

O ECOCARDIOGRAMA NO PACIENTE CRÍTICO

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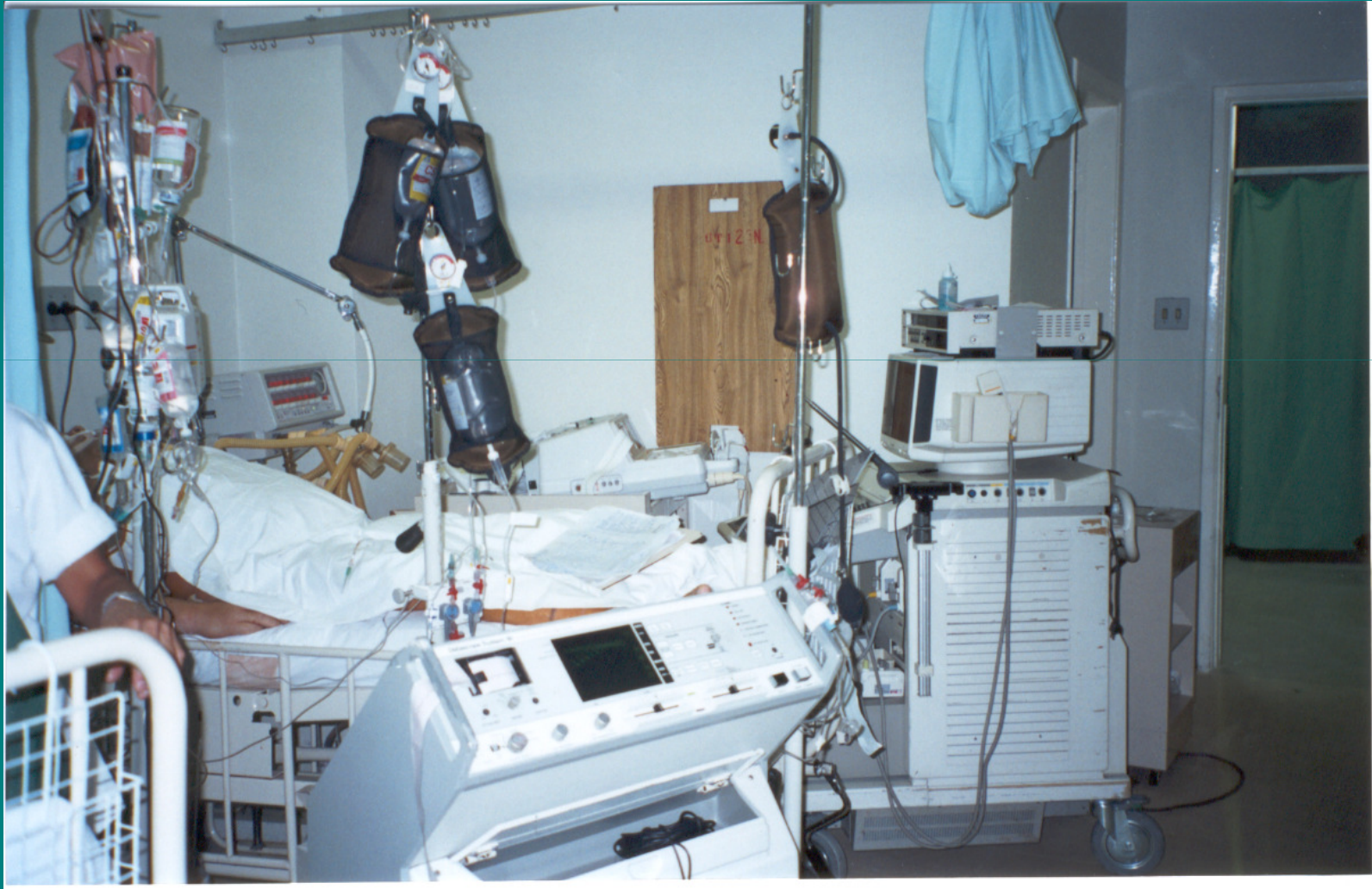
Unicamp – novembro de 2008

Ultrassom na Cardiologia

- 1954 – Edler e Hertz – avaliação pós-operatória de comissurotomia mitral.
- 1965 – Feigenbaum – avaliação líquido pericárdico
- 1974 – Thurstone e von Ramm – ecocardiograma bidimensional
- 1984 – Omoto – bidimensional em tempo real

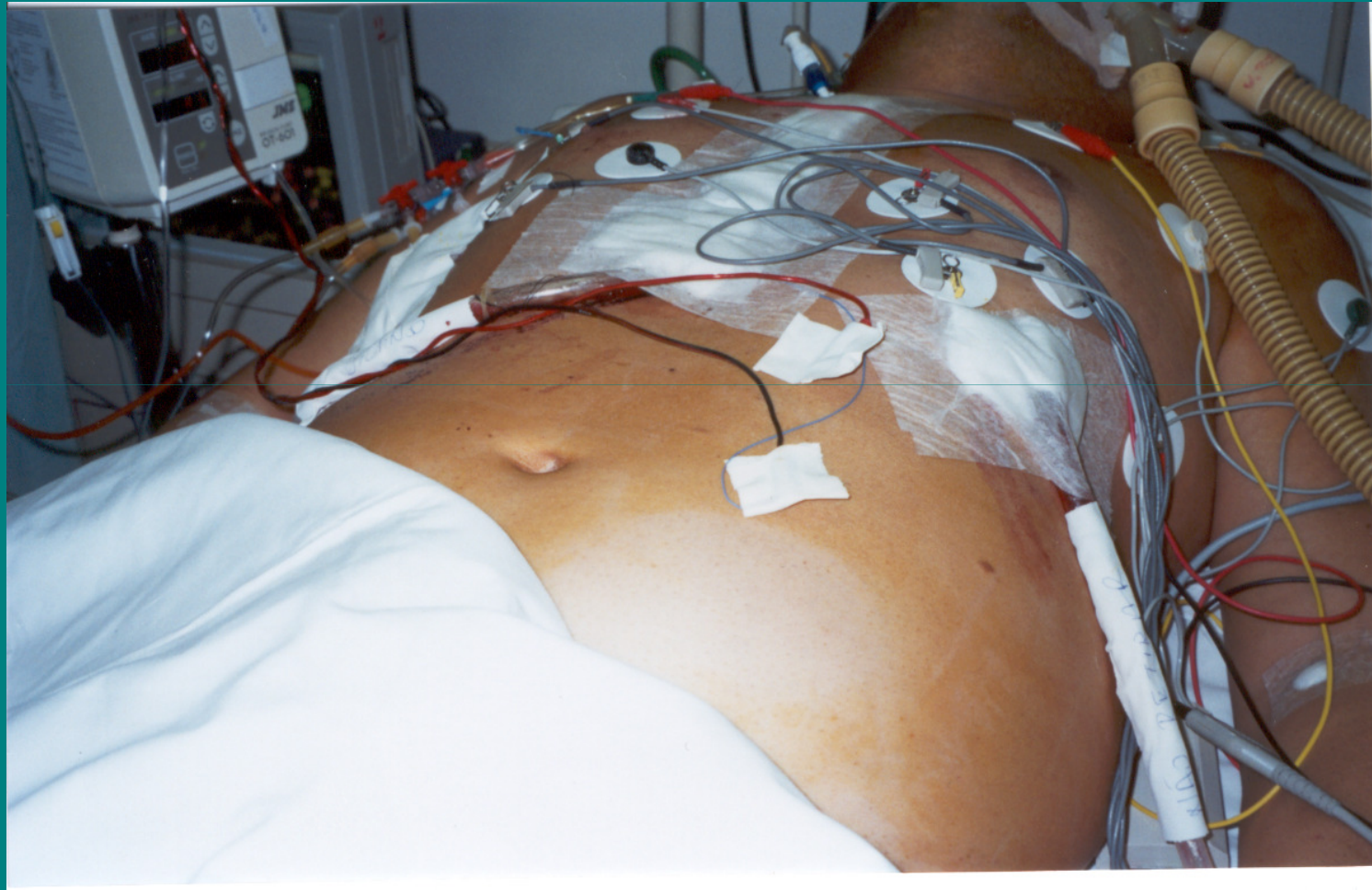
Ecocardiograma na UTI

- Condições do exame:
 - ventilação mecânica
 - bombas de infusão
 - máquina de hemodiálise
 - desfibrilador
 - balão intra-aórtico



Condições do exame

- Acesso ao tórax do paciente:
 - Paciente em decúbito dorsal horizontal
 - Curativos
 - Drenos
 - Ventilador
 - Cateter de PA média
 - Acesso venoso central
 - Sondas (vesical, nasoenteral, nasogástrica)
 - Eletrodos



Importância da ecocardiografia em UTI

Transthoracic echocardiography: impact on diagnosis and management in tertiary care intensive care units

- Mudança no diagnóstico:
 - 19% pac.com dados clínicos adequados
 - 56% pac. com dados clínicos inadequados
($p < 0,001$)
- Mudança na conduta:
 - 34% em pac. com dados clínicos adequados
 - 58% em pac. com dados clínicos inadequados
($p = 0,017$)

Diagnostic accuracy and therapeutic impact of transthoracic and transesophageal echocardiography in mechanically ventilated patients in the ICU

- 128 ETT e 96 ETE
- ETT:
 - avaliação função ventricular
 - avaliação derrame pericárdico
- ETE: maior impacto terapêutico
(35/96 x 20/128) $p < 0,001$
- Não houve complicações relacionadas aos procedimentos

Vignon P et al. Chest 1994;106:1829-4

What is the real clinical utility of echocardiography? A prospective observational study

- 542 exams
- Principais indicações:
 - avaliação função VE (54%)
 - avaliação função valvar (16%)
- Mais freqüente em pac.UTI
(54 x 37%, $p=0,02$)

Tam JW et al. J Am Soc Echocardiogr 1999;12:689-97.

Usefulness of transesophageal echocardiography in the treatment of critically ill patients

- Indicações:
 - Suspeita diss. aorta – 34 pac
 - Instabilidade hemod. – 22 pac
 - Suspeita embolia – 11 pac
 - Avaliação severidade IMi – 7 pac
 - Suspeita endocardite – 6 pac
- ETE forneceu informações adicionais ao ETT em 39 pac (50%, $p < 0,005$)
- Intervenção cirúrgica em 14 pac (18%), com achados confirmados no intra-op.

Hwang JJ et al. Chest 1993;104(3):861-6

Transesophageal echocardiography in critically ill patients

- 51 pacientes
- ETT inadequado/inconclusivo
- Indicações:
 - 49% - instabilidade hemodinâmica
 - outras: avaliação IMi, disf. prótese, endocardite, dissecção aorta
- 59% - ETE identificou problemas não identificados ETT.

Indicações no paciente crítico

American Heart Association

- Hipotensão e instabilidade hemodinâmica
- Isquemia miocárdica/infarto agudo do miocárdio
- Pesquisa foco embólico
- Tromboembolismo pulmonar

Douglas PS et al. J Am Coll Cardiol 2007;50(2):187-204

Ecocardiograma na hipotensão e instabilidade hemodinâmica

Diagnóstico diferencial

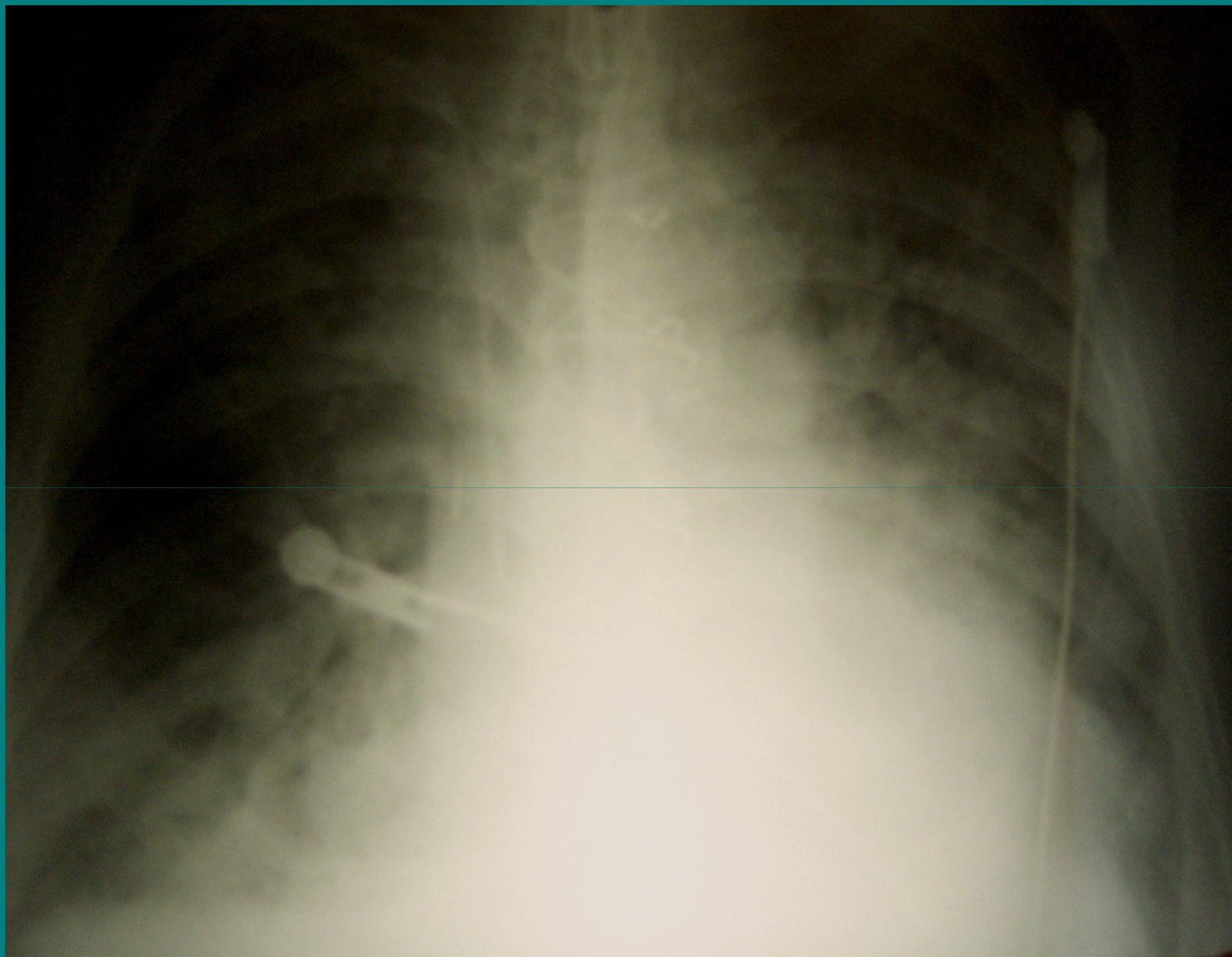
- Etiologia cardíaca ↓ DC

Instab. Hemodinâmica

- Não cardíaca – hipovolemia, sepse

Etiologia não cardíaca

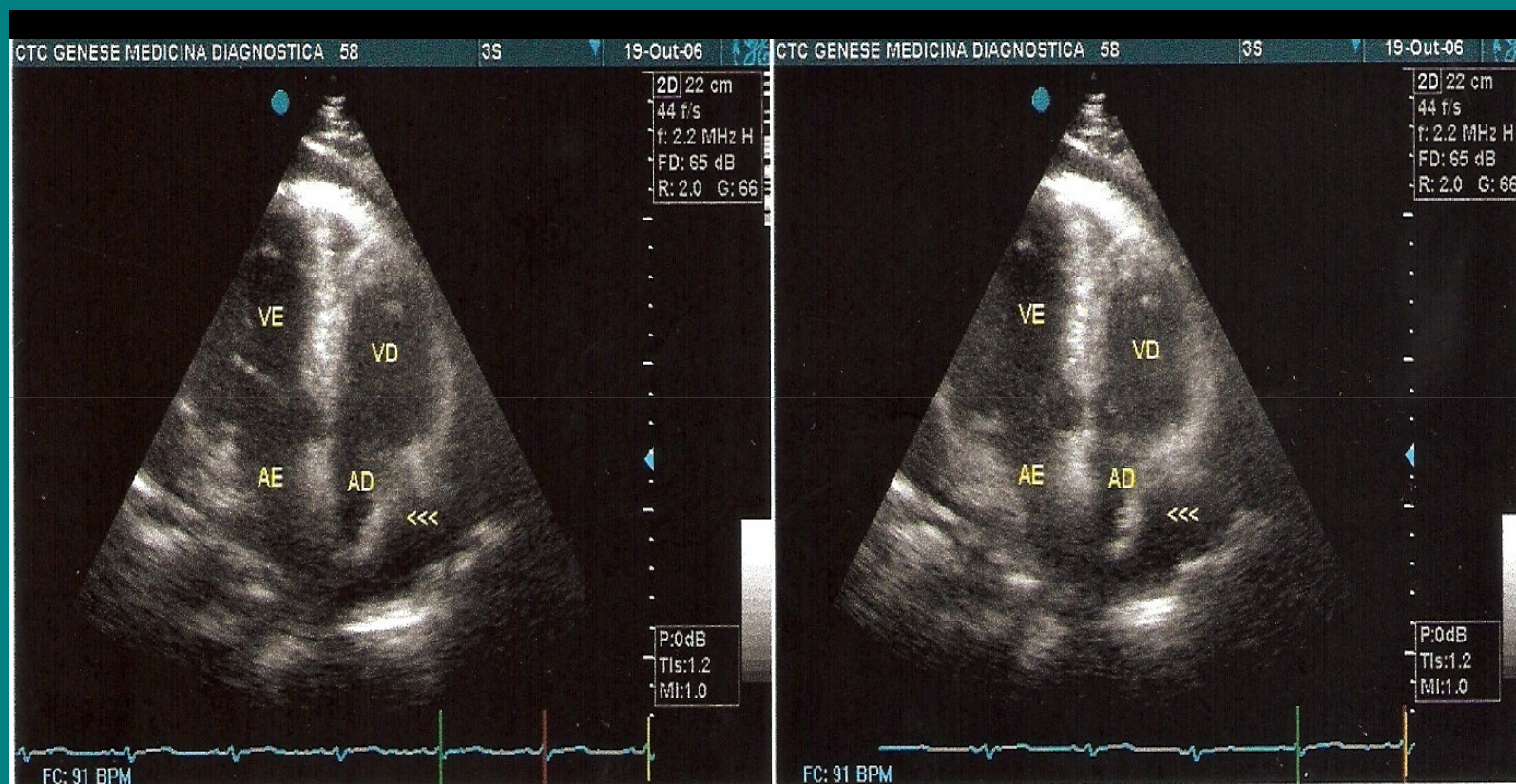


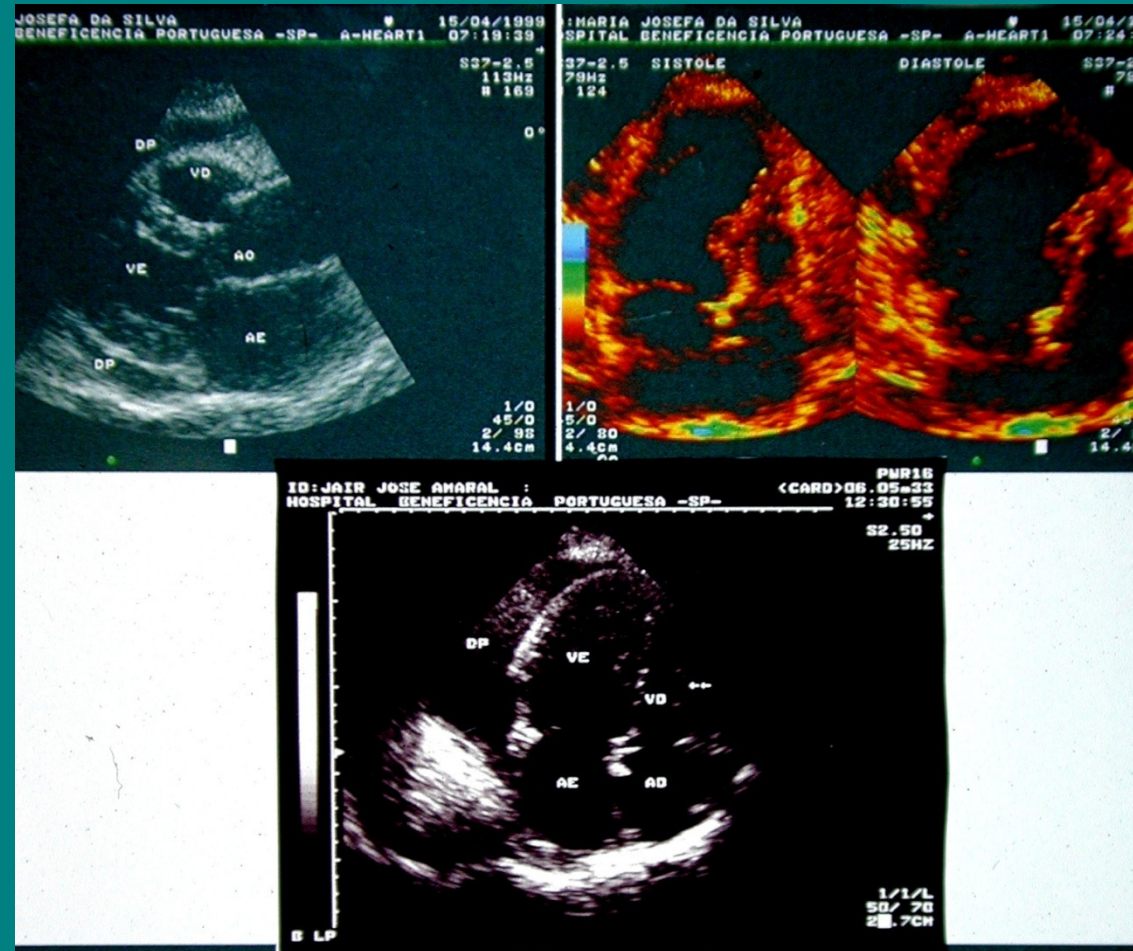


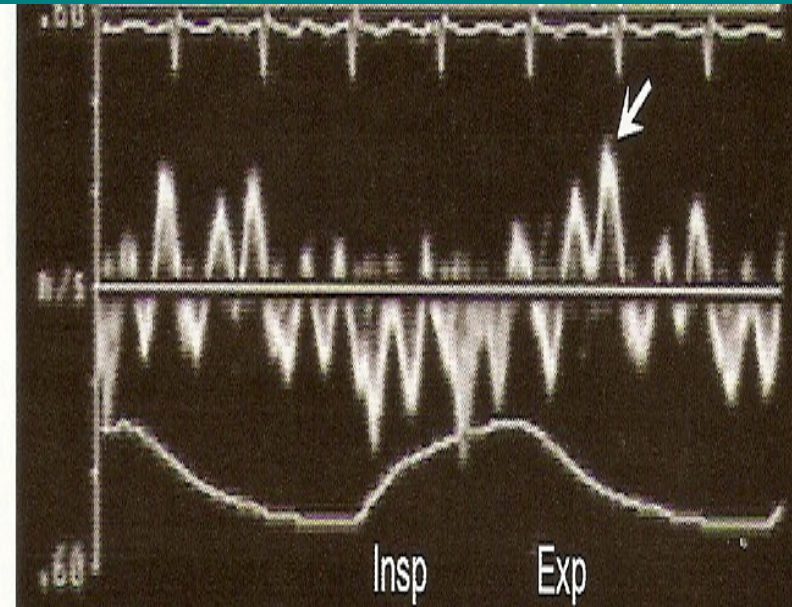
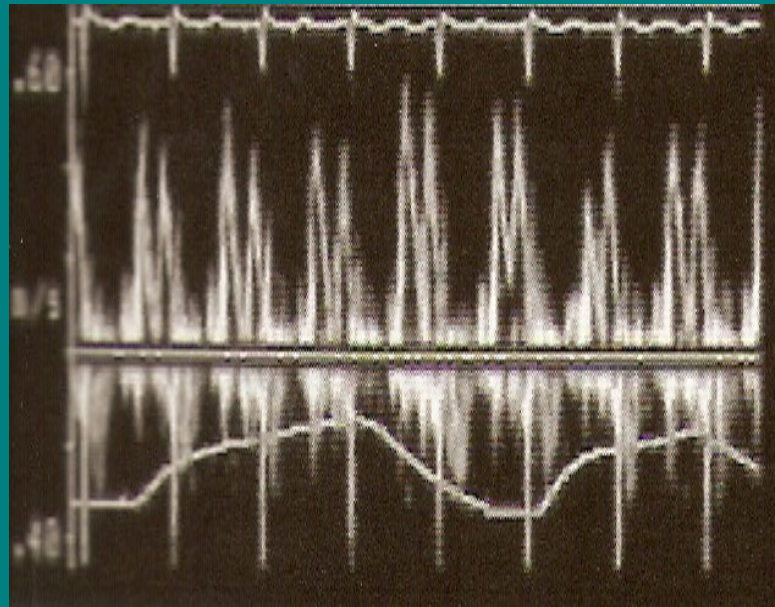
ETIOLOGIA CARDÍACA

Derrame Pericárdico

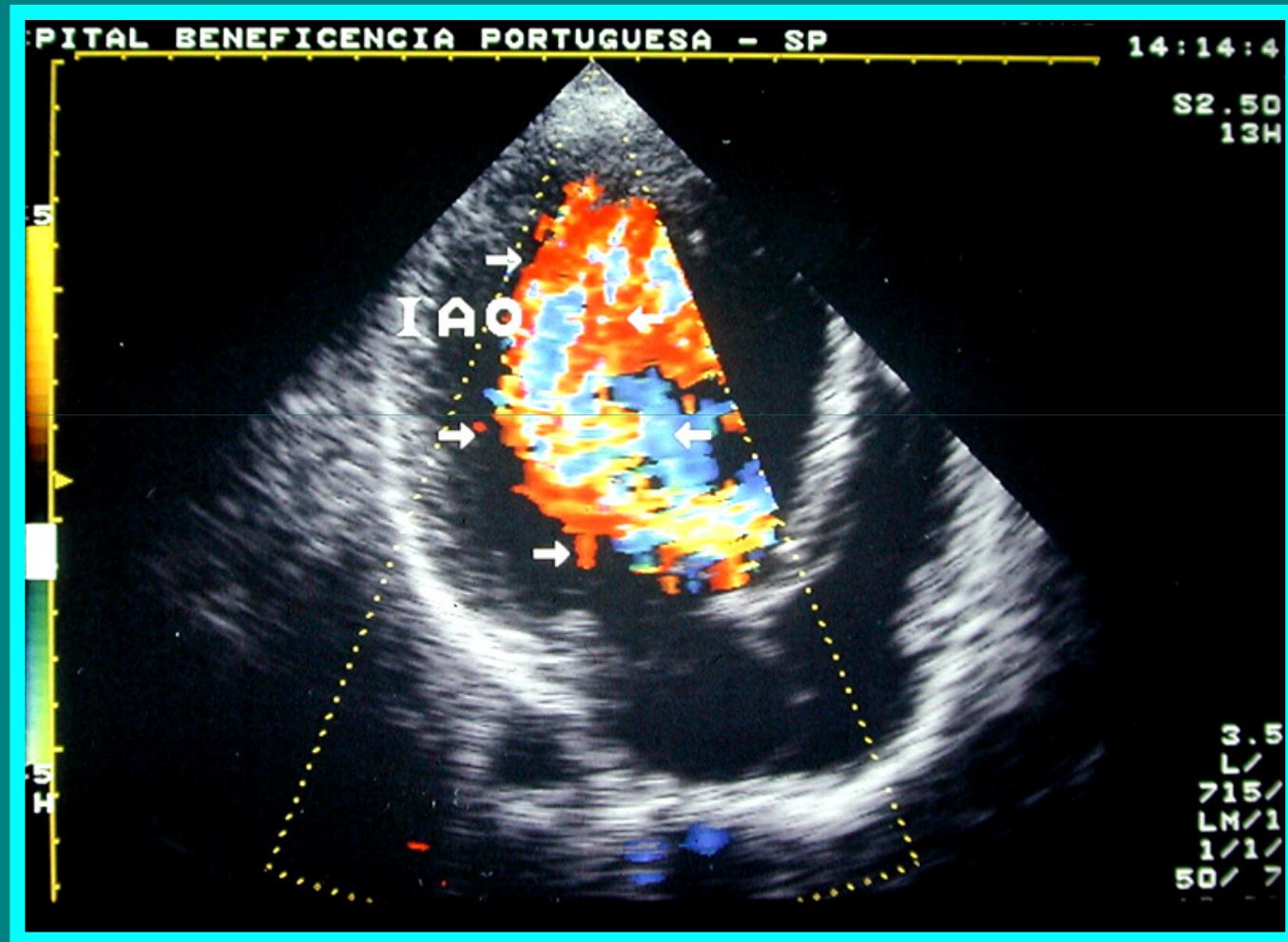


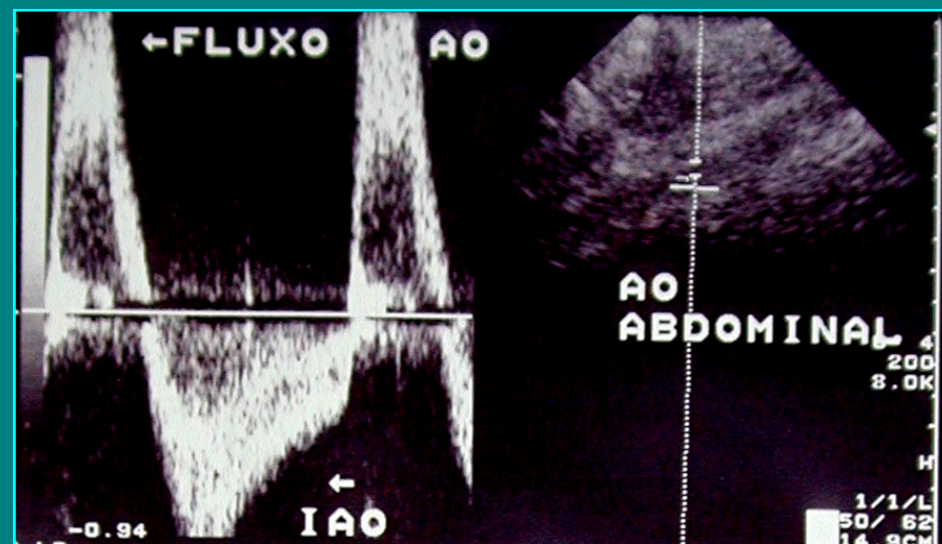
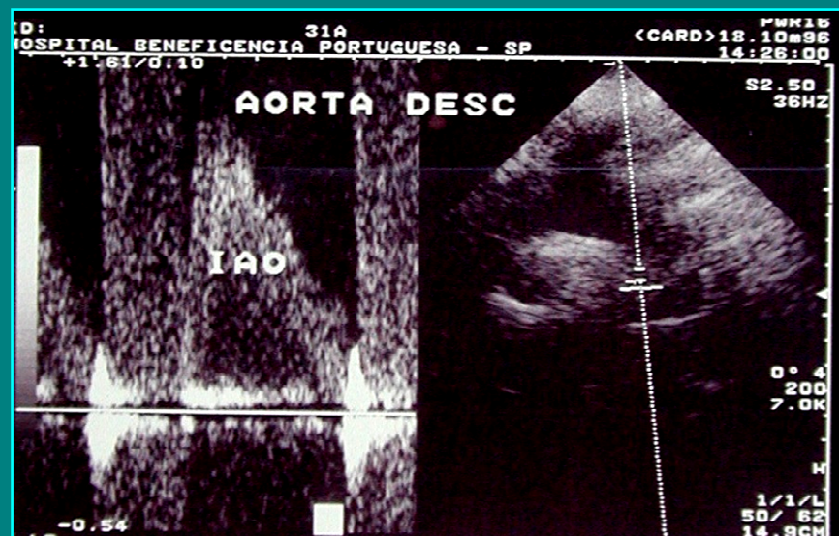






VALVAR







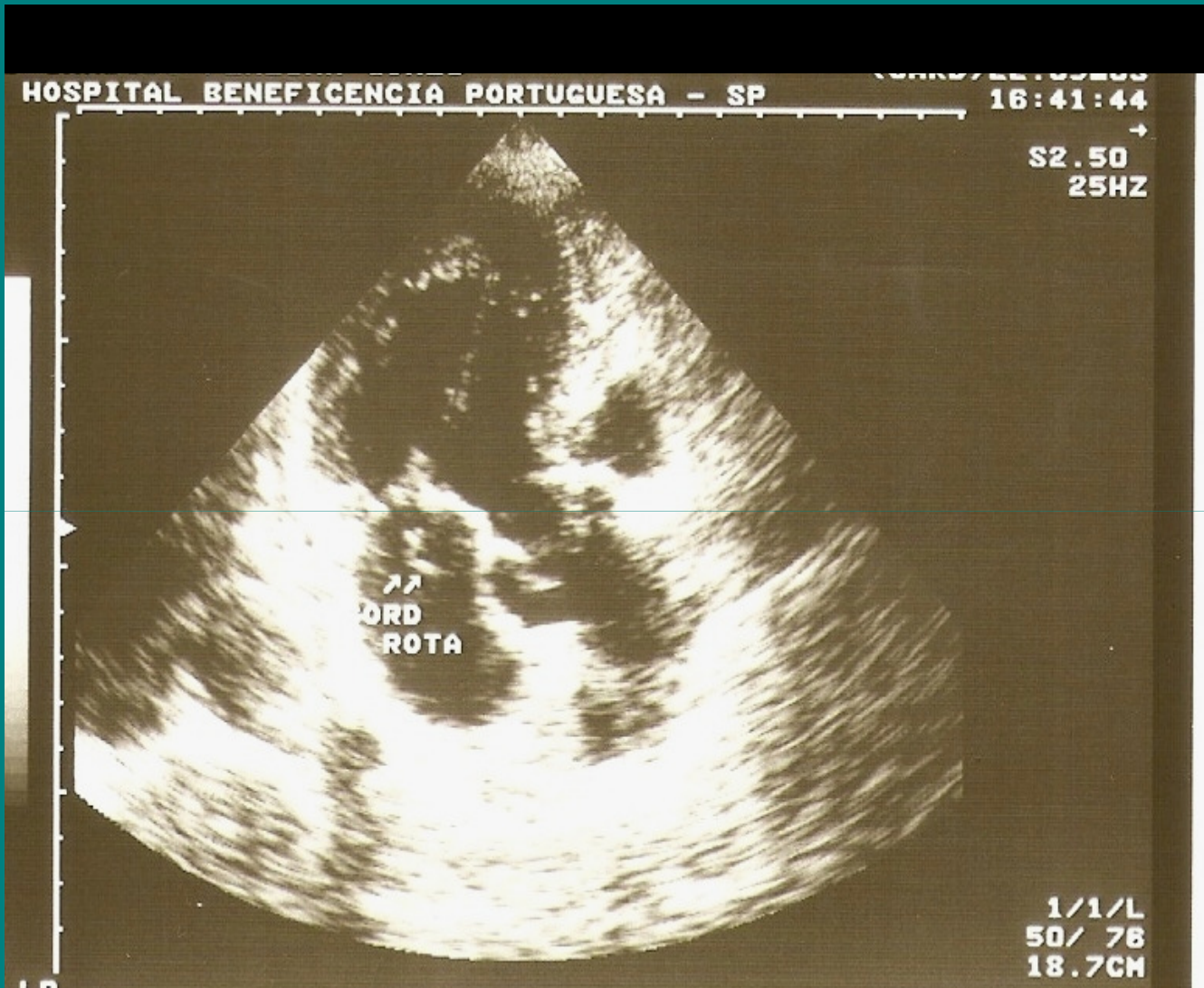
HOSPITAL BENEFICENCIA PORTUGUESA - SP

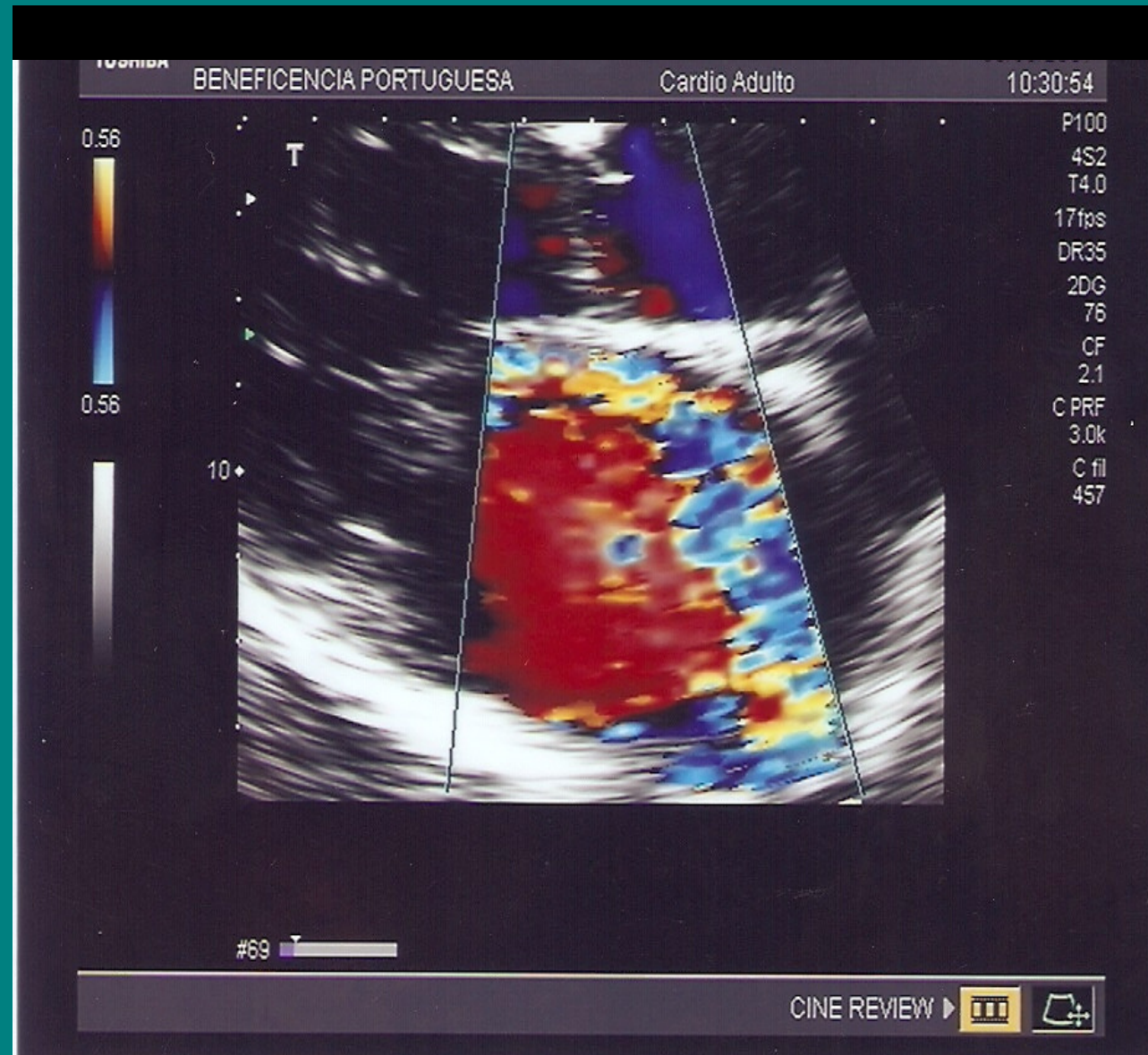
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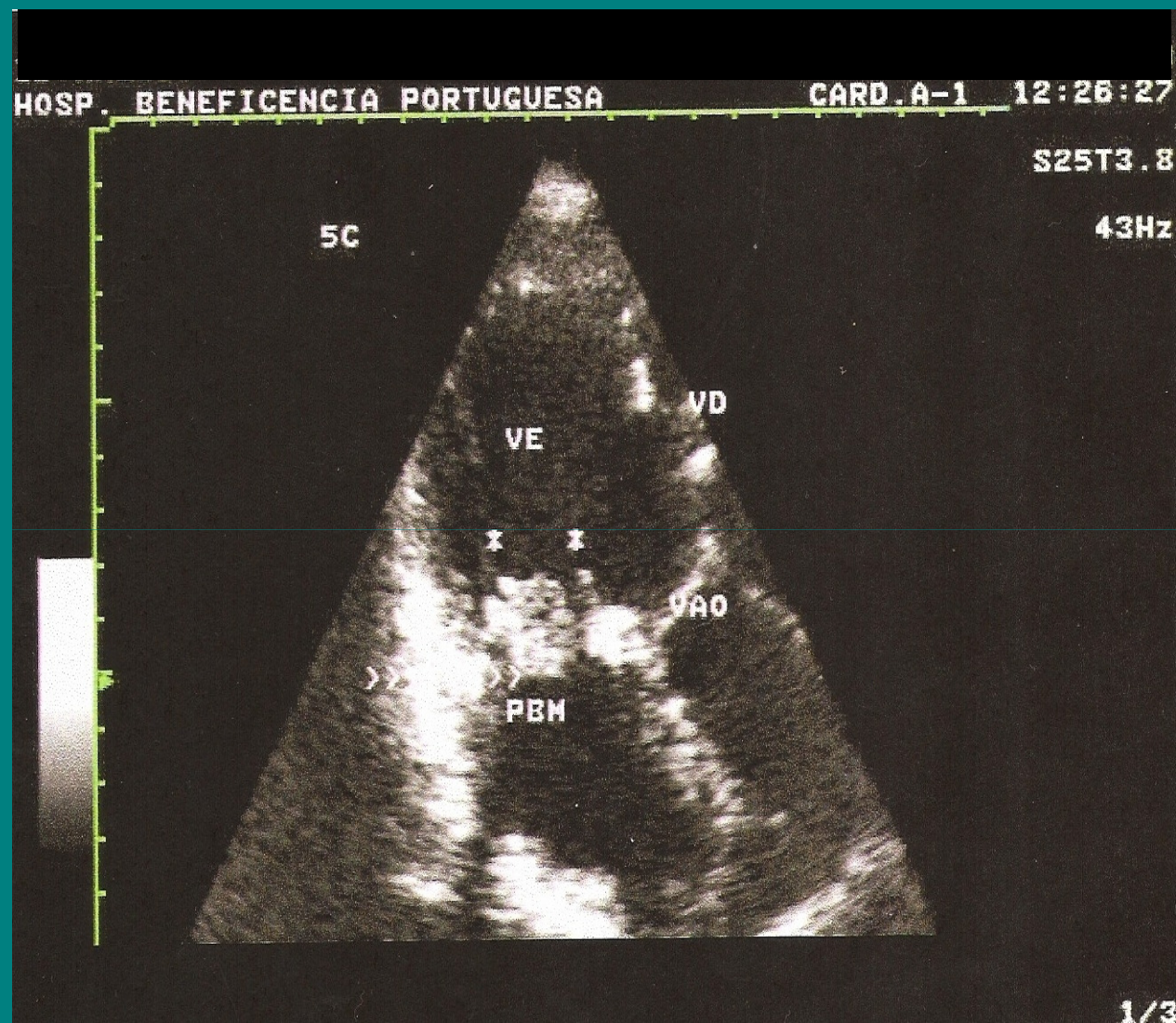
S2.50
25HZ

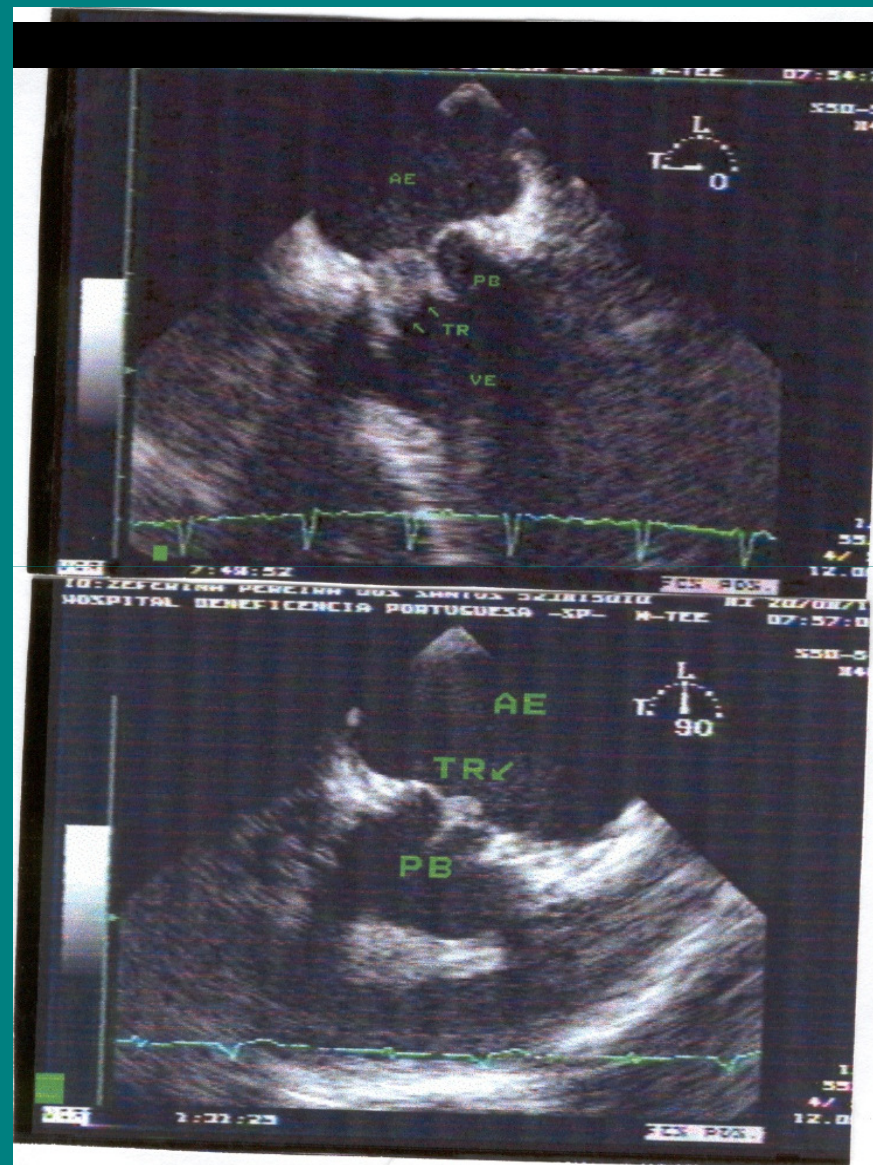
77
ORD
ROTA

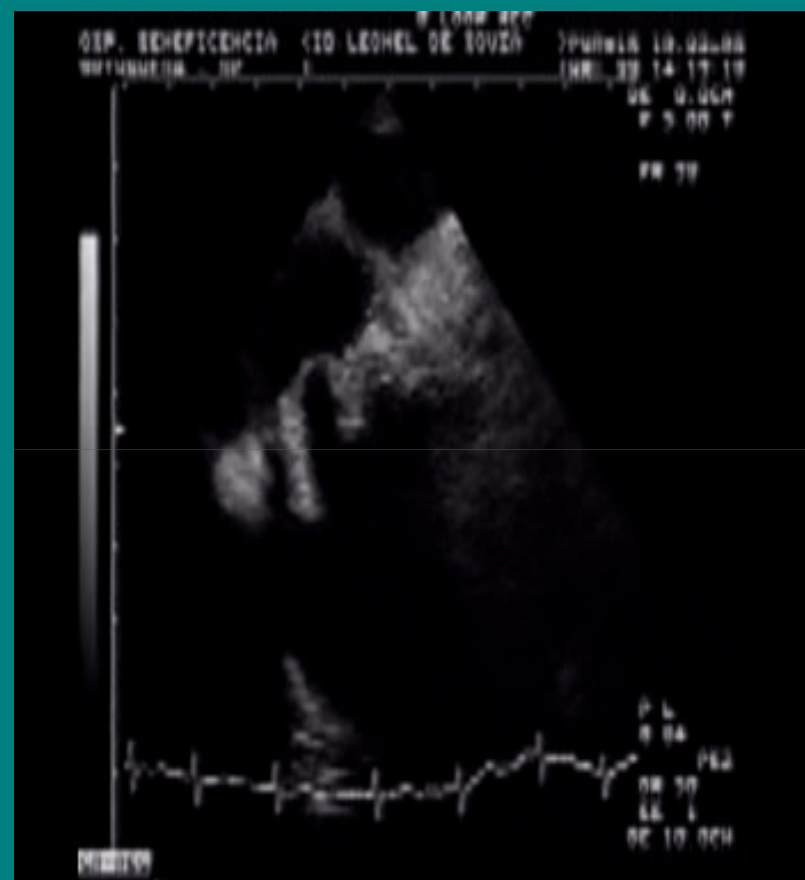
1/1/L
50/ 76
18.7CM

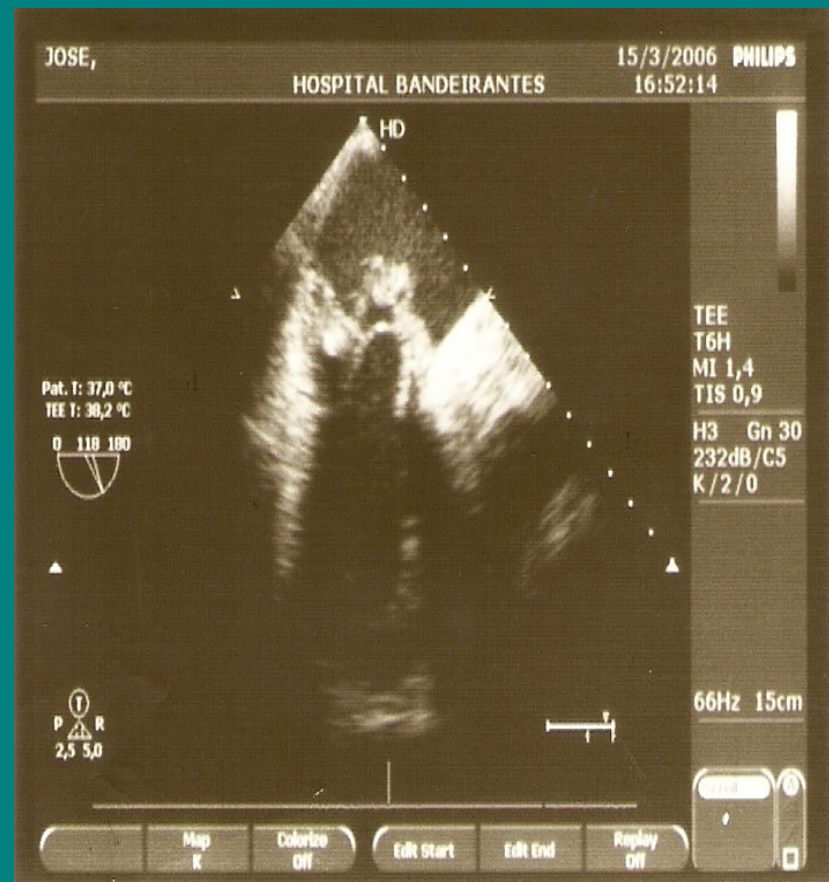












MI:0.3

T6210

15 MAR 04

19:58:37

PROC 2/0/E/F3

HOSPITAL ALEMAO

OSWALDO CRUZ

HP TEE

PAT T: 37.0C

TEE T <37.0C

(hp)



0:59:31

GAIN 32

COMP 65

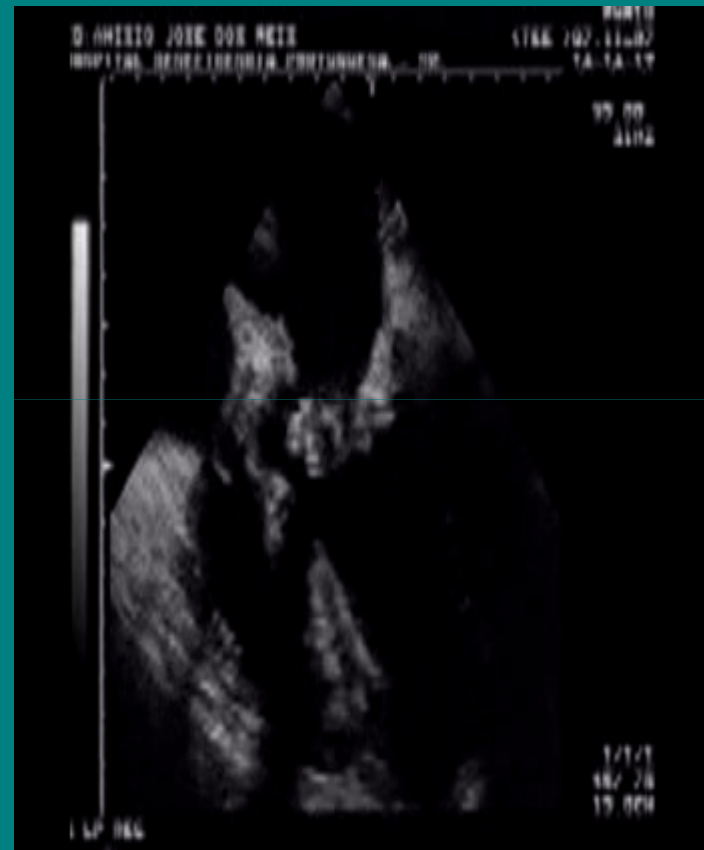
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35HZ

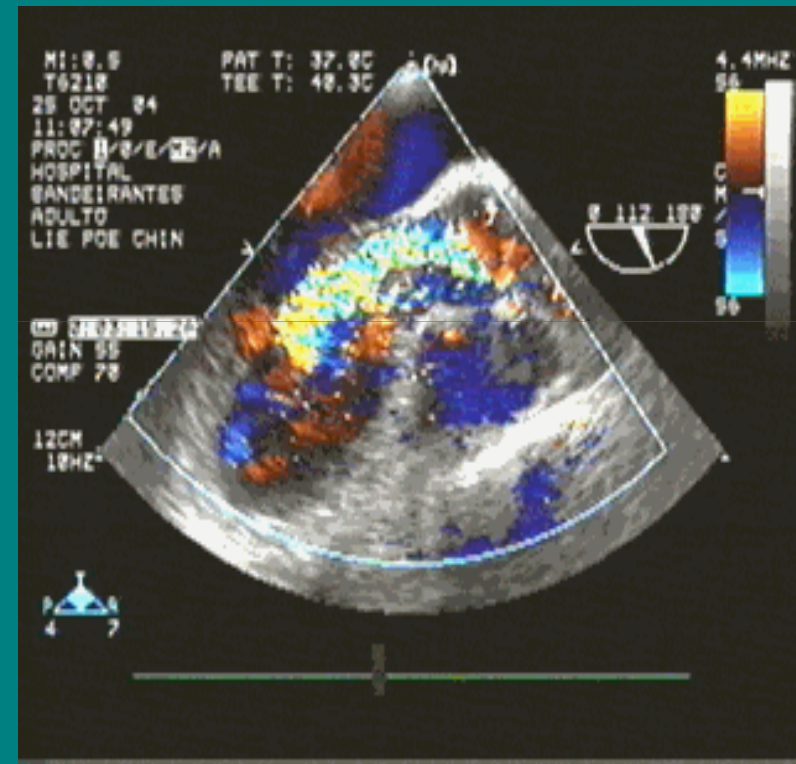
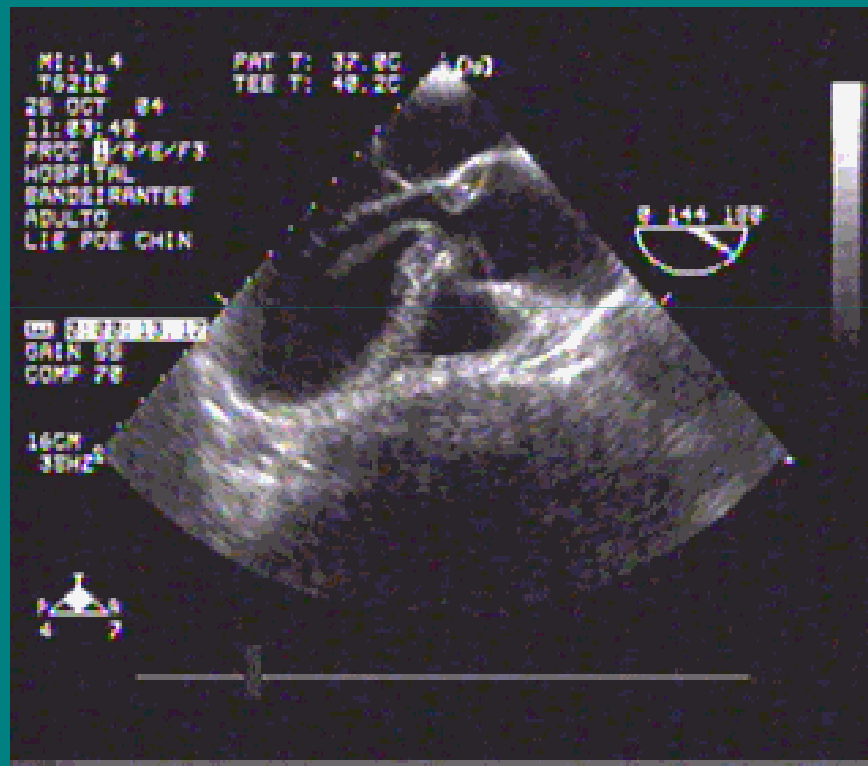








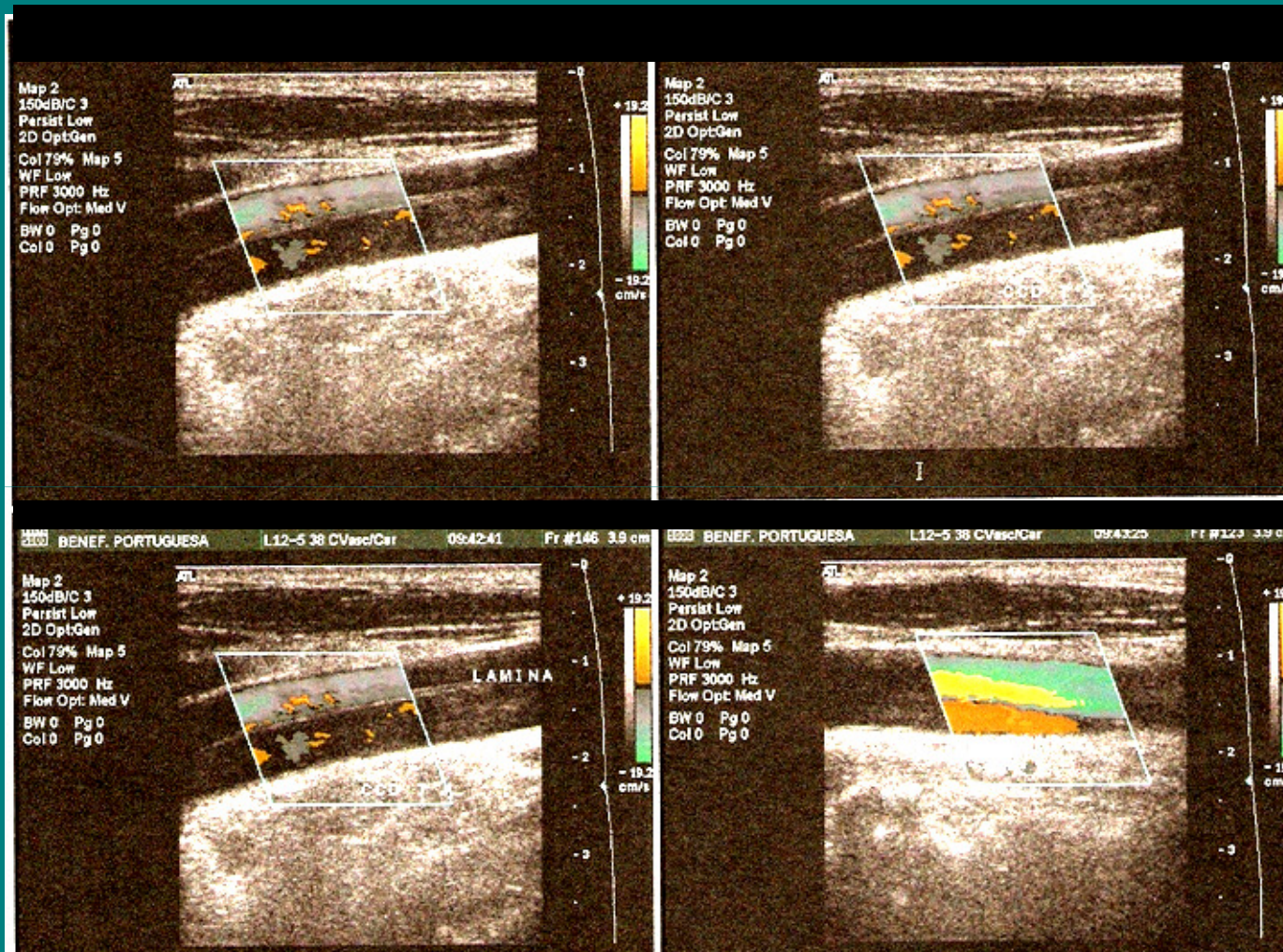
Dissecção de aorta



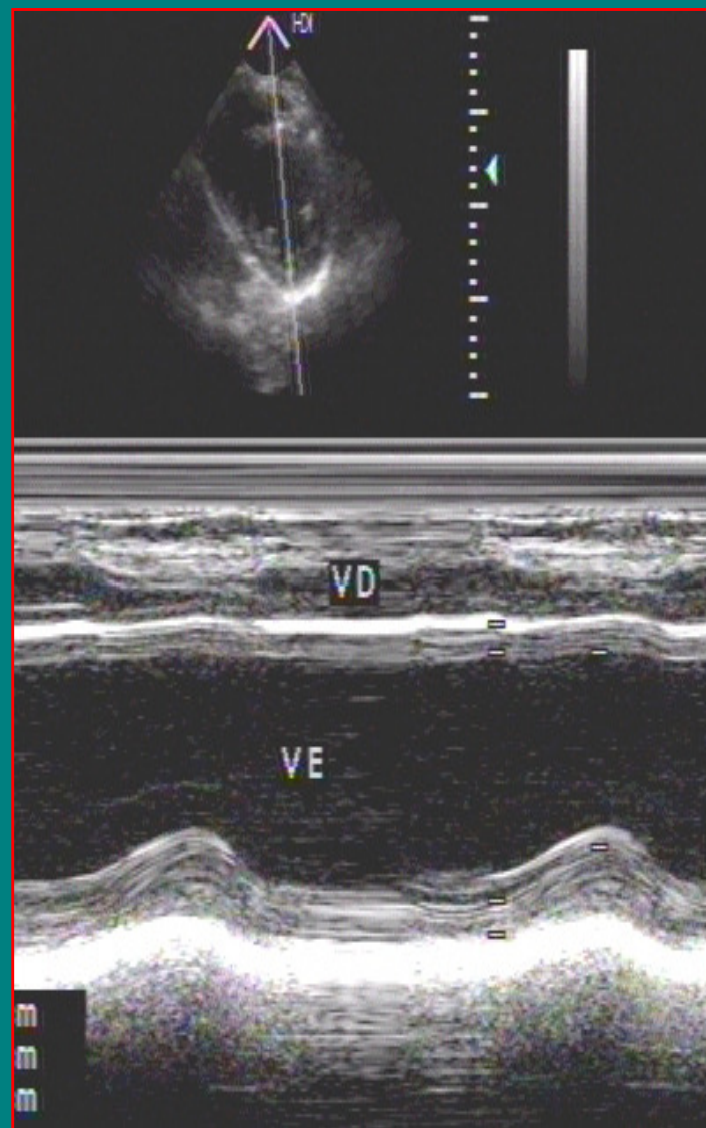




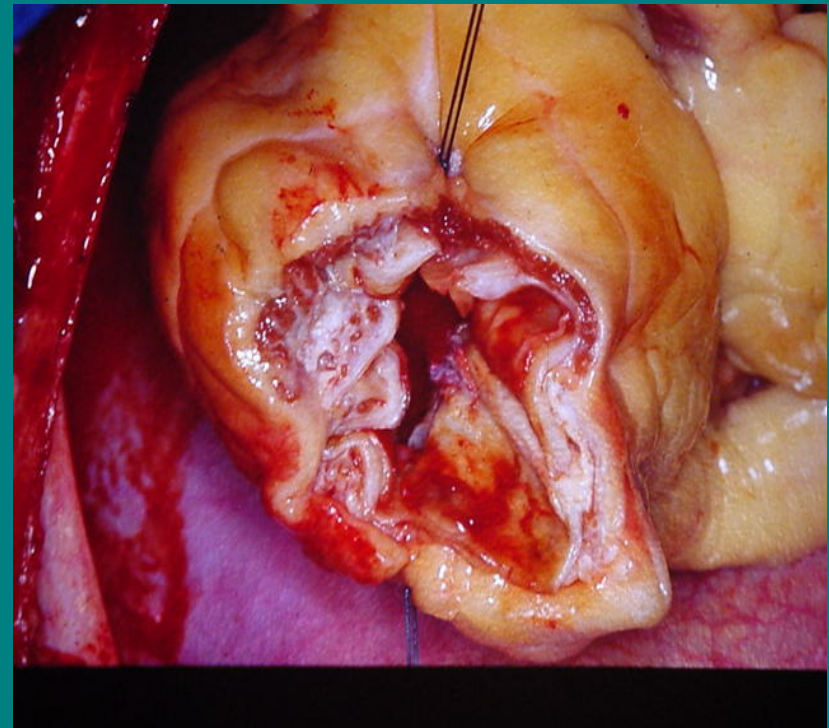
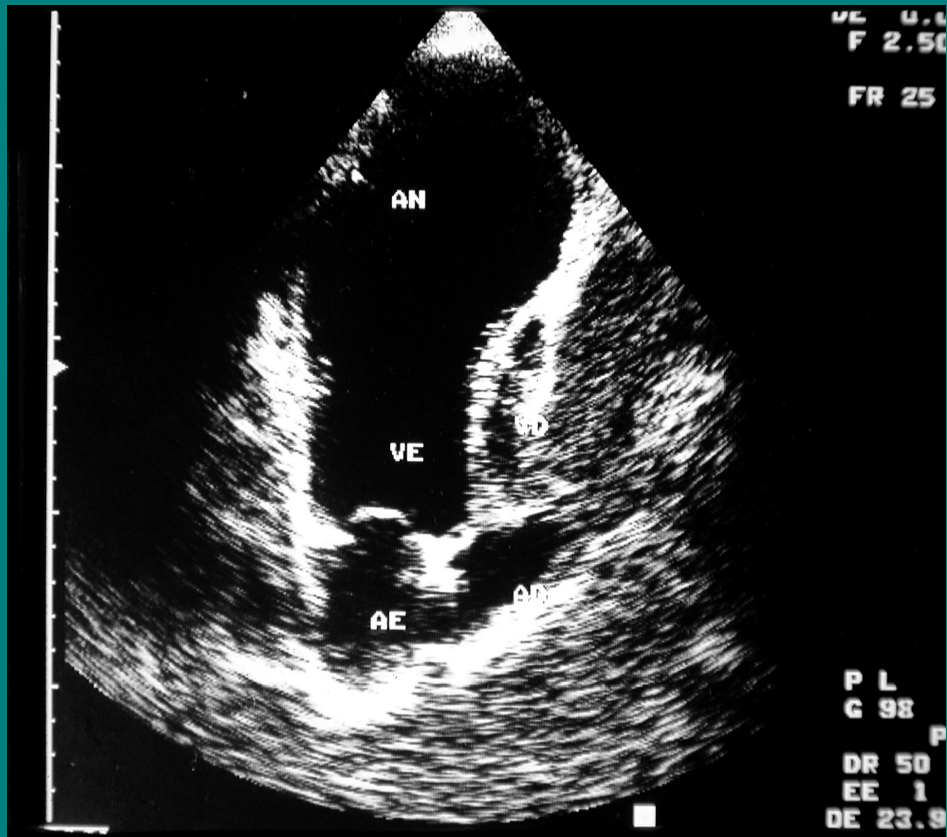


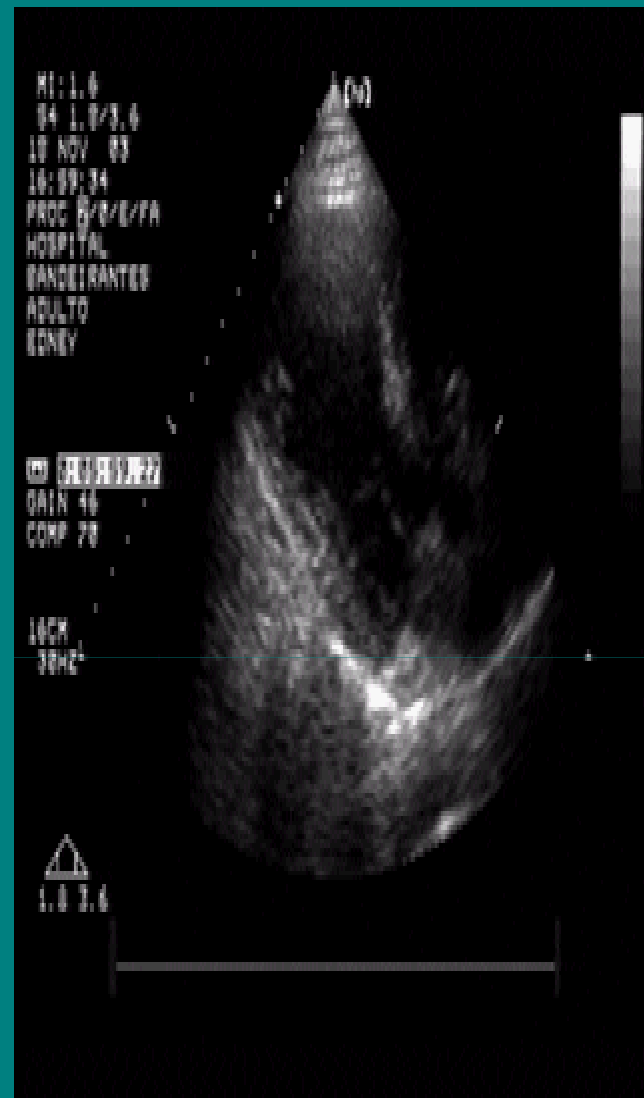


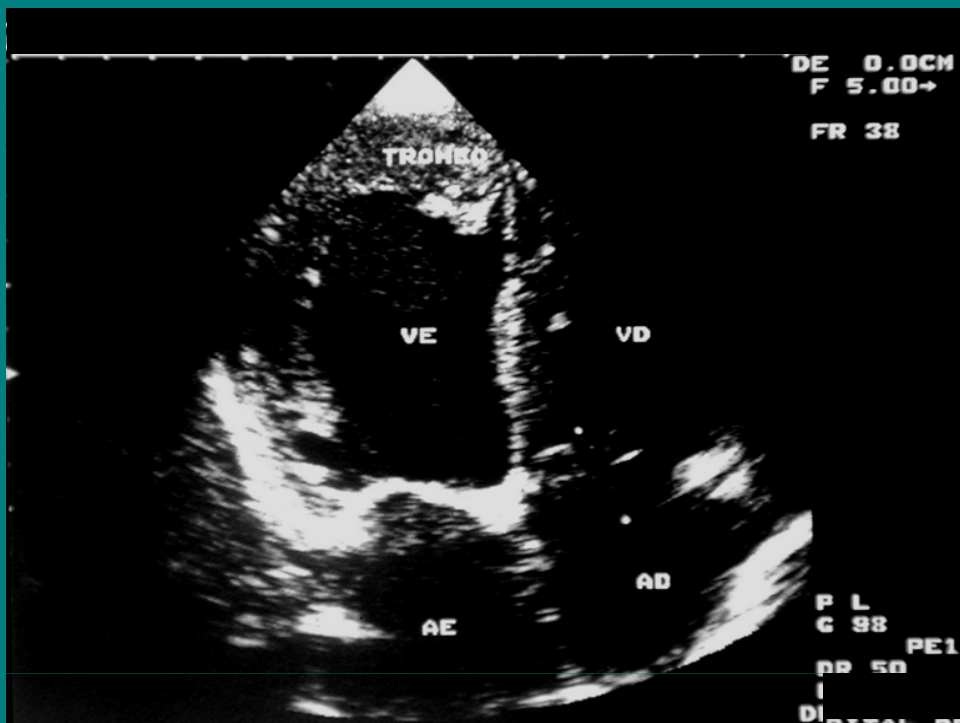
Isquemia miocárdica/infarto agudo do miocárdio



Avaliação contração segmentar

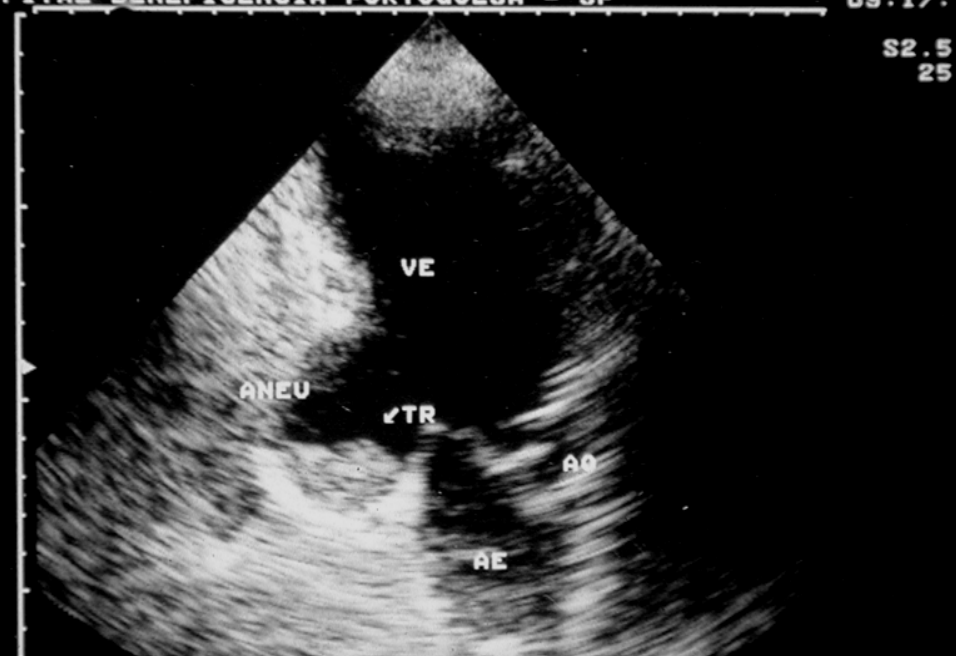


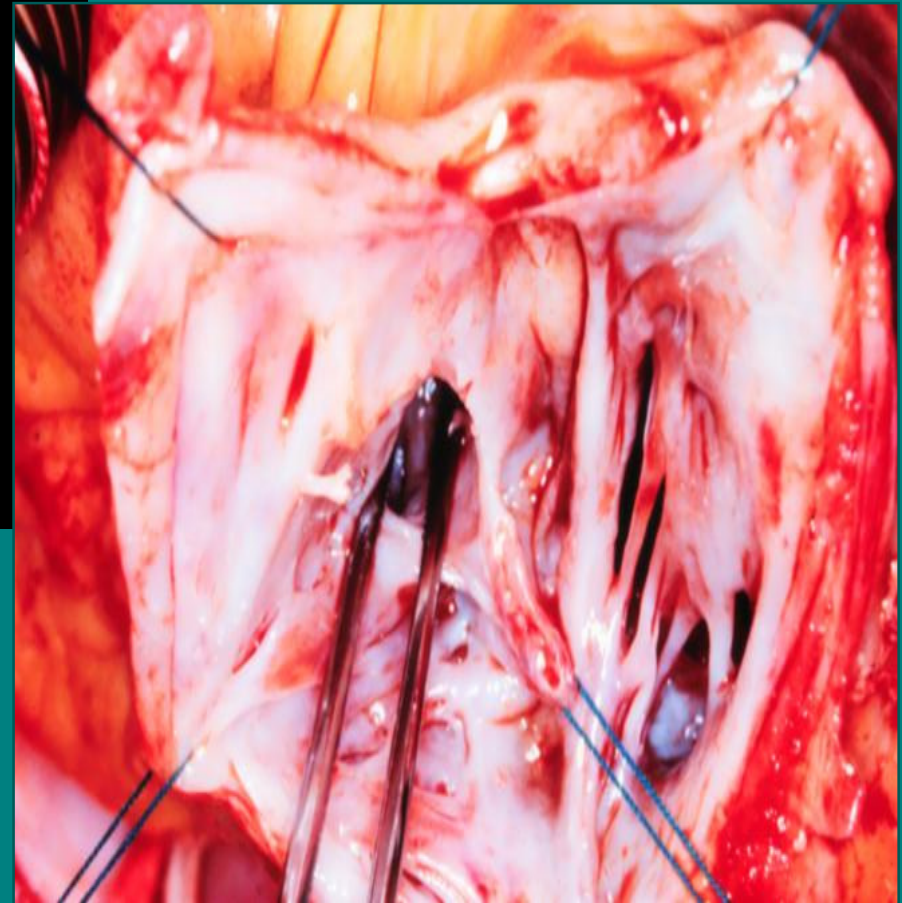
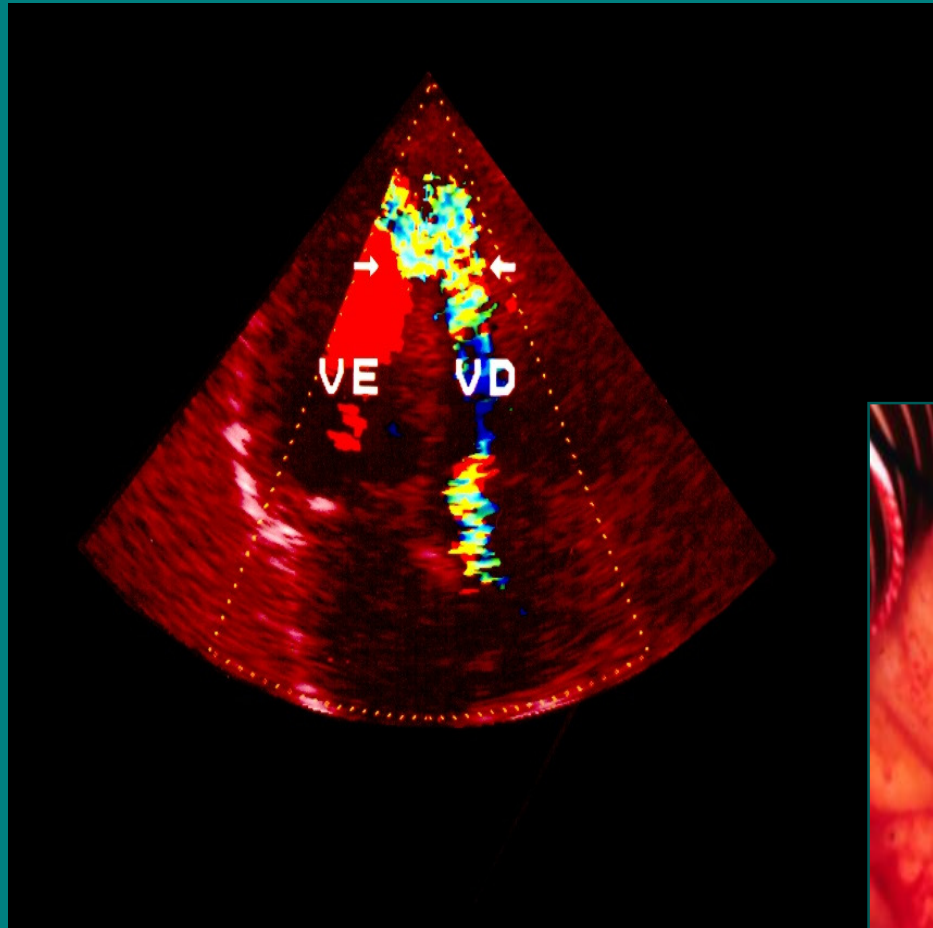


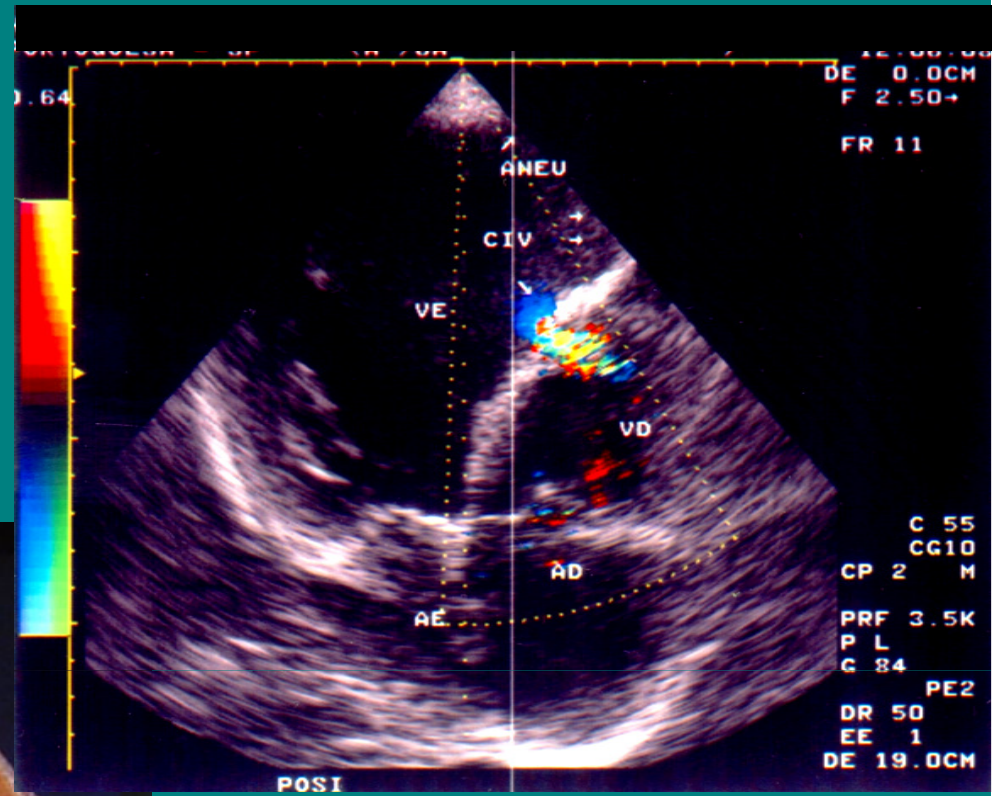
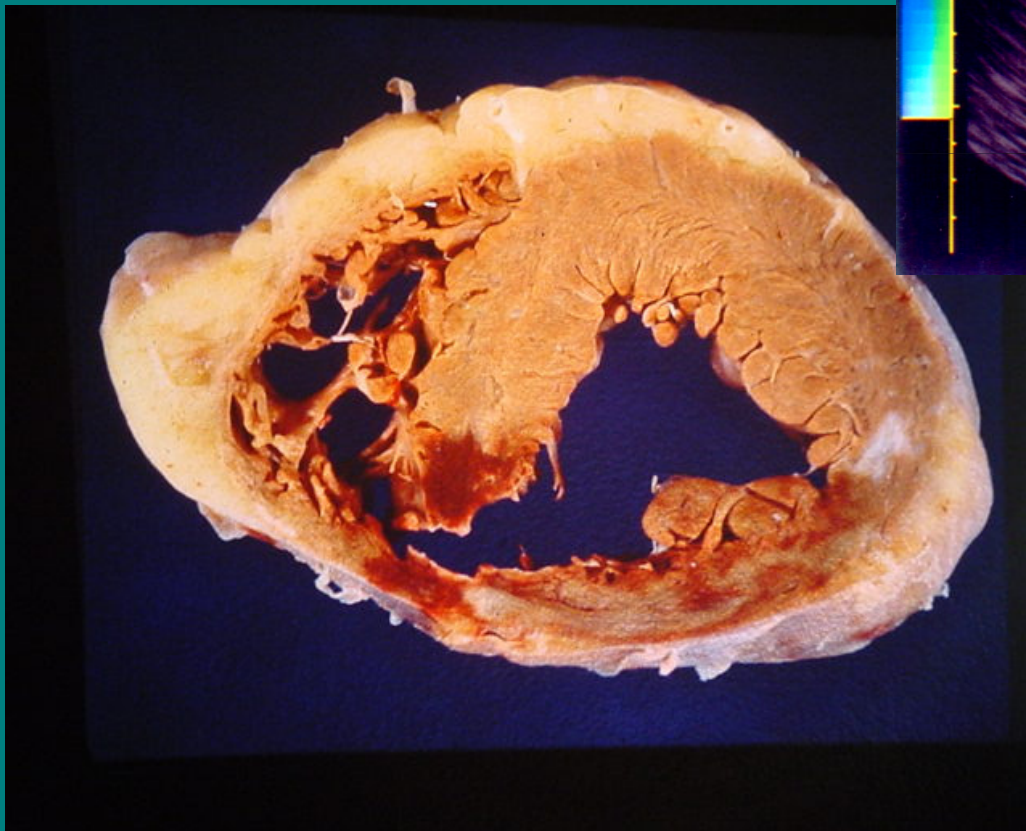


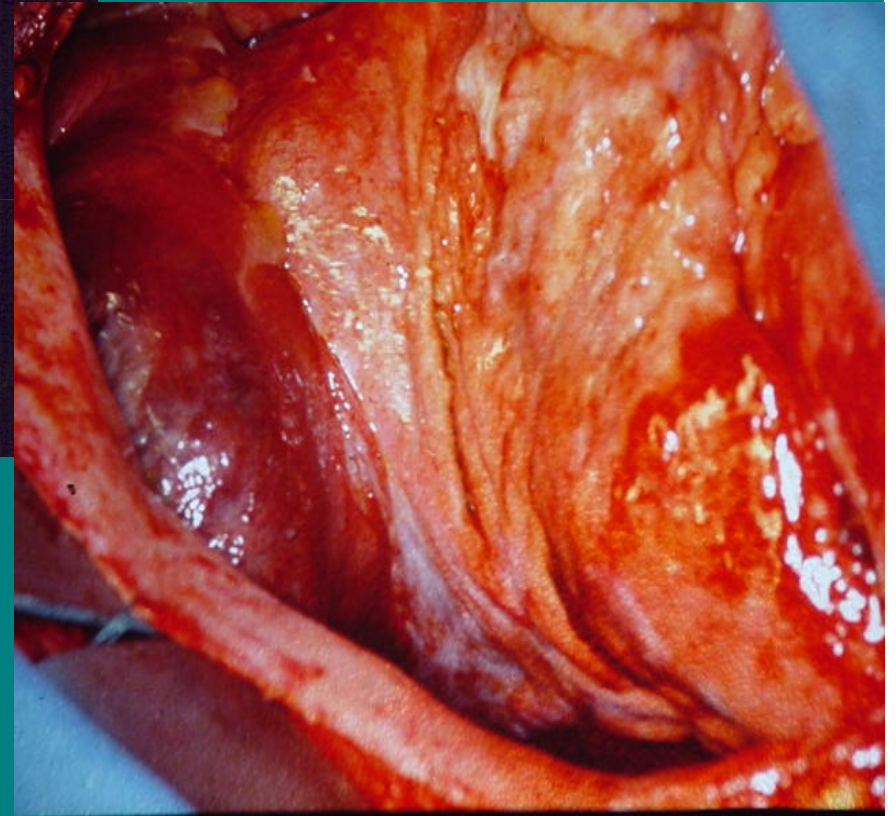
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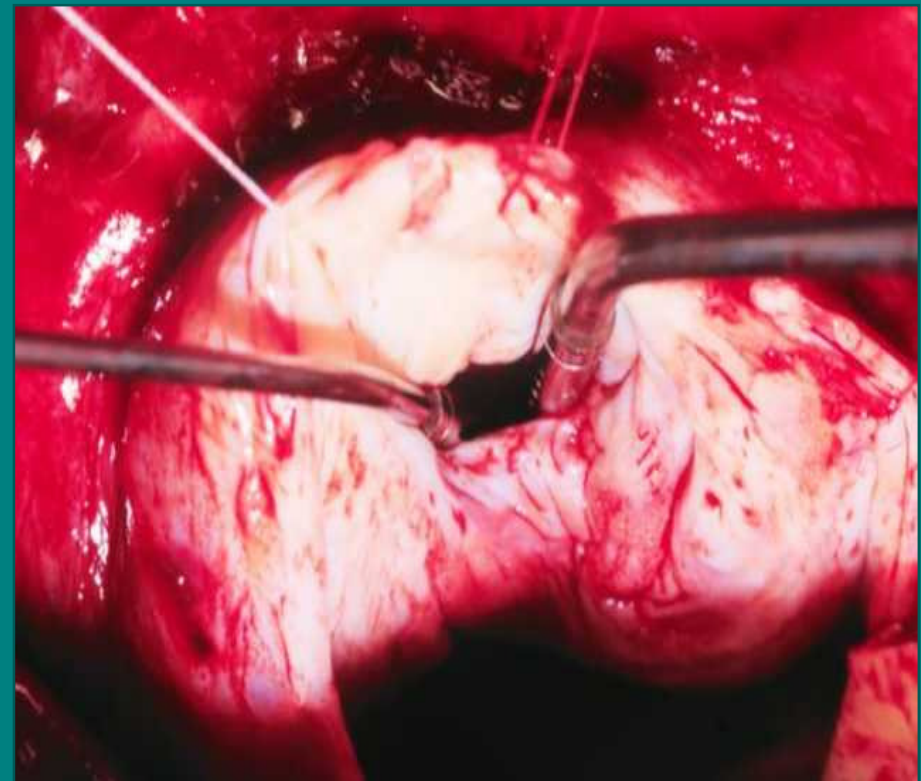
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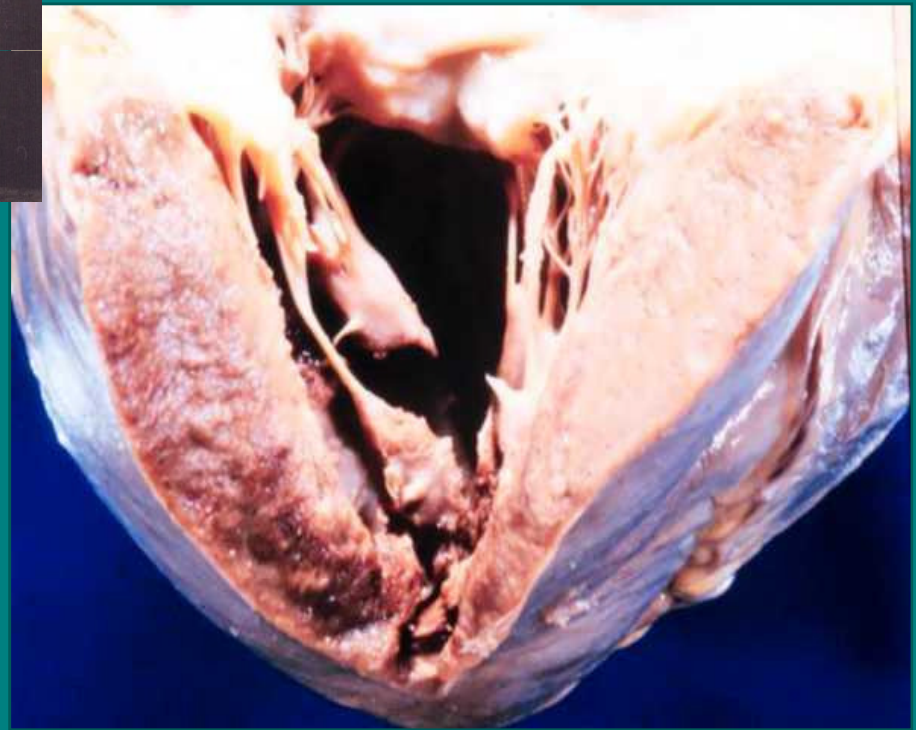
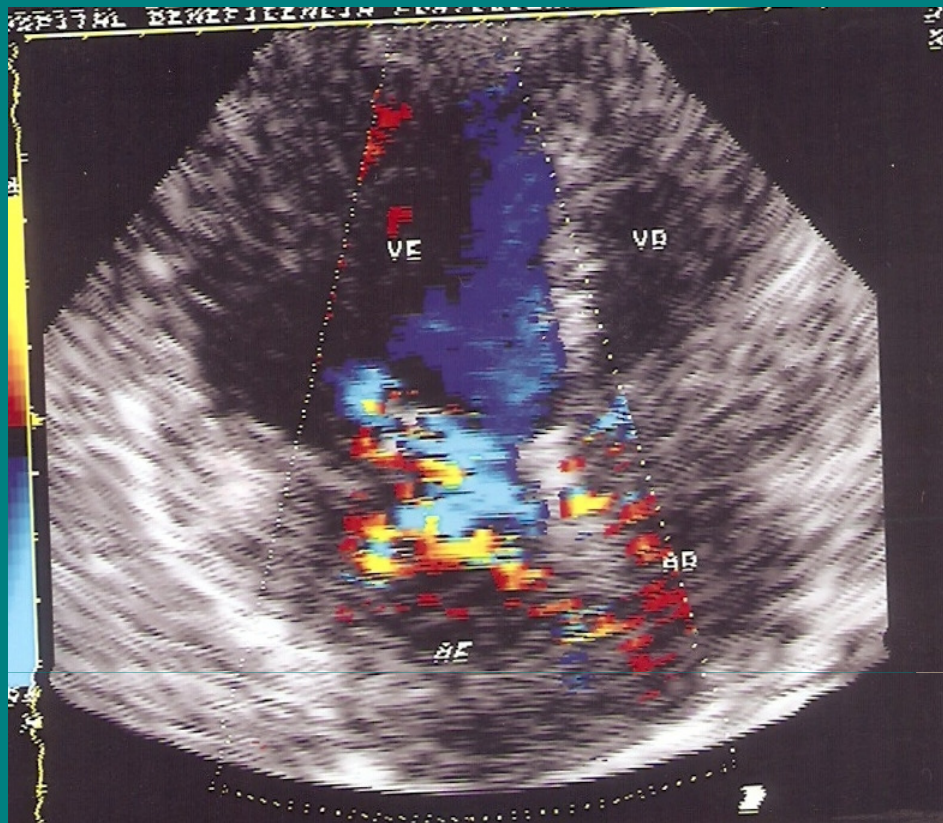




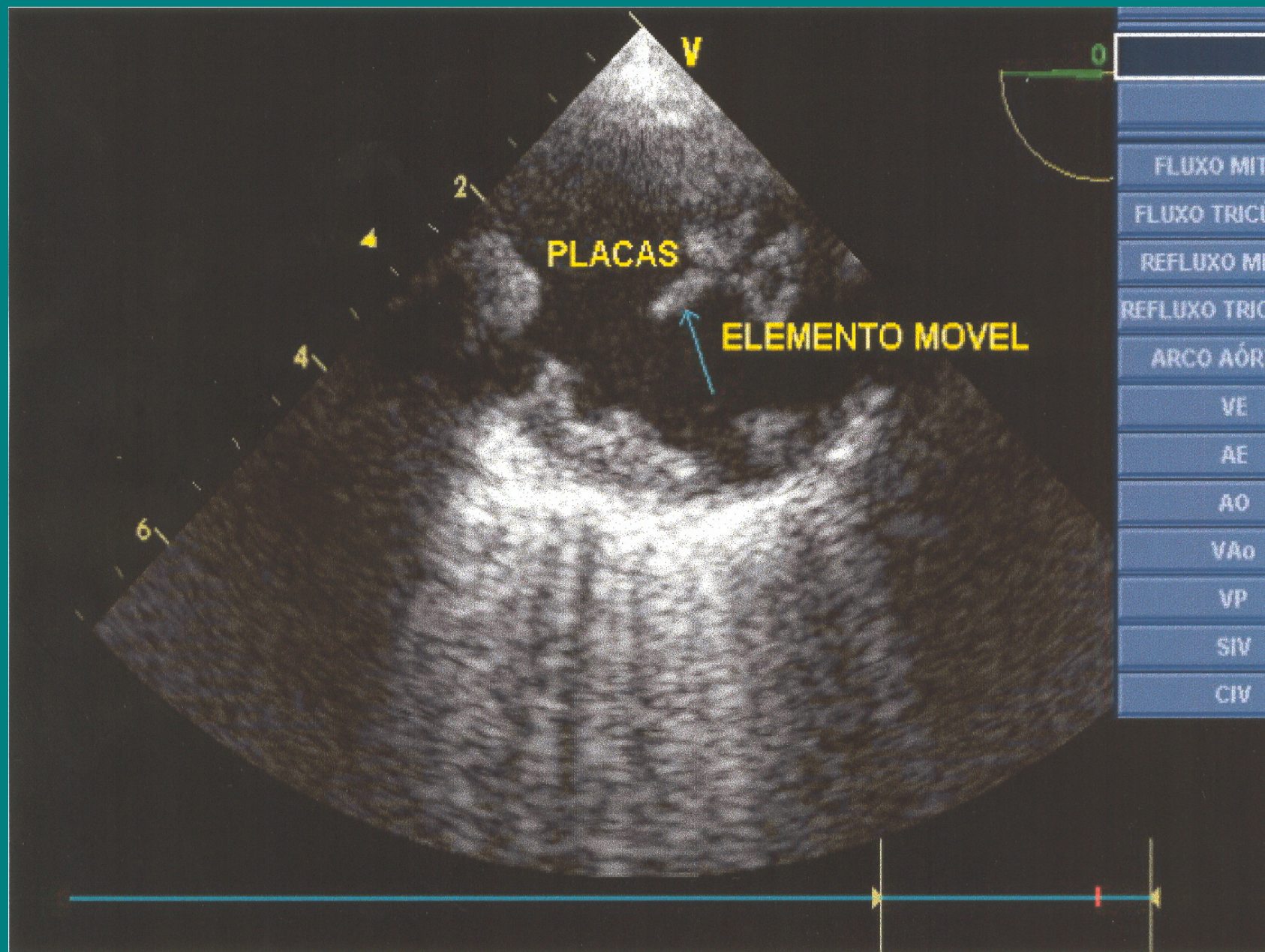








Foco embólico



TOSHIBA

BENEFICENCIA PORTUGUESA

Cardio Adulto

21/09/2007

09:03:50

0

T

P100

4S2

T4.0

60fps

DR30

2DG

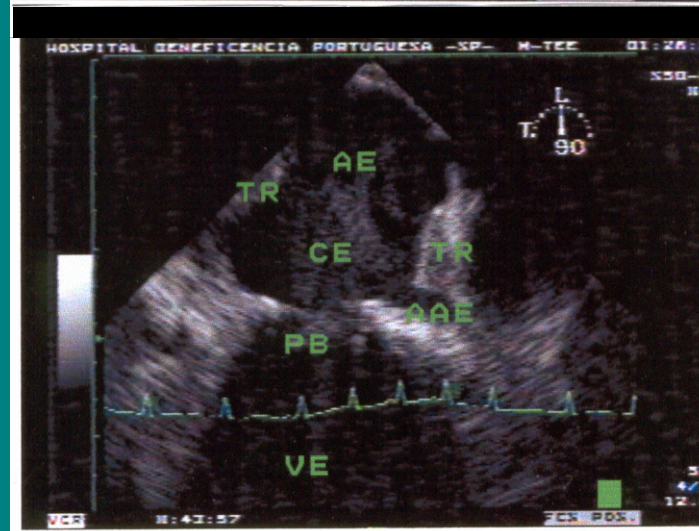
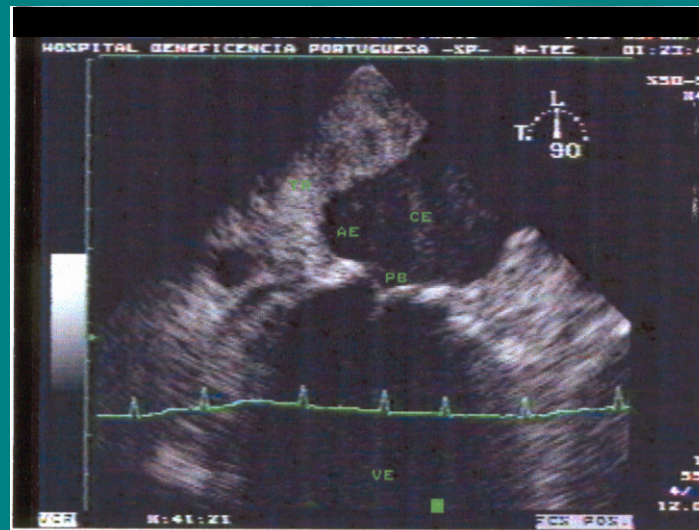
86

5

10

15





HI: 1.5
T6212
25 MAR 24
17:29:53
PROC R2/E/F3
HOSPITAL
BANDEIRANTES
ETE

PAT T: 37.2C
TEE T: 38.8C

A[75]

0 120 180

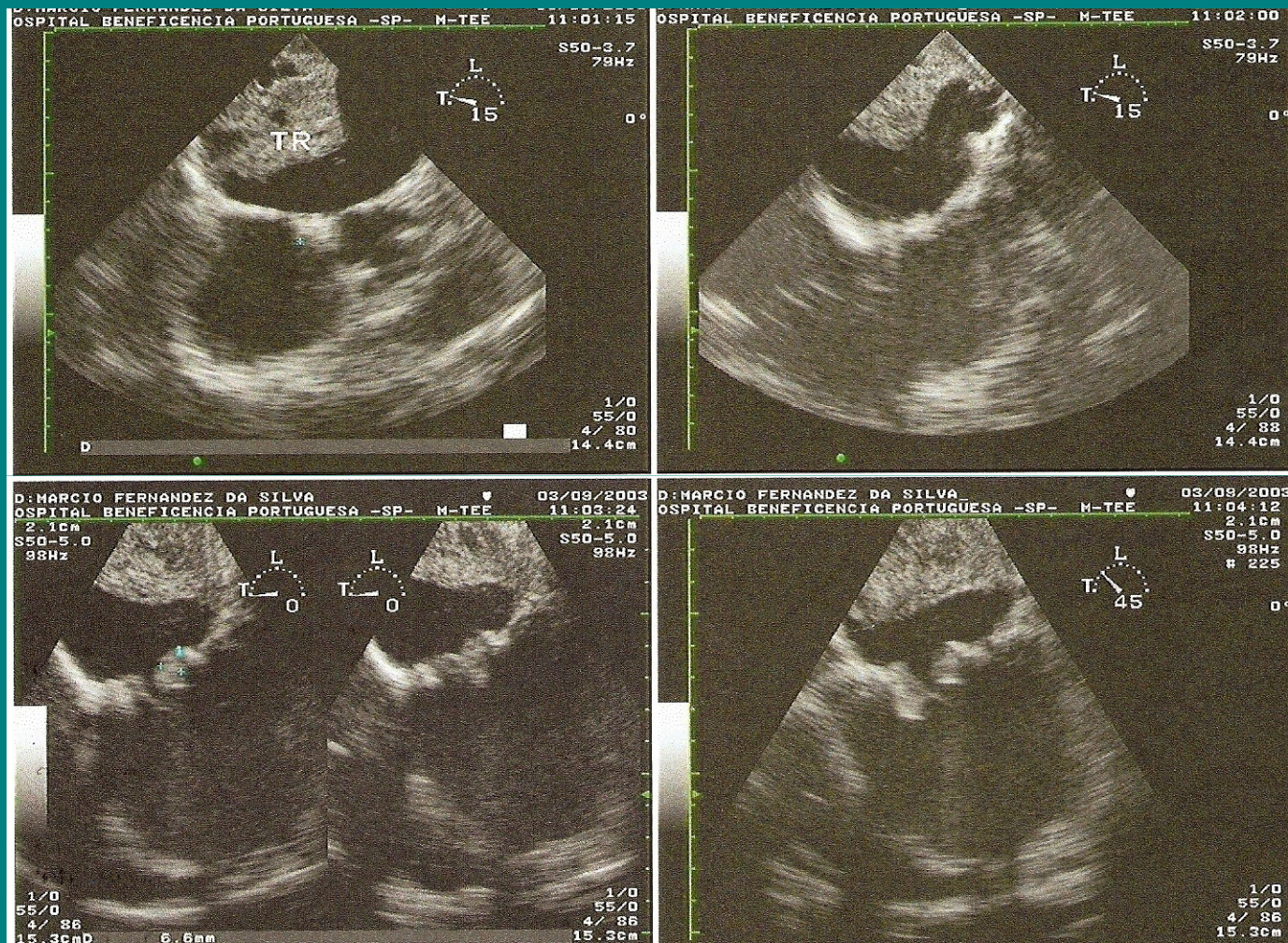
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GAIN 53

COMP 74

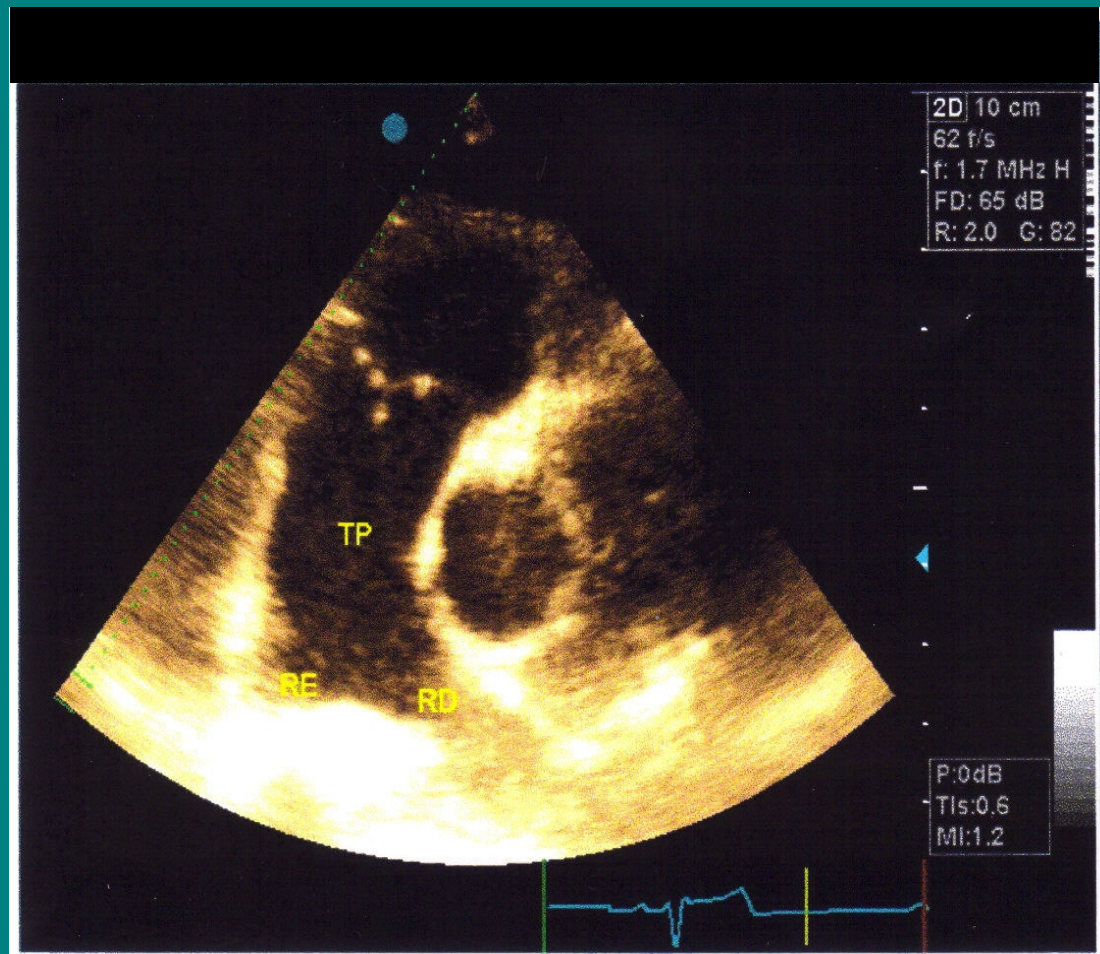
15CH
34HZ

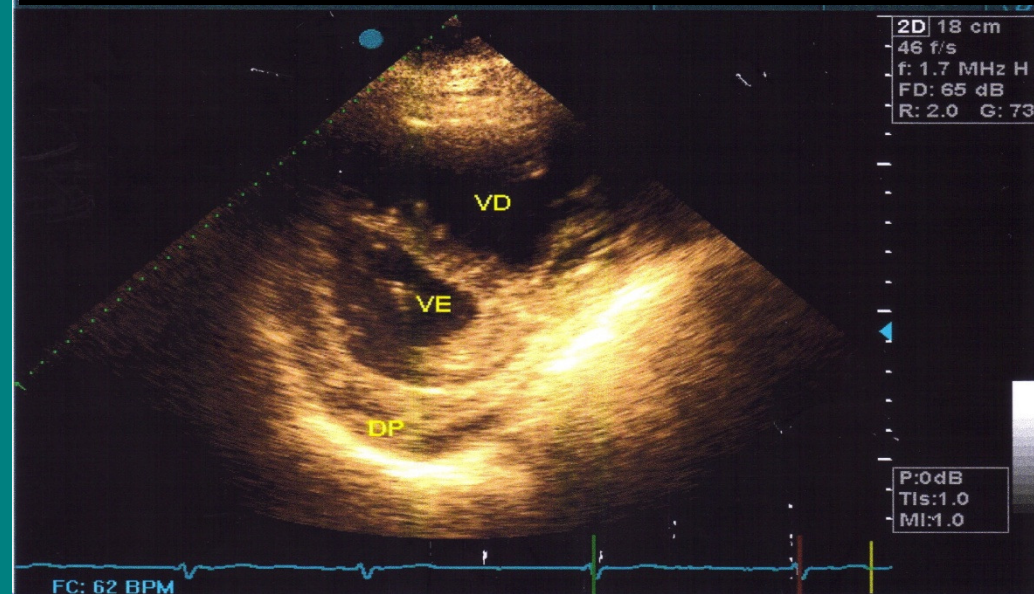
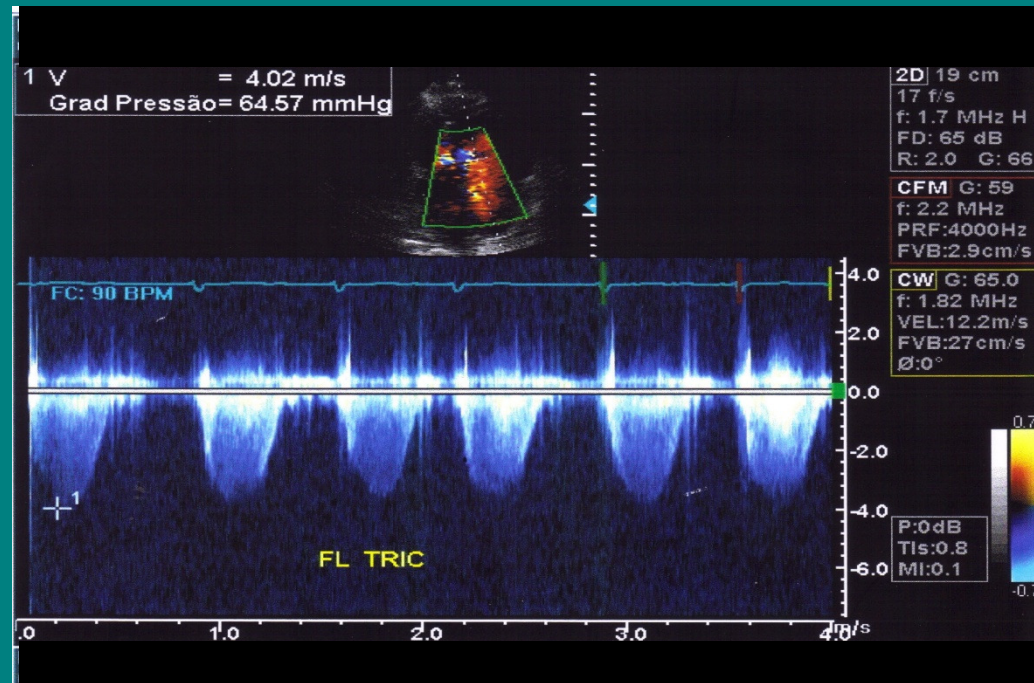
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P 8
4 7

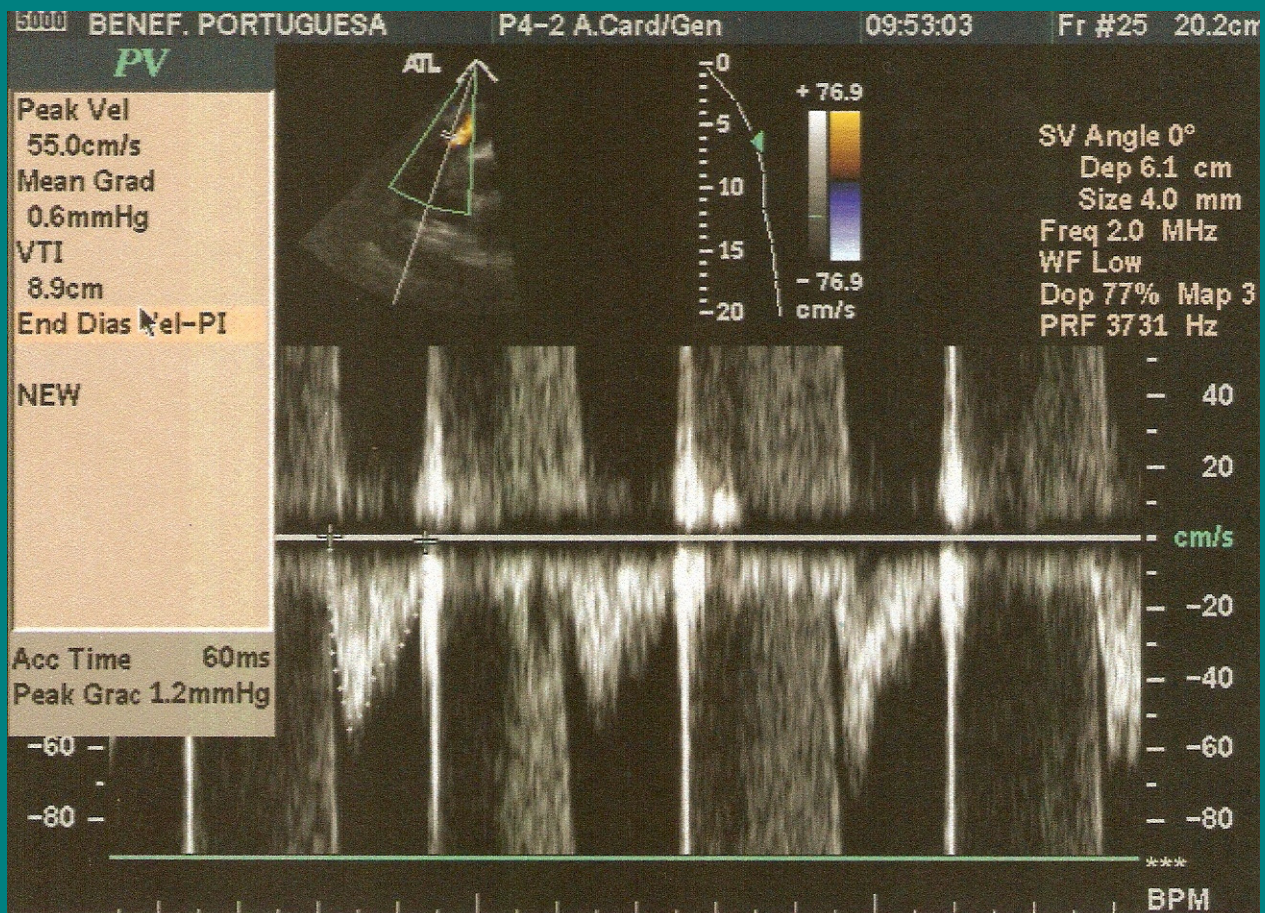




Tromboembolismo Pulmonar

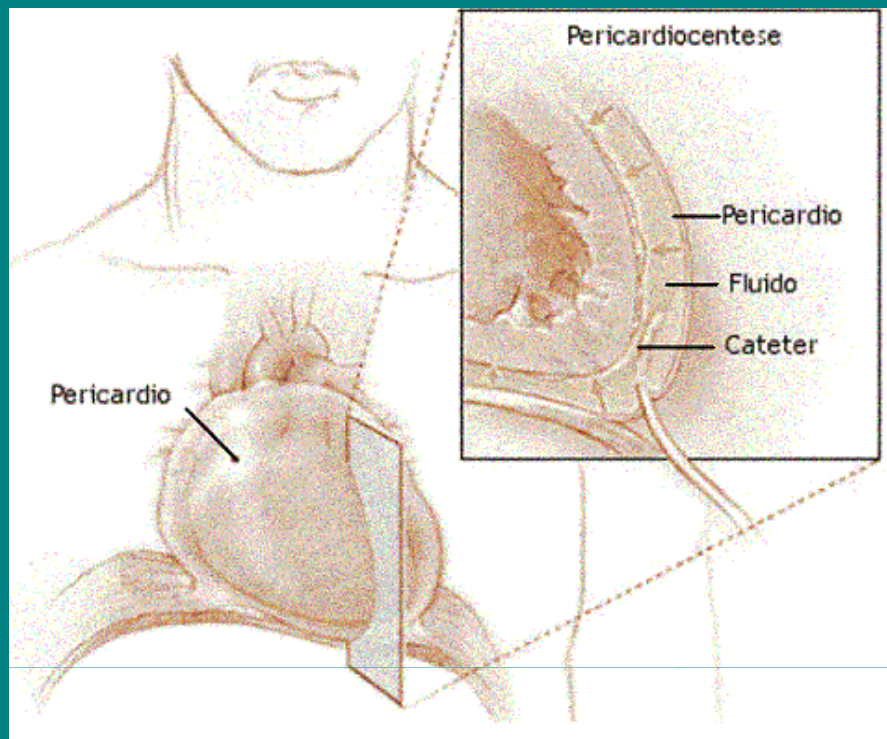


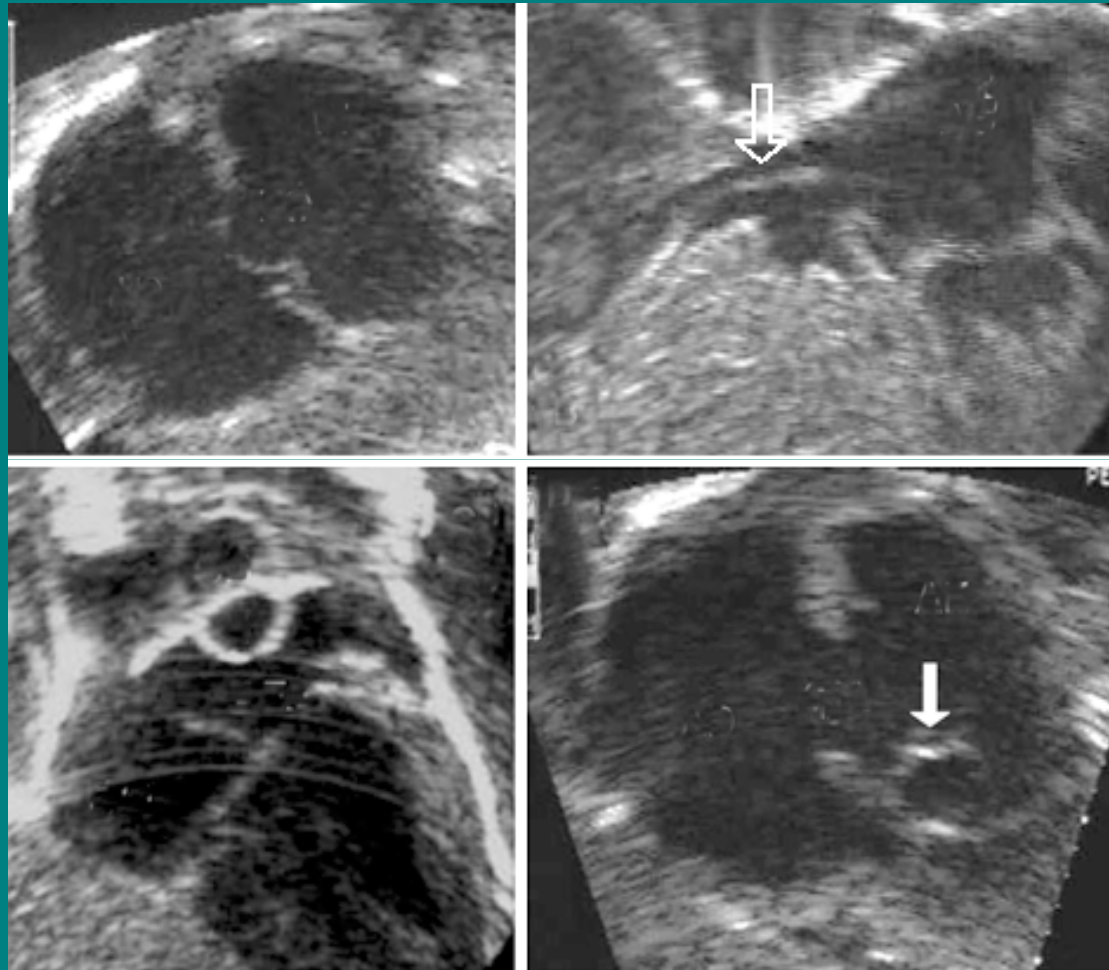




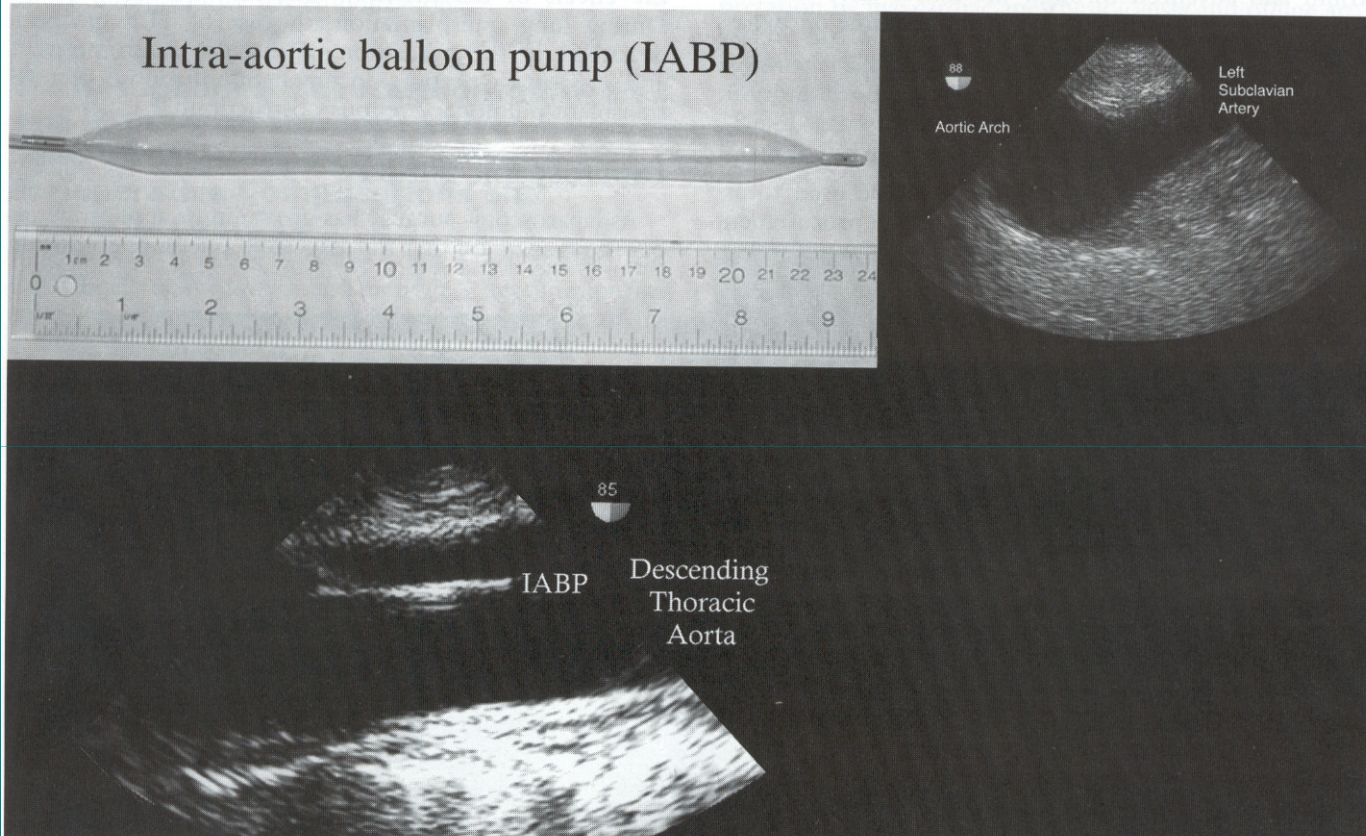
Monitorização de procedimentos

- Drenagem pericárdica
- Posicionamento de Balão Intra-Aórtico
- Rashkind





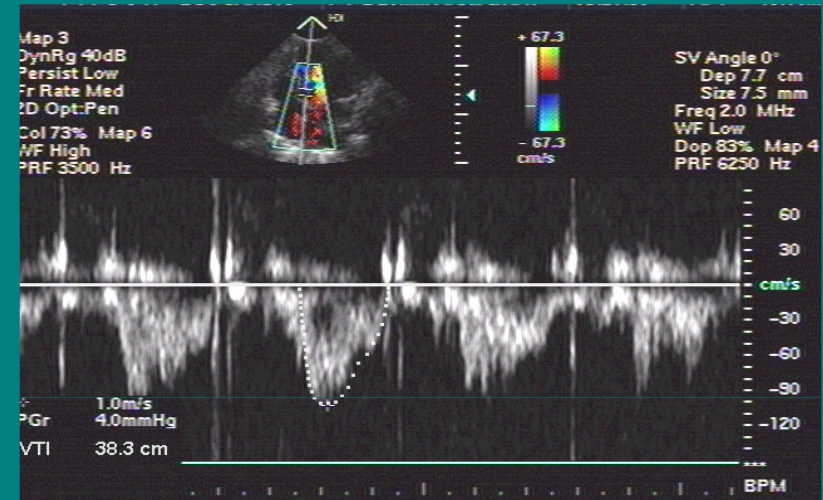
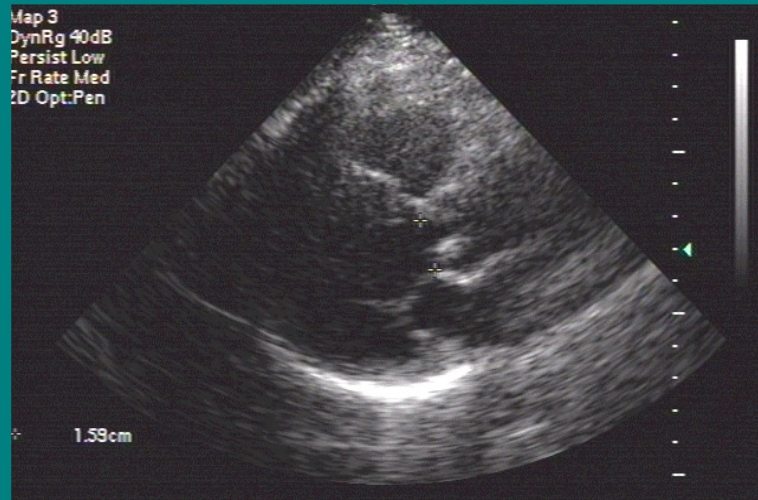
Intra-aortic balloon pump (IABP)



Avaliação Hemodinâmica

- Débito Cardíaco
- Pressão Sistólica do Ventrículo Direito
- Avaliação Pressão Átrio Esquerdo

Débito Cardíaco



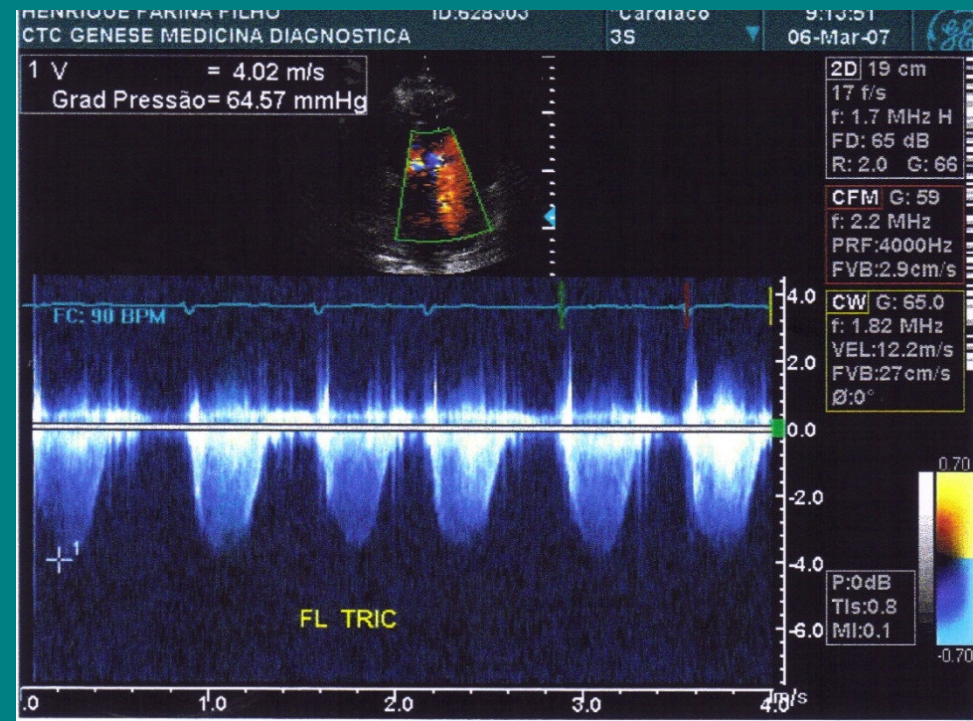
$$DC = VS \times FC$$



$$\uparrow R^2 \times VTI_{AO}$$

PSVD

$$\text{PSVD} = 4V^2 + \text{PAD}$$

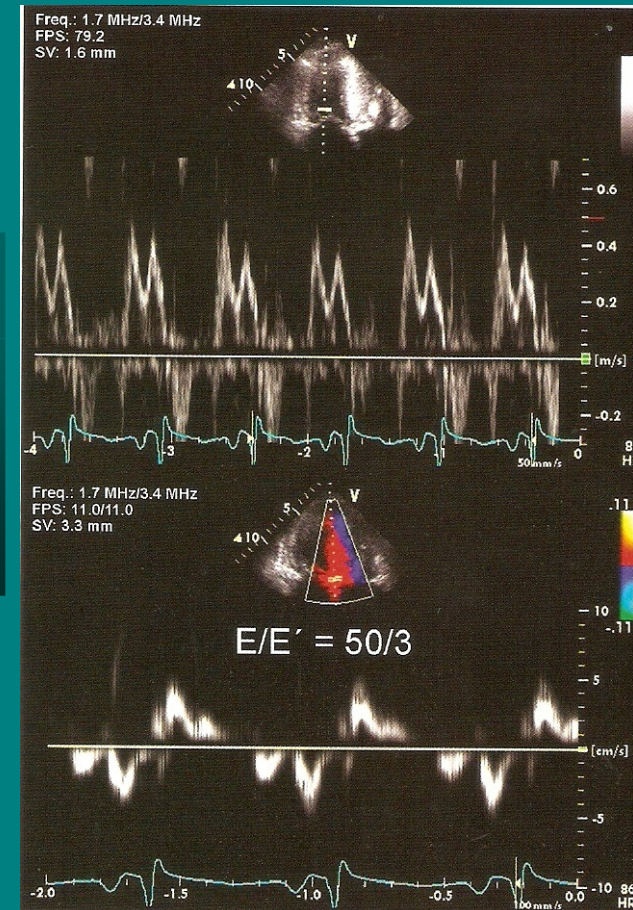


Pressão do AD

Diâmetro VCI	Variação respiratória	PAD
NI (1,5 – 2,5cm)	NI (> 50%)	5 – 10mmHg
NI ou levemente dilatada	Reduzida (< 50%)	15mmHg
Dilatada (>2,5cm)	Ausente	20mmHg

Avaliação Pressão no Átrio Esquerdo

$E/E' > 10 \Rightarrow PAE > 15\text{mmHg}$
(S – 97%, E – 71%)



Nagueh SF et al. JACC 1997;30:1527-33

Conclusão

- Síndrome Baixo Débito:
 - Disfunção Ventricular
 - Tamponamento Cardíaco
 - Hipovolemia
 - Valvopatias Agudas
 - Aortopatias

