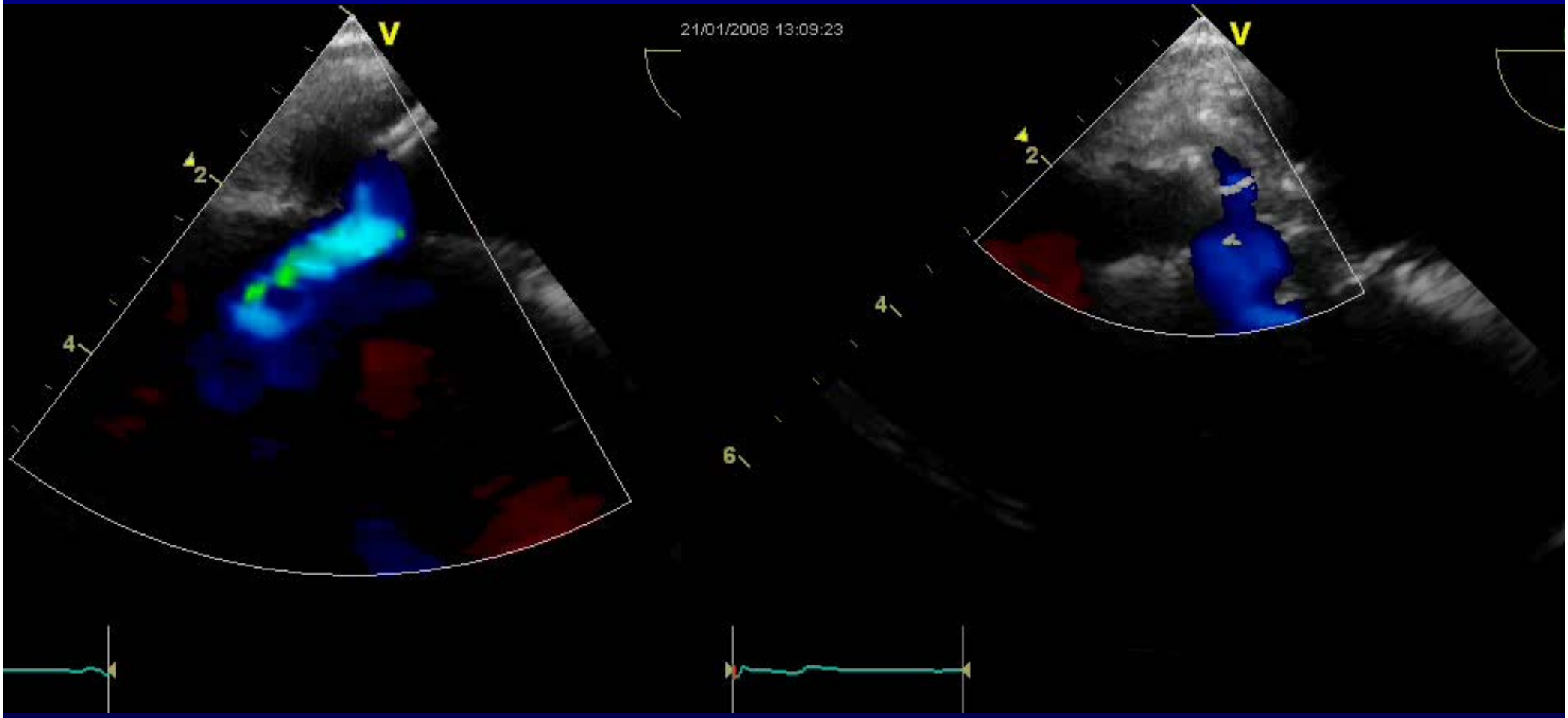
Multiple ASD II



Multiple ASD`s



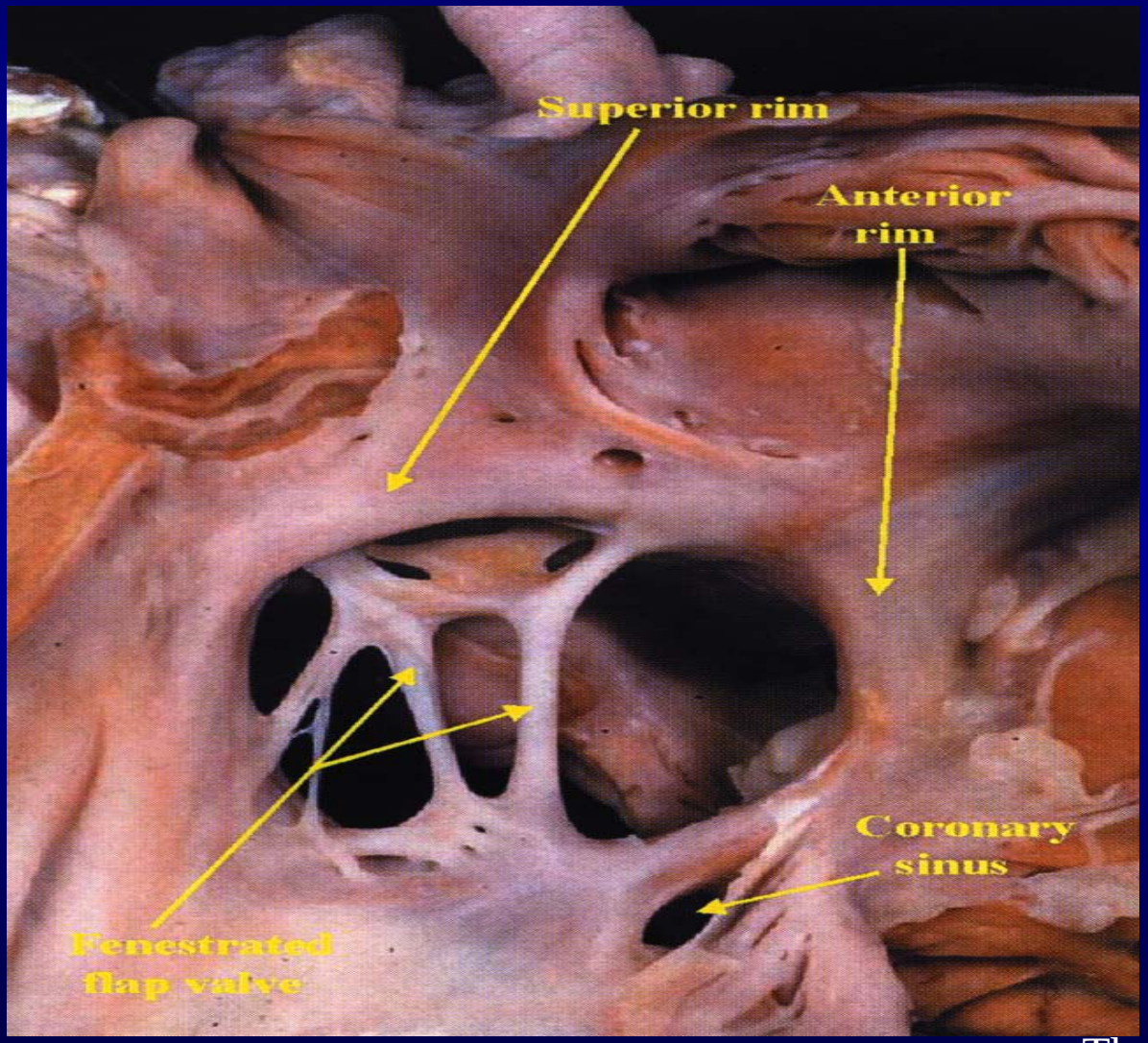
ASD II plus PFO



ASD II plus PFO

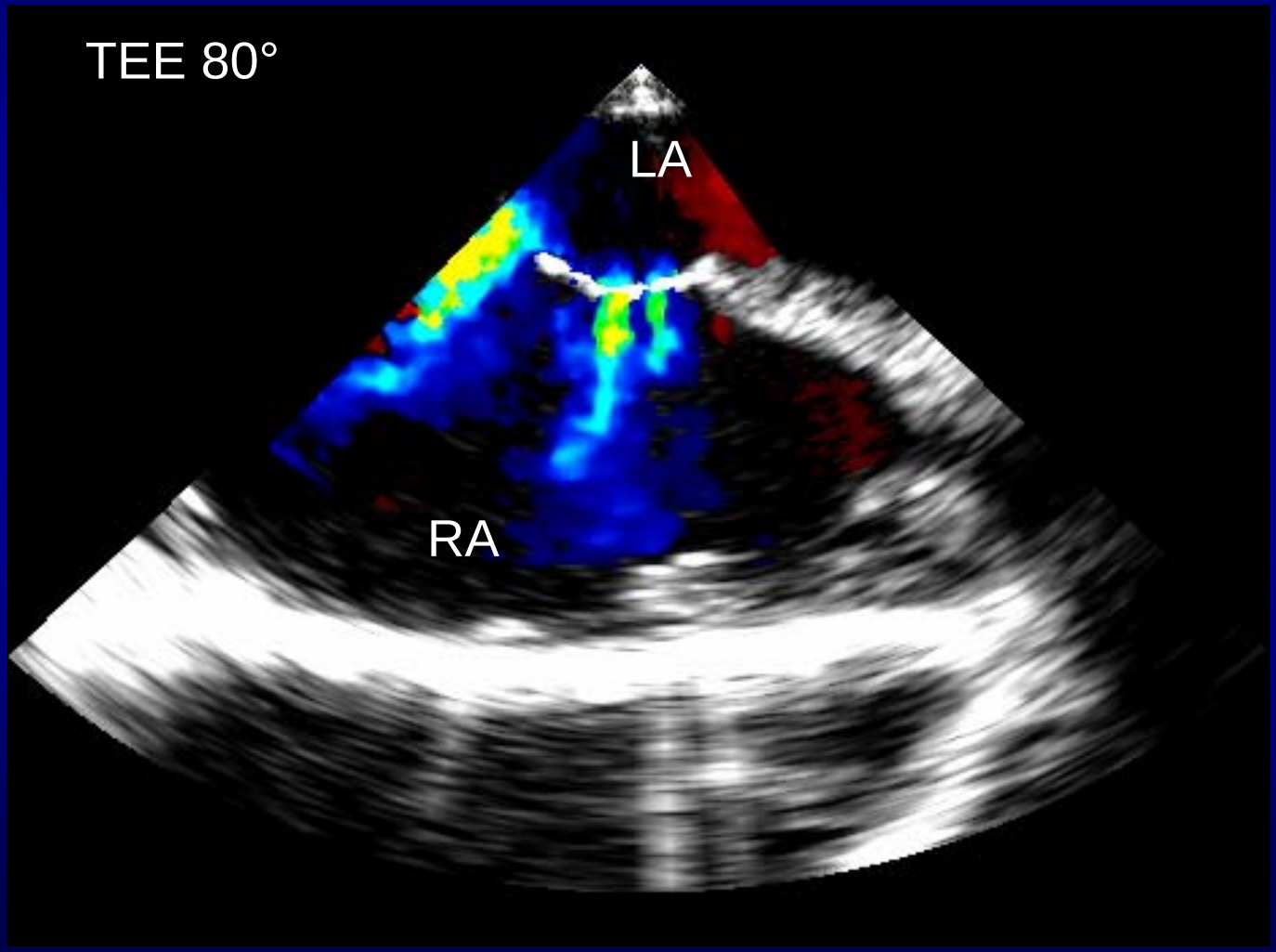
10 mm Amplatzer ASD Occluder plus 25 mm PFO Occluder

Multifenestrated oval fossa

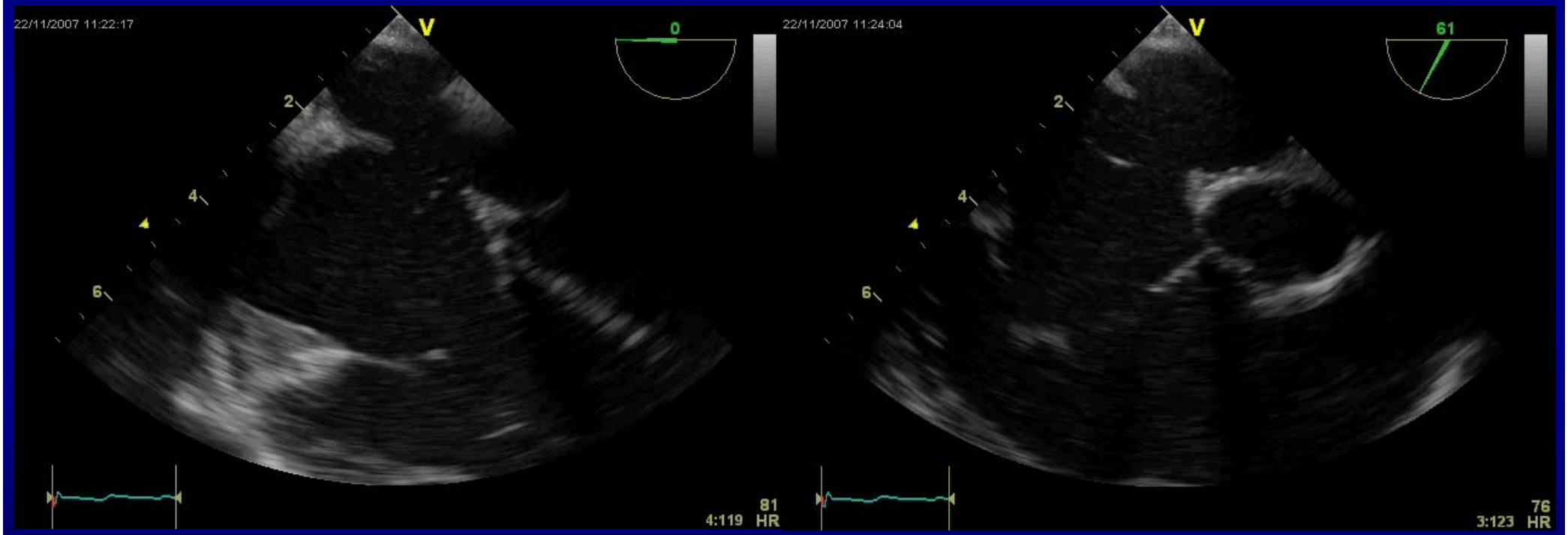


Thanks to Bob Anderson

Multifenestrated fossa ovalis

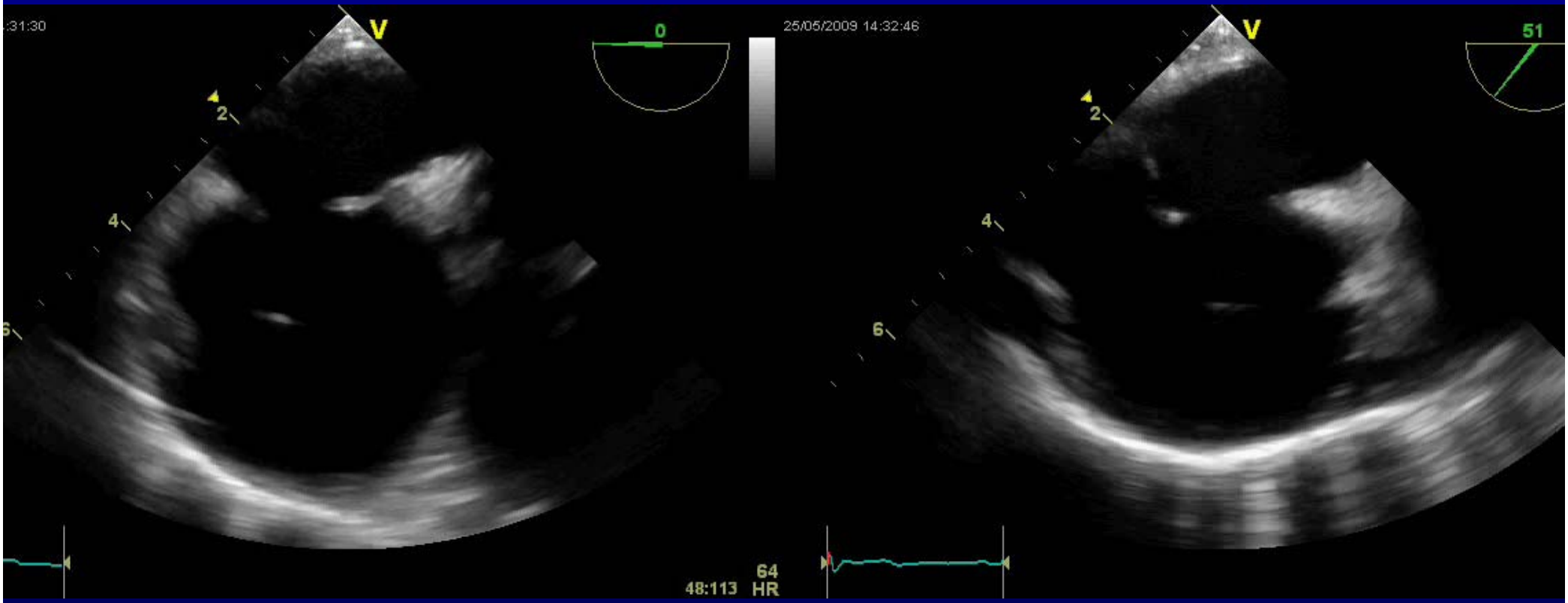


Multifenestrated fossa ovalis



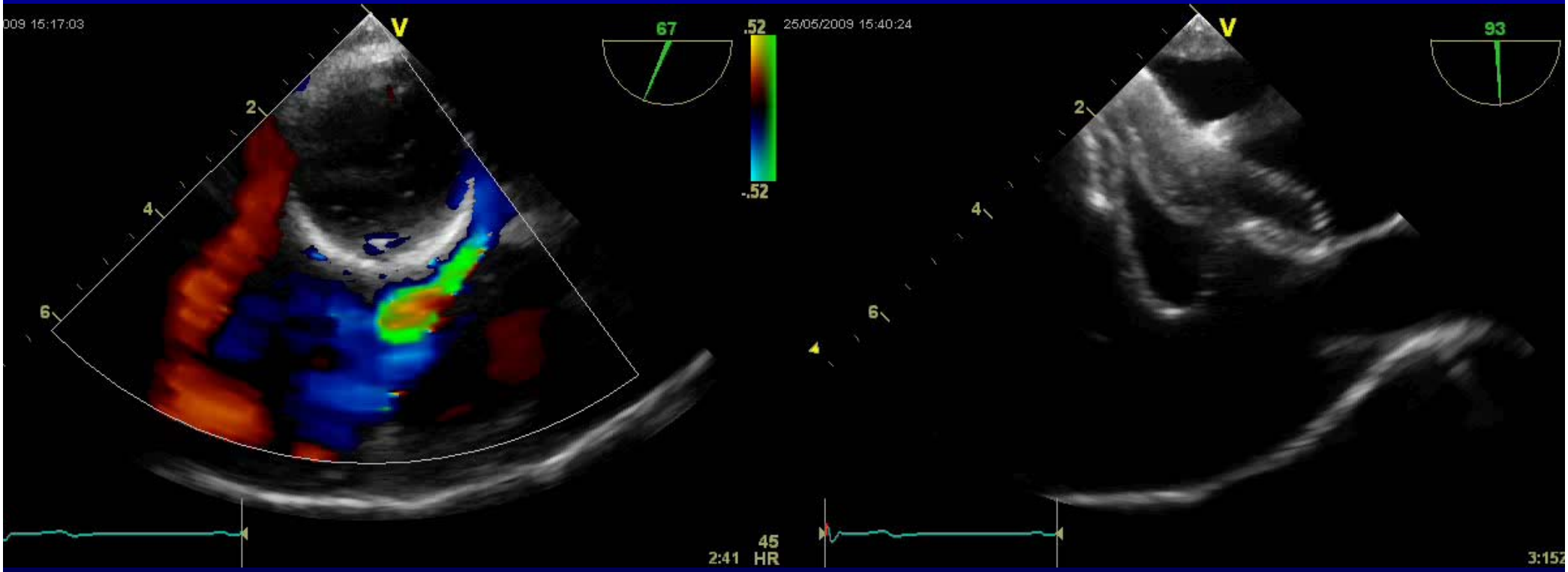
8 y boy, multifenestrated ASD, small ant-inf rim -> OP

Shit happens….



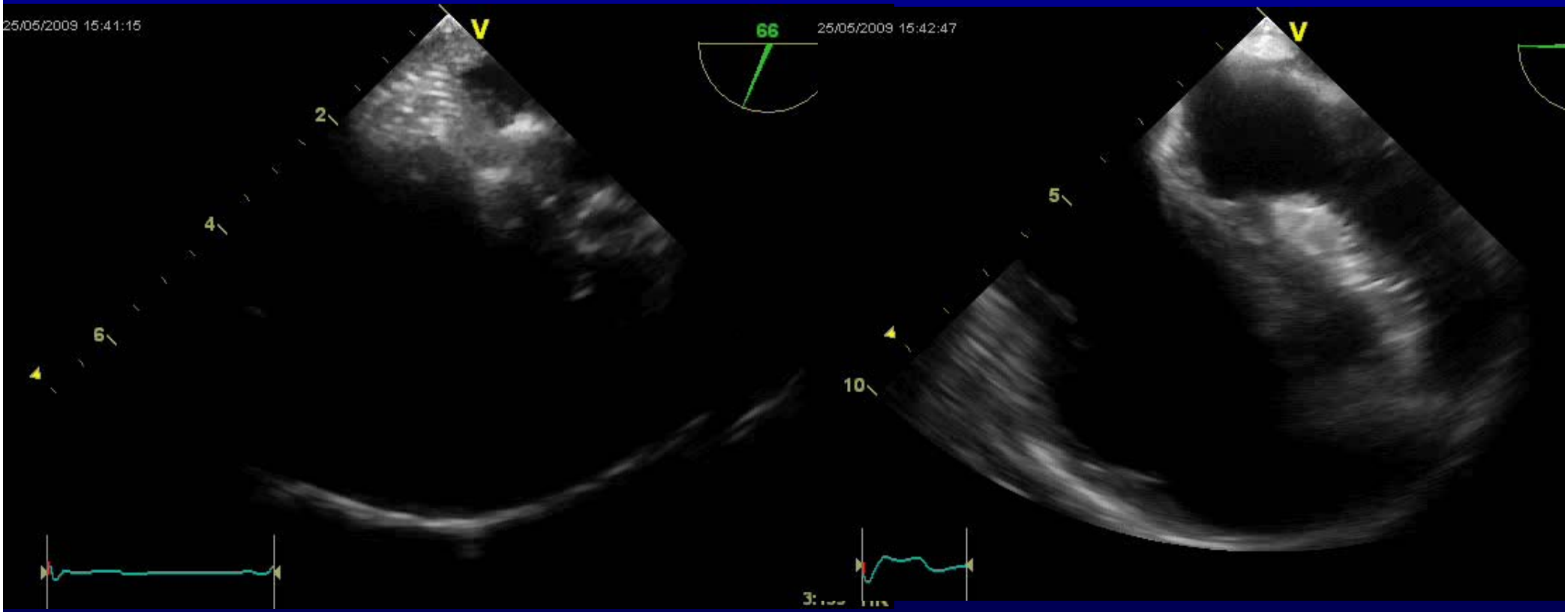
25 y fem., 2 ASD 14-16 and 9 mm

Shit happens….



BOD 28 mm, Amplatzer 32 mm

Shit happens….

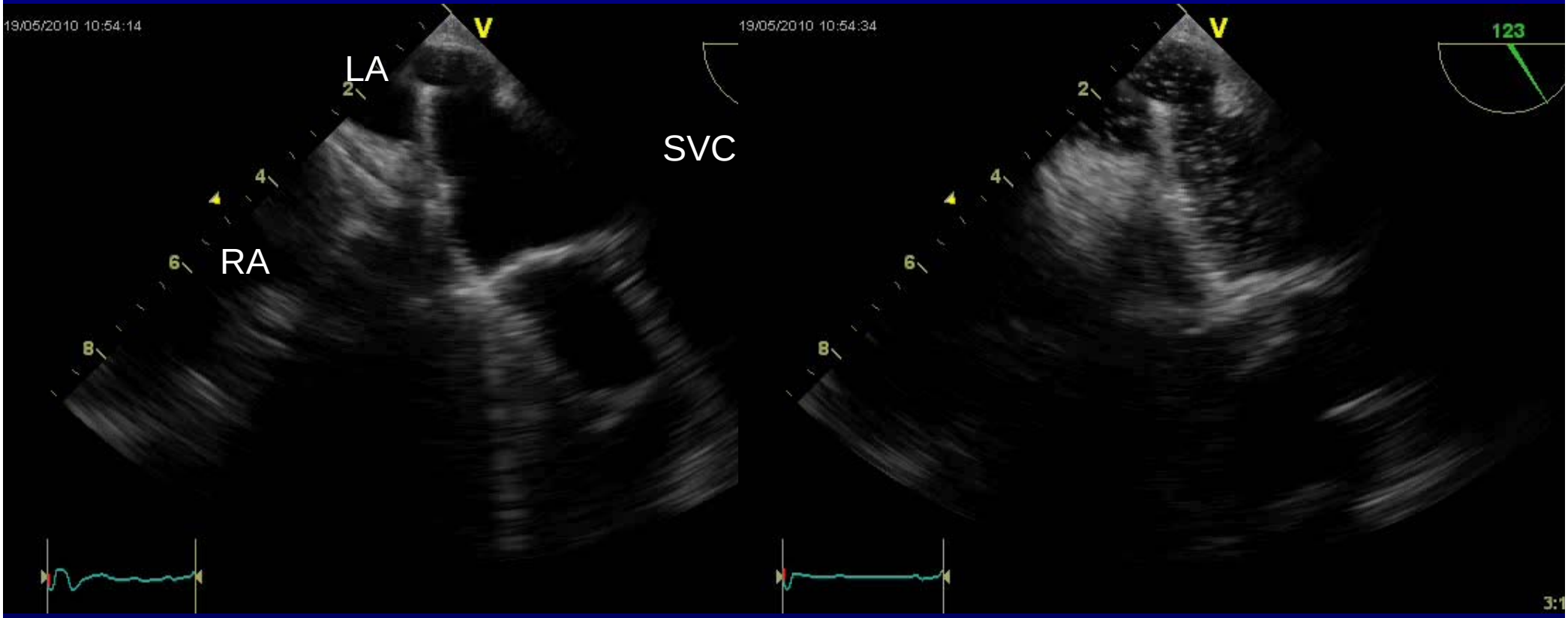


1 minute later …… call for surgery

Superior sinus venosus defect

18 y girl, RA/RV enlargement no intervention possible

Cyanosis after „PFO-occlusion“



25 y woman, stroke, „PFO-occlusion

Summary

- Echocardiography is the leading tool in diagnosis and therapy of ASD/PFO
- TEE is superior to TTE in presentation of morphology
- Interventionalist is the „hand“ of the procedure, the sonographer „the brain“
- Surgical support should be availabel for all interventions

Thanks!

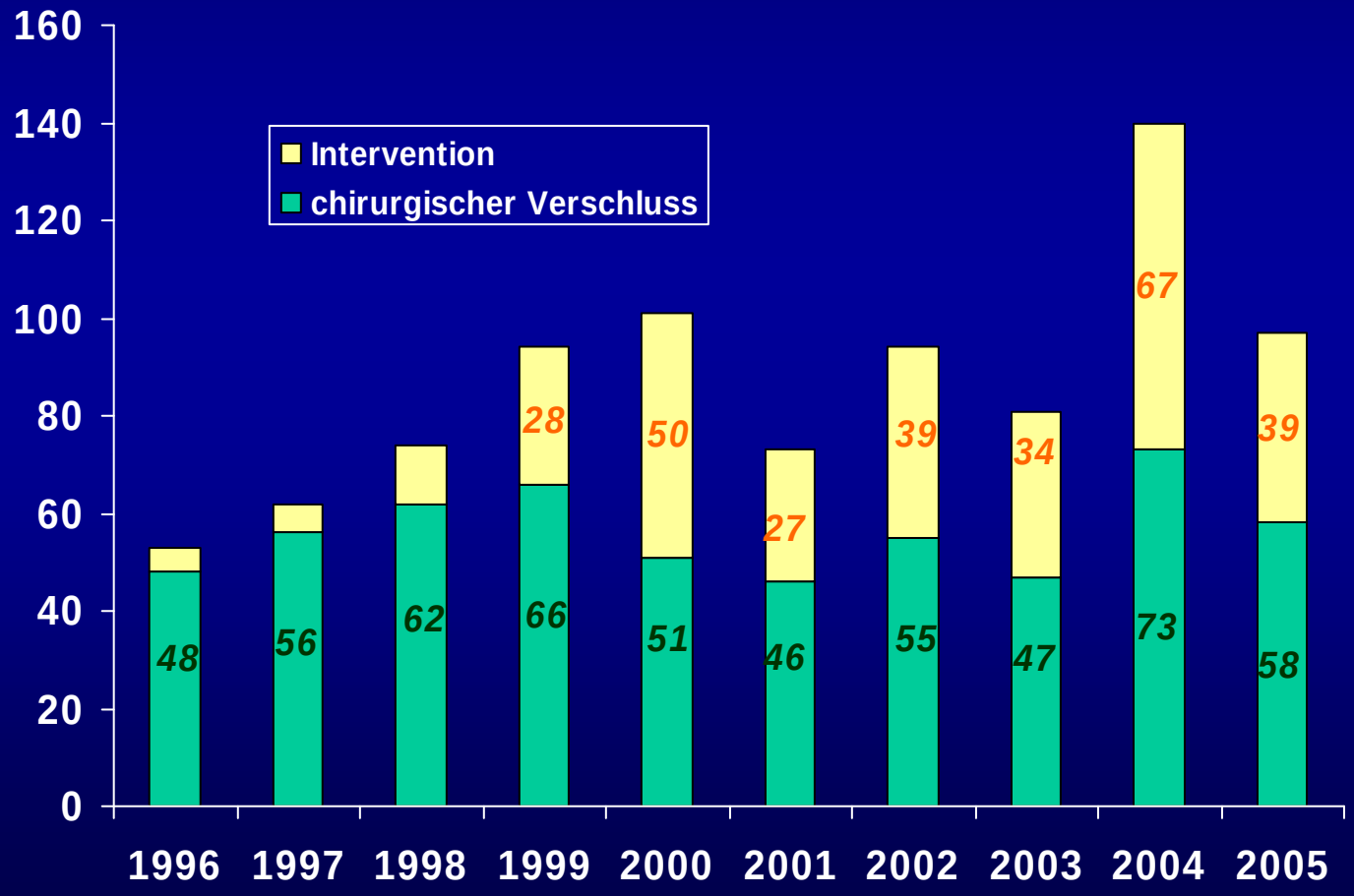
Klinik für Kinderkardiologie und angeborene Herzfehler

Deutsches Herzzentrum

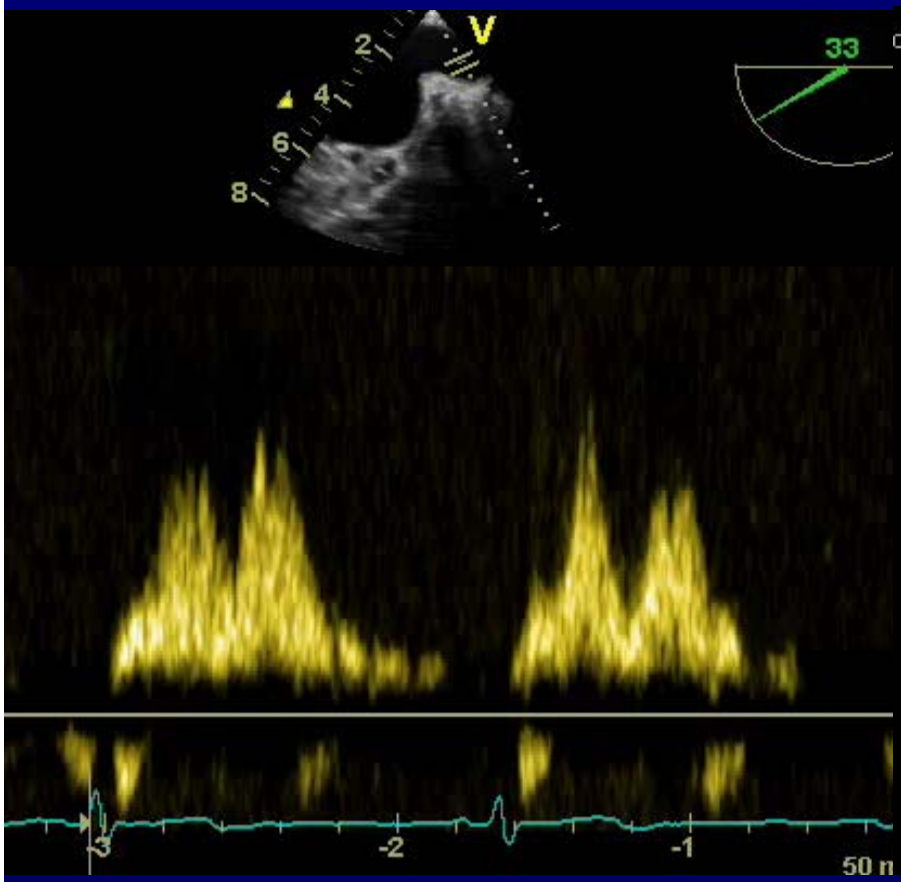
Klinik an der Technischen Universität München

ASD II

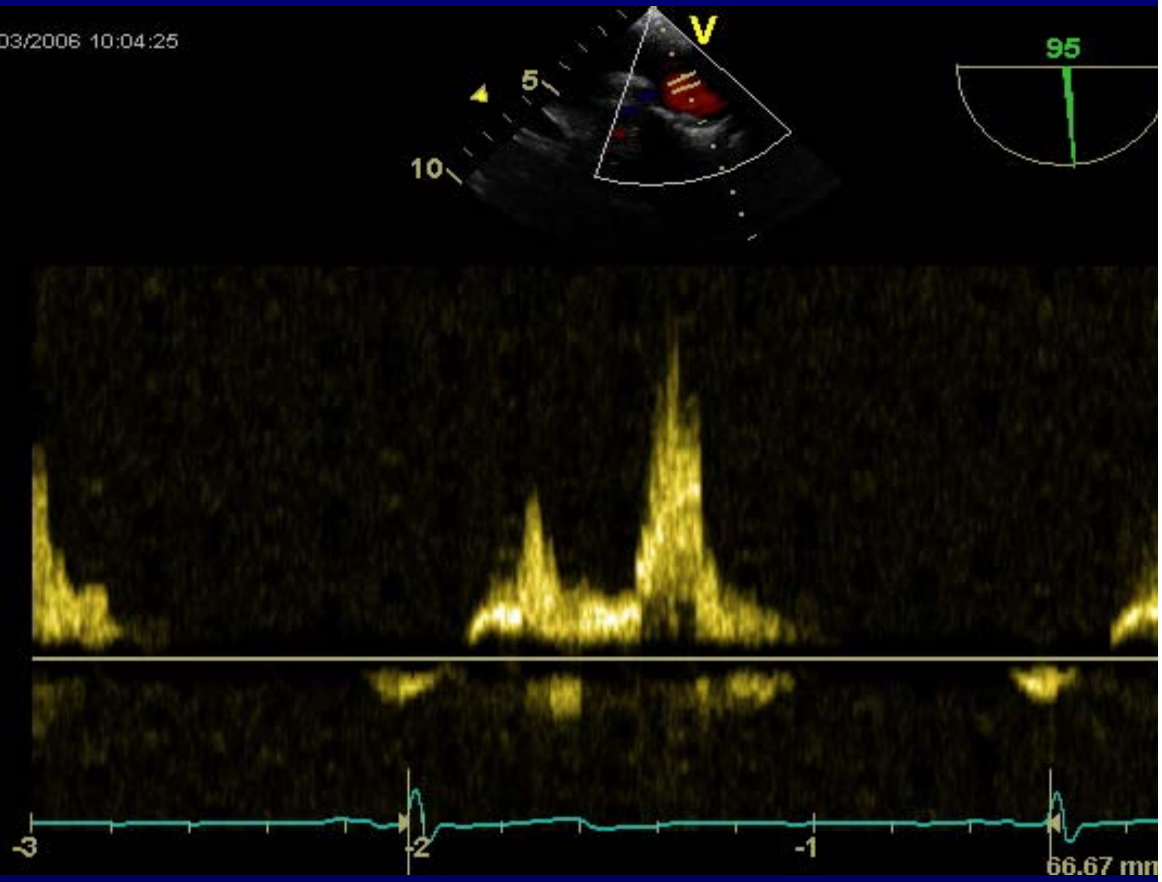
Chirurgie vs. Intervention



ASD + LV Dysfunktion

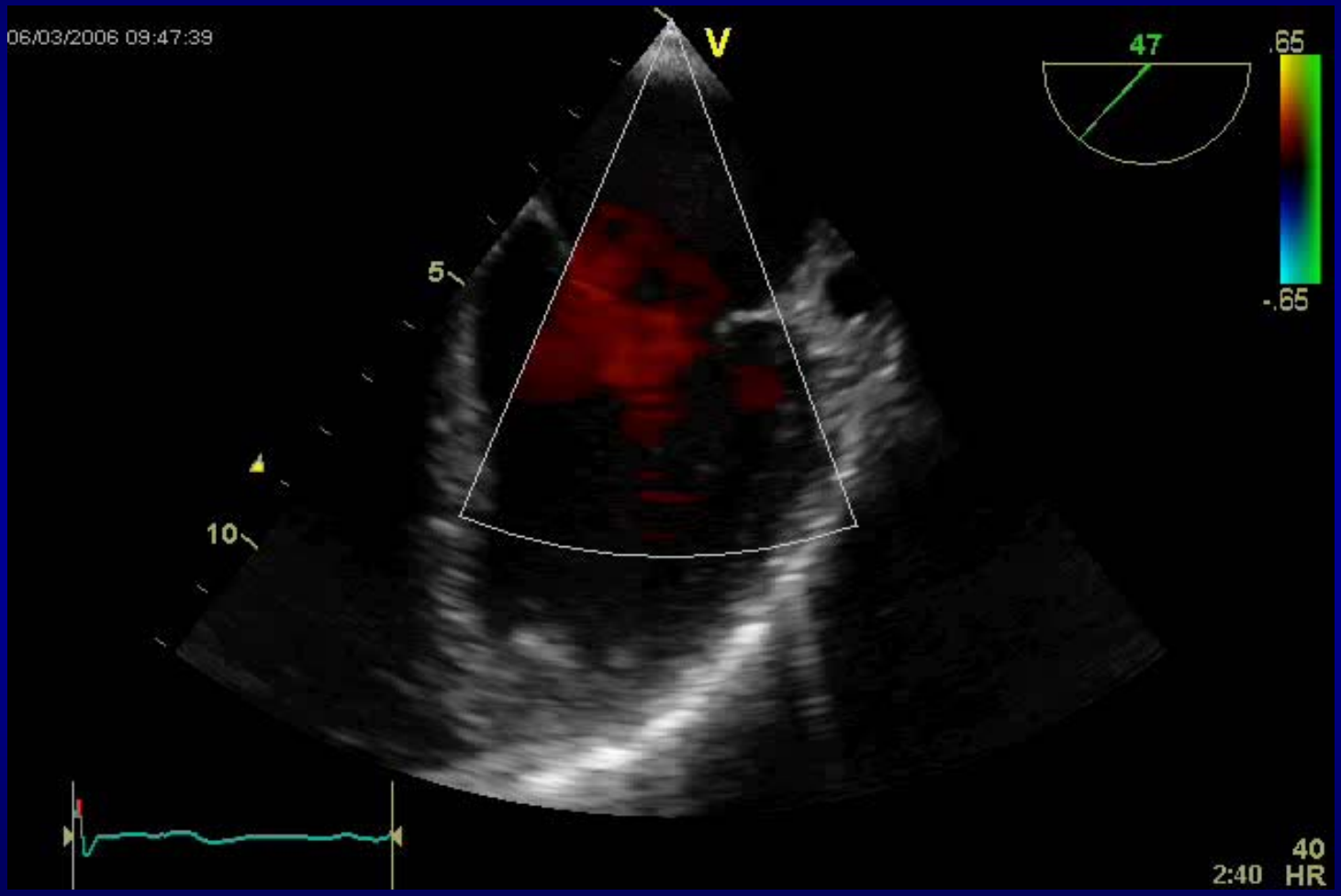


PV inflow before ballon



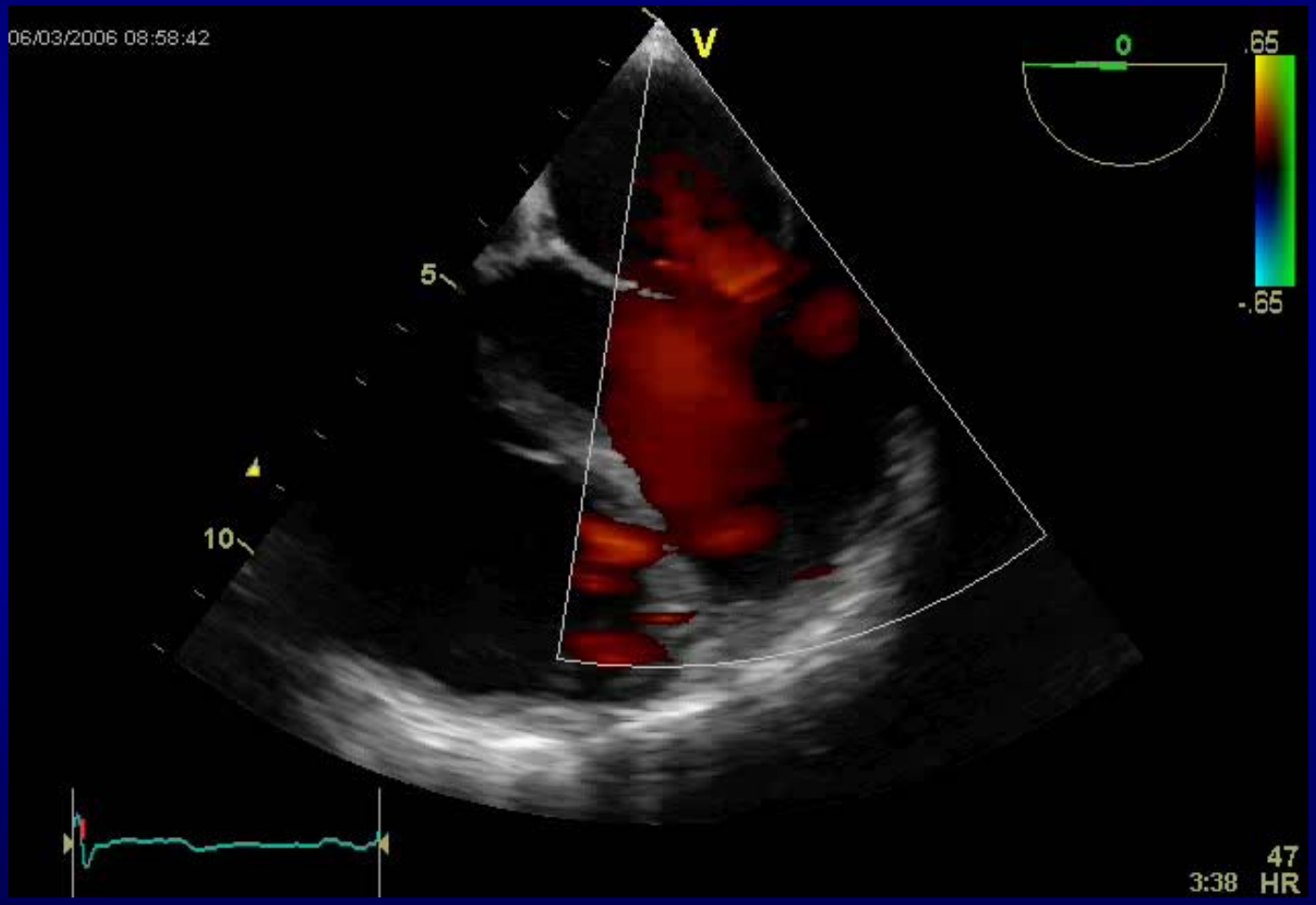
PV inflow with ballon

ASD + LV Dysfunktion



MR during ballonocclusion

ASD + LV Dysfunktion



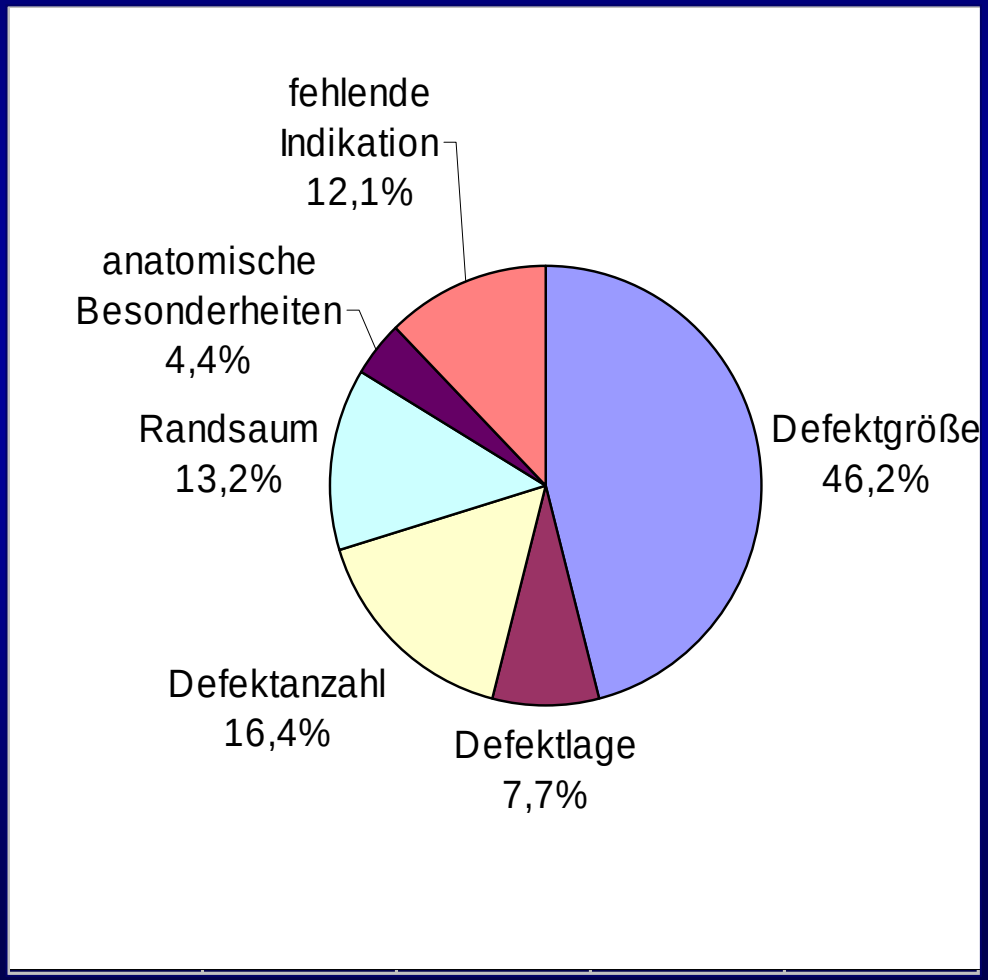
MR before ballonocclusion

Zusammenfassung

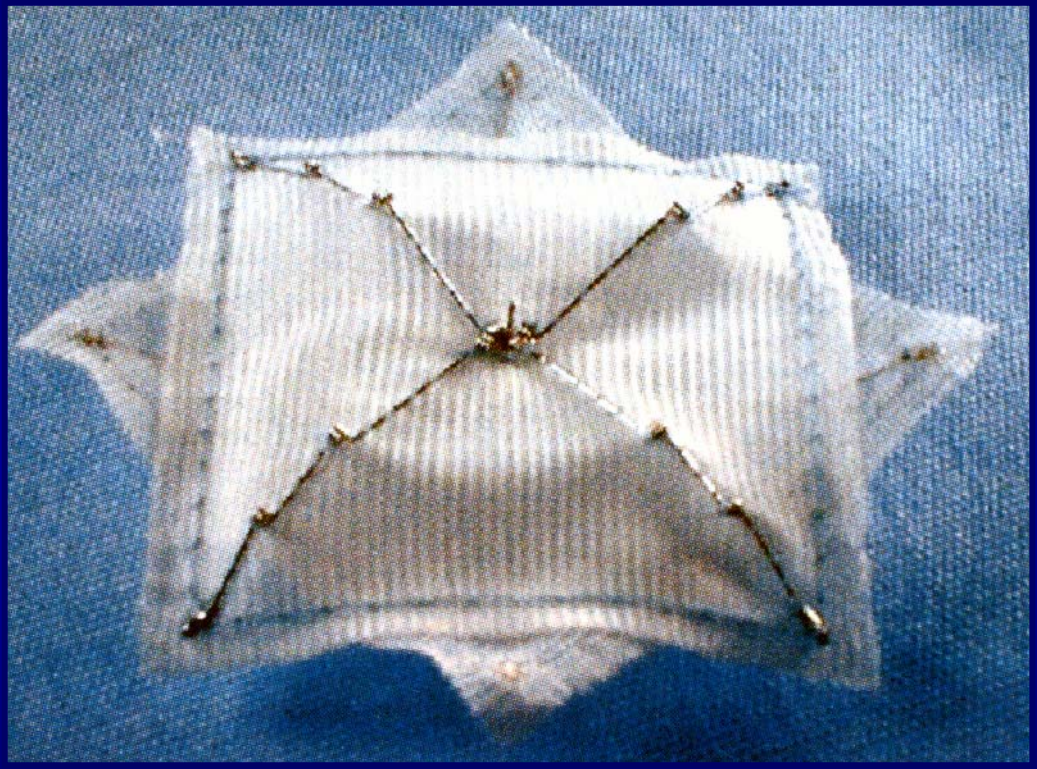
- Echokardiografie entscheidend beim interventionellen ASD-Verschluß
  - TTE als Screening Methode
  - TEE vor/während/nach Intervention
  - Idealer ASD: singulär, nicht zu groß, mittig gelegen
  - Schwierig: große oder multiple ASD II
  - Fehlender Randsaum

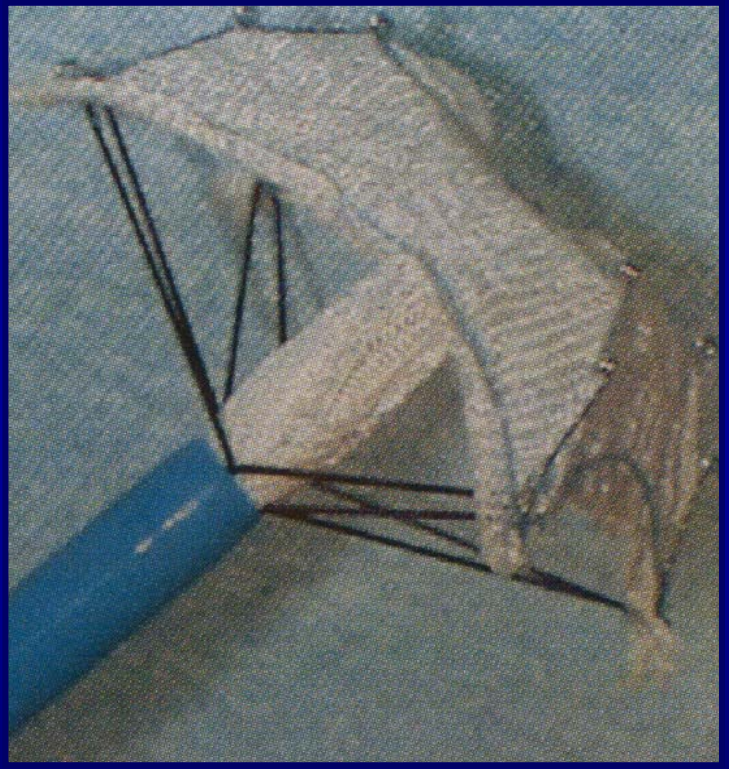
Abbruchgründe - TEE
n = 91

- bei **55** Pat. nach dem TEE (Echoabbruchkritierien)
- bei **31** Pat. nach dem Herzkatheter (BOD zu groß zur Septumlänge)
- bei **5** Pat. wurde das Schirmchen in der gleichen Herzkatheteruntersuchung wieder entfernt



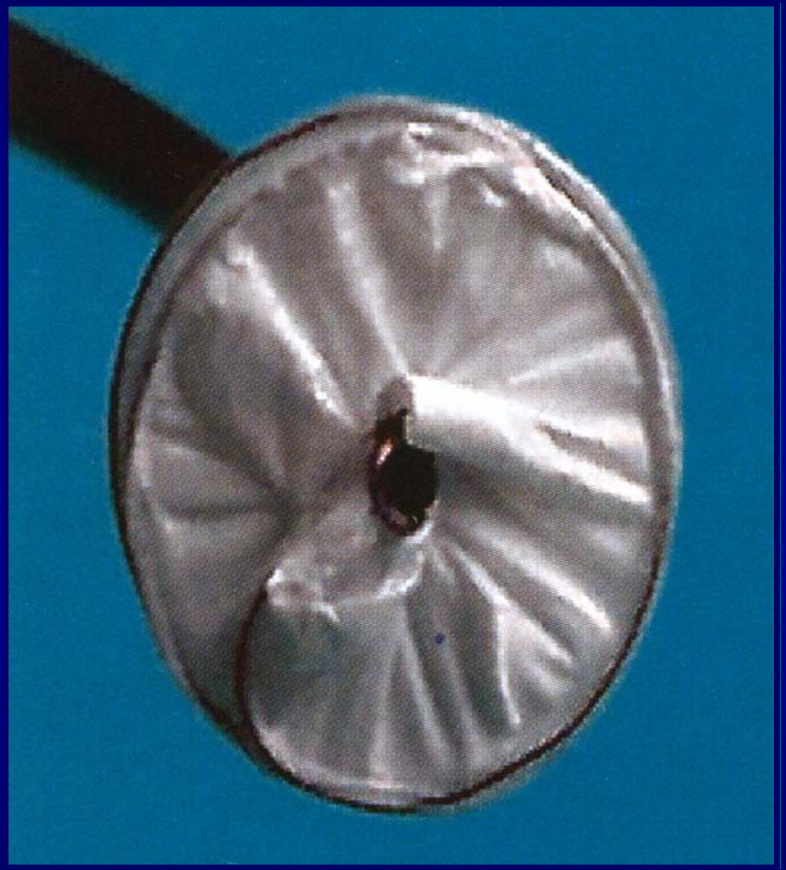
CardioSeal / Starflex





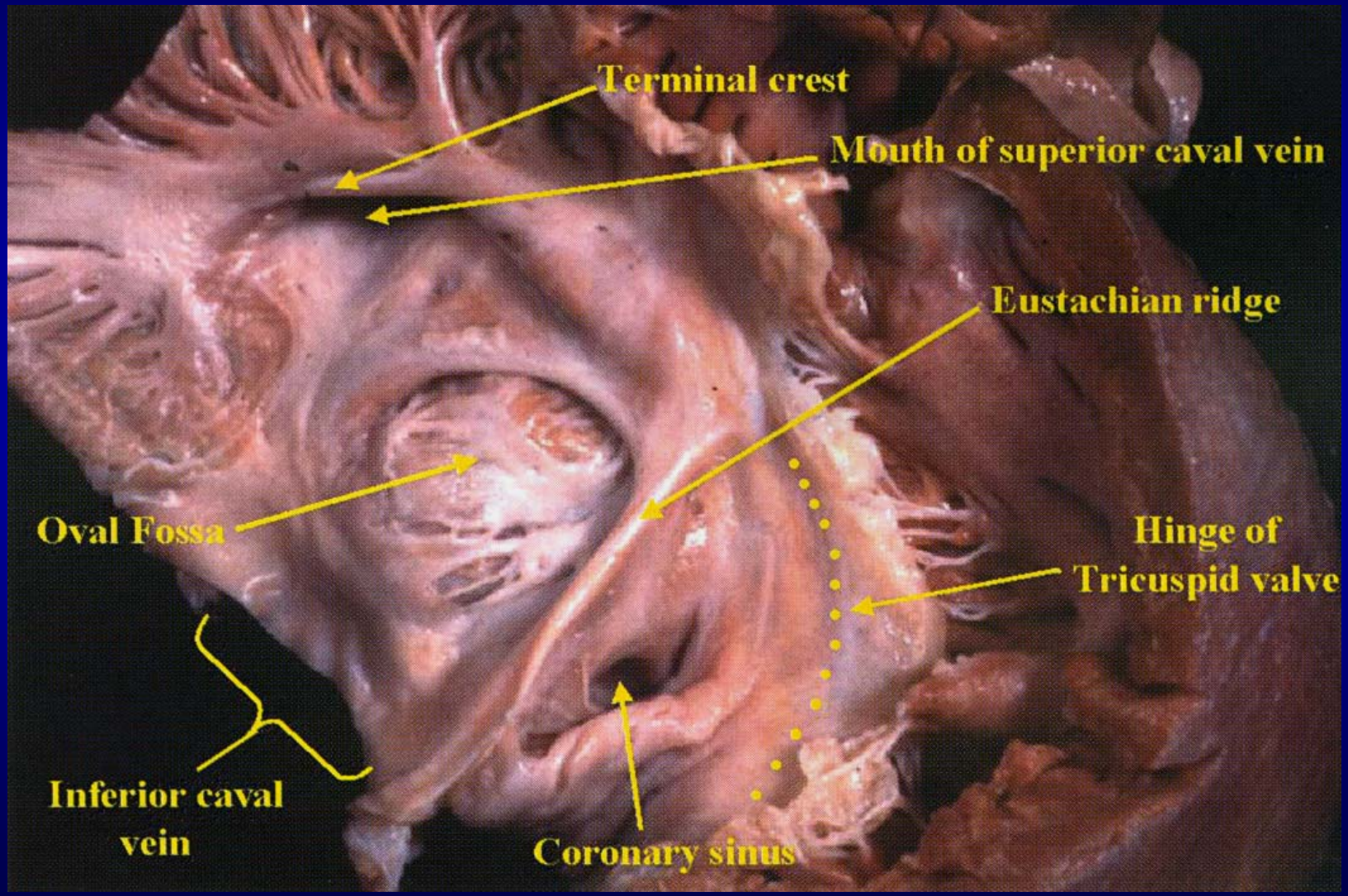
Grösse : 17 - 40 mm
Material : Dacron

Helex



Grösse : 15 - 35 mm
Material : e-PTFE

Anatomy


Terminal crest
Mouth of superior caval vein
Eustachian ridge
Oval Fossa
Hinge of
Tricuspid valve
Inferior caval
vein
Coronary sinus

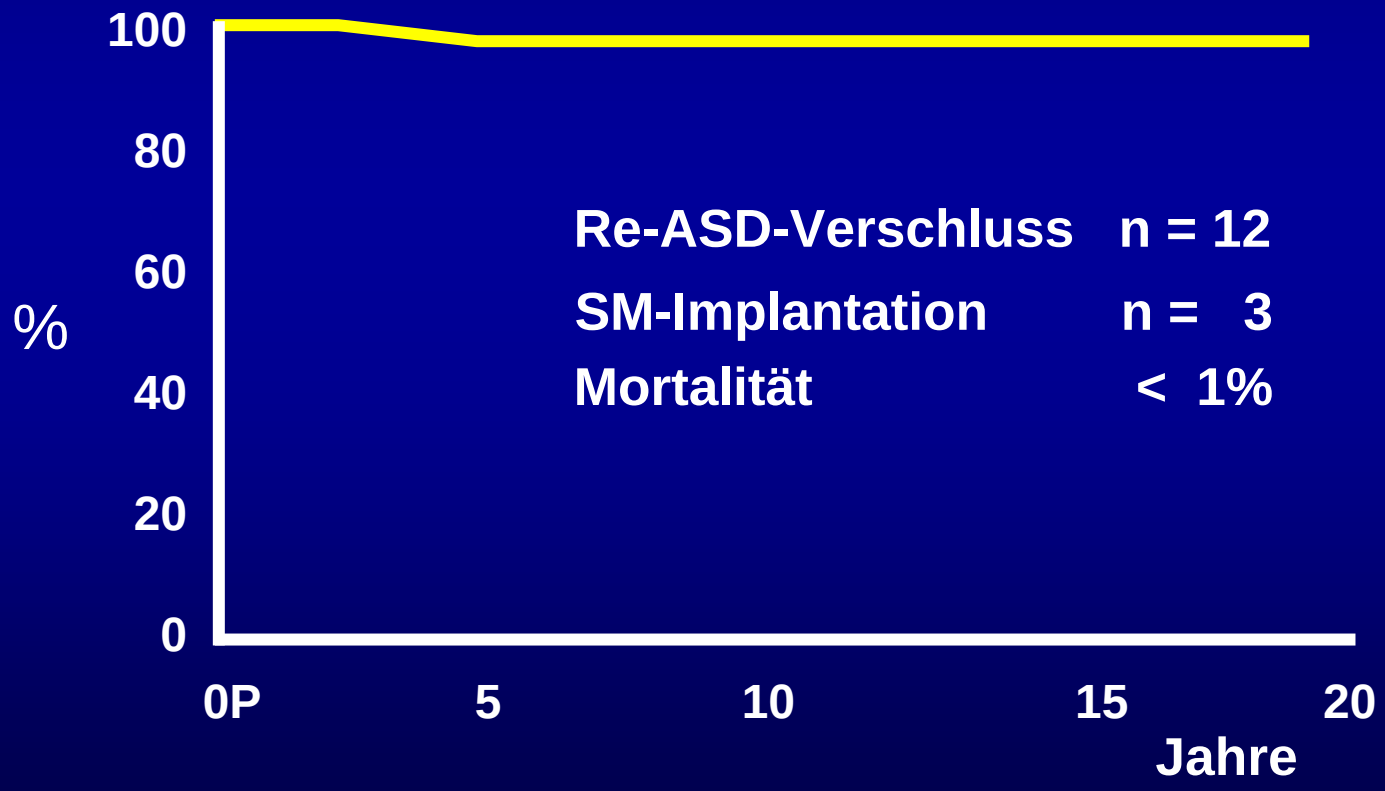
ASD II
Zusammenfassung

	Pat.-anzahl	Nativ ∅ TEE **Median** (Range)	BOD **Median** (Range)	Device **Median** (Range)
Alle erfolgreichen ASD **aus n = 179**	**91**	**12 mm** (3 – 25)	**19 mm** (12 – 34)	**23 mm** (12– 40)
Angel Wings	**7**	**9 mm** (9 – 12)	**14 mm** (12 – 16,5)	**22 mm** (18 – 30)
CardioSeal/ Starflex	**22**	**10 mm** (3 – 16)	**17 mm** (14 –20)	**28 mm** (17 – 40)
Amplatzer	**59**	**15 mm** (16 – 25)	**20 mm** (13 – 34)	**22 mm** (12 – 34)
Helex	**3**	**8 mm** (9 – 10)	**12 mm** (10 – 18)	**25 mm** (20 – 30)

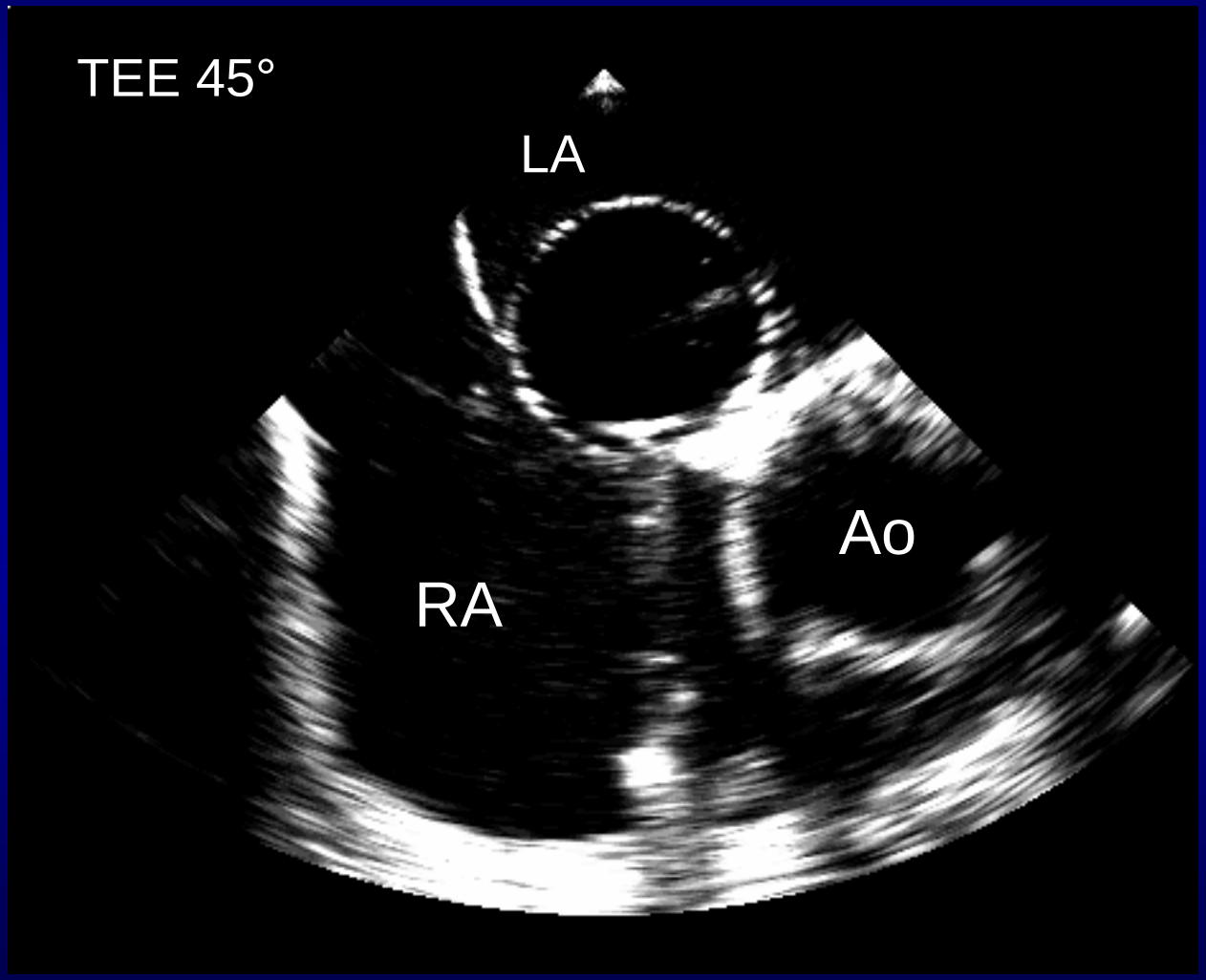
Langzeitergebnisse ASD II - Verschluss

Freiheit von Reoperation

n = 1298 (1974 – 2001)



Echo: Ballonsizing



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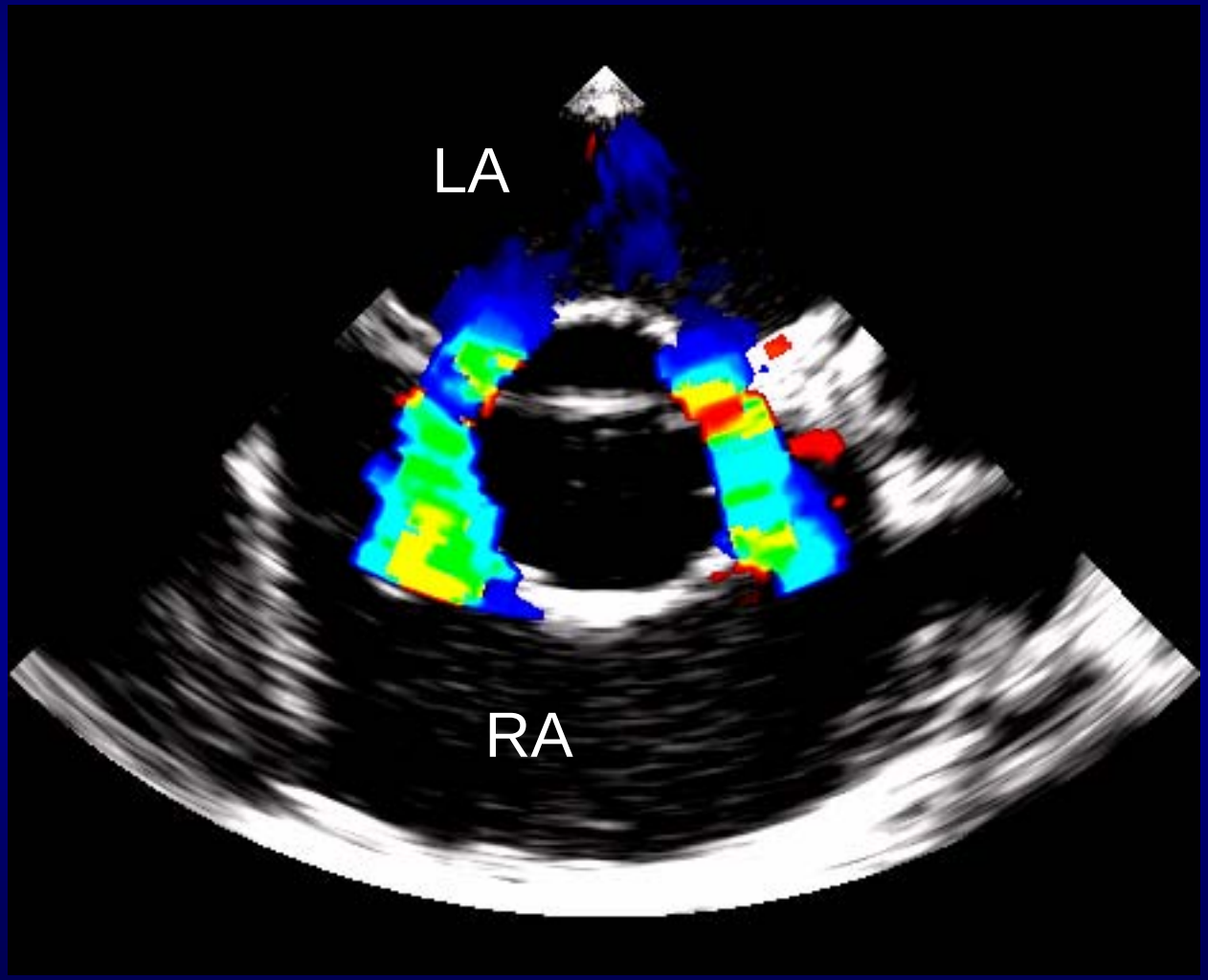
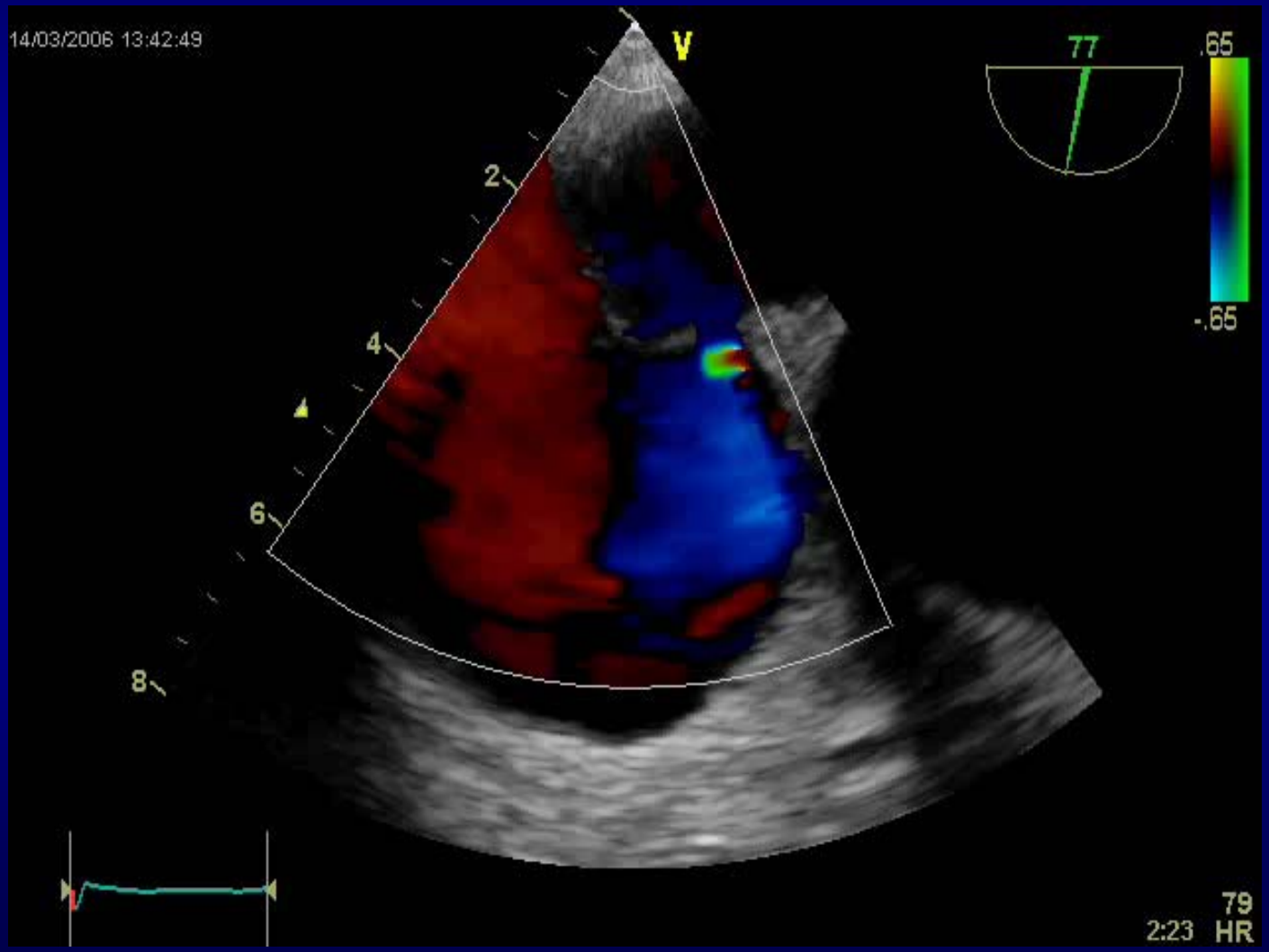
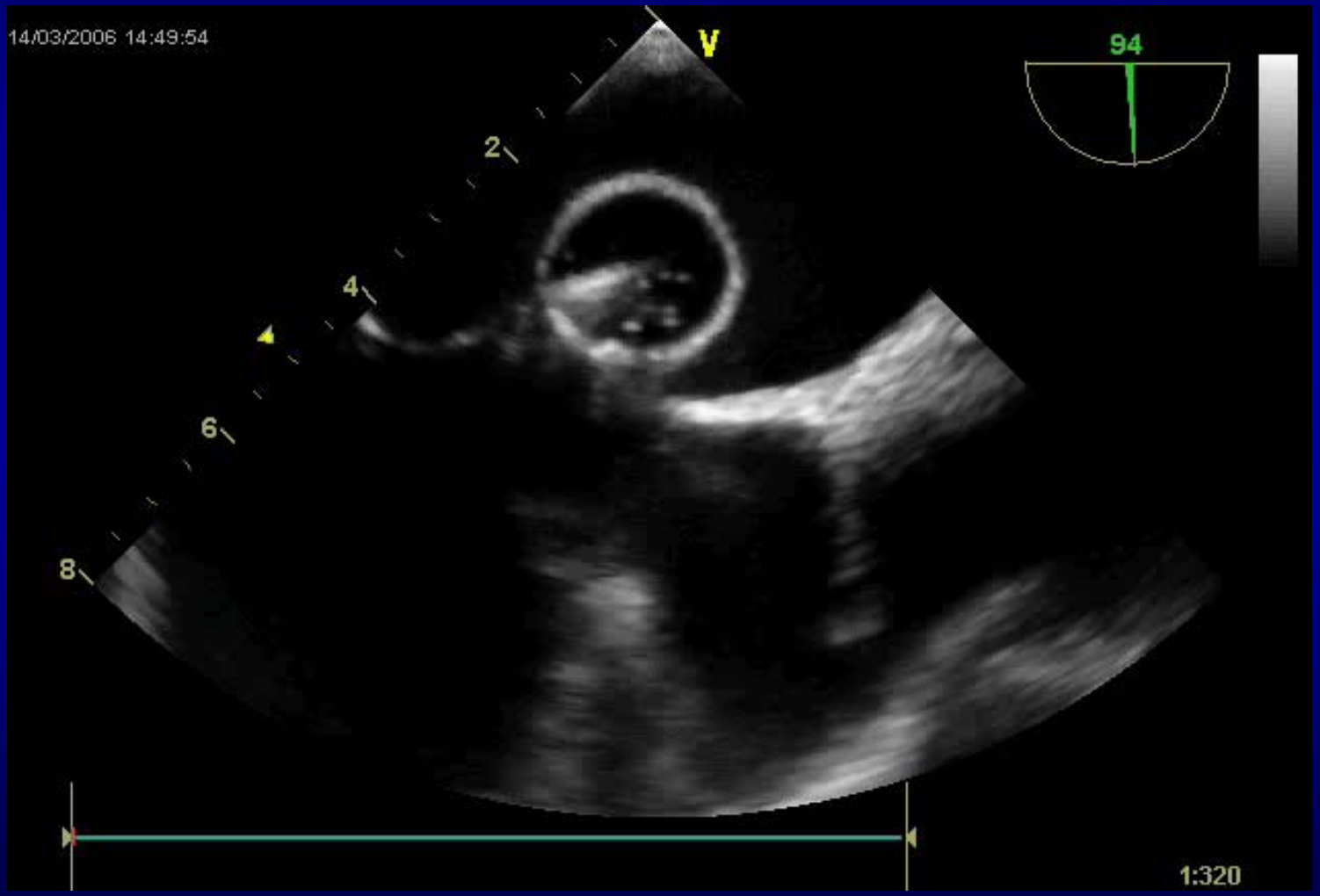


„simple“ ASD



„simple“ ASD



„simple“ ASD