Aortic Stenosis Challenges

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MEDICINE *of* THE HIGHEST ORDER

UR MEDICINE

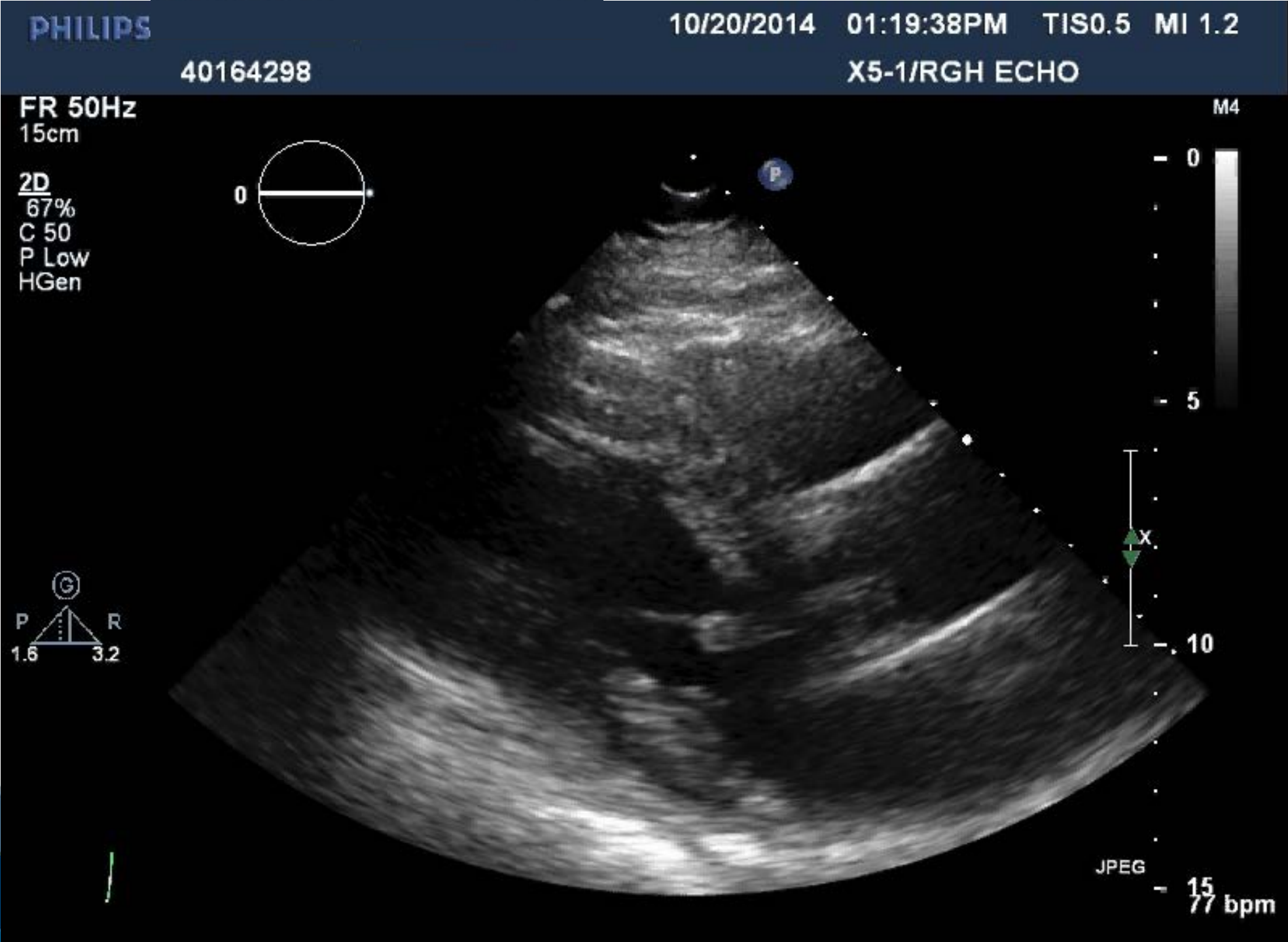
No disclosures

Aortic Stenosis- Management Challenges

1. True or a mistaken diagnosis?
2. The asymptomatic patient with severe AS
3. Low flow-low gradient aortic stenosis
4. Indications for TAVR

CASE #1

- 72 year white male with a cardiac murmur
- Recent onset of dyspnea
- Suspected severe valvular aortic stenosis
- Referred for AV surgery
- Echocardiogram was repeated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2D
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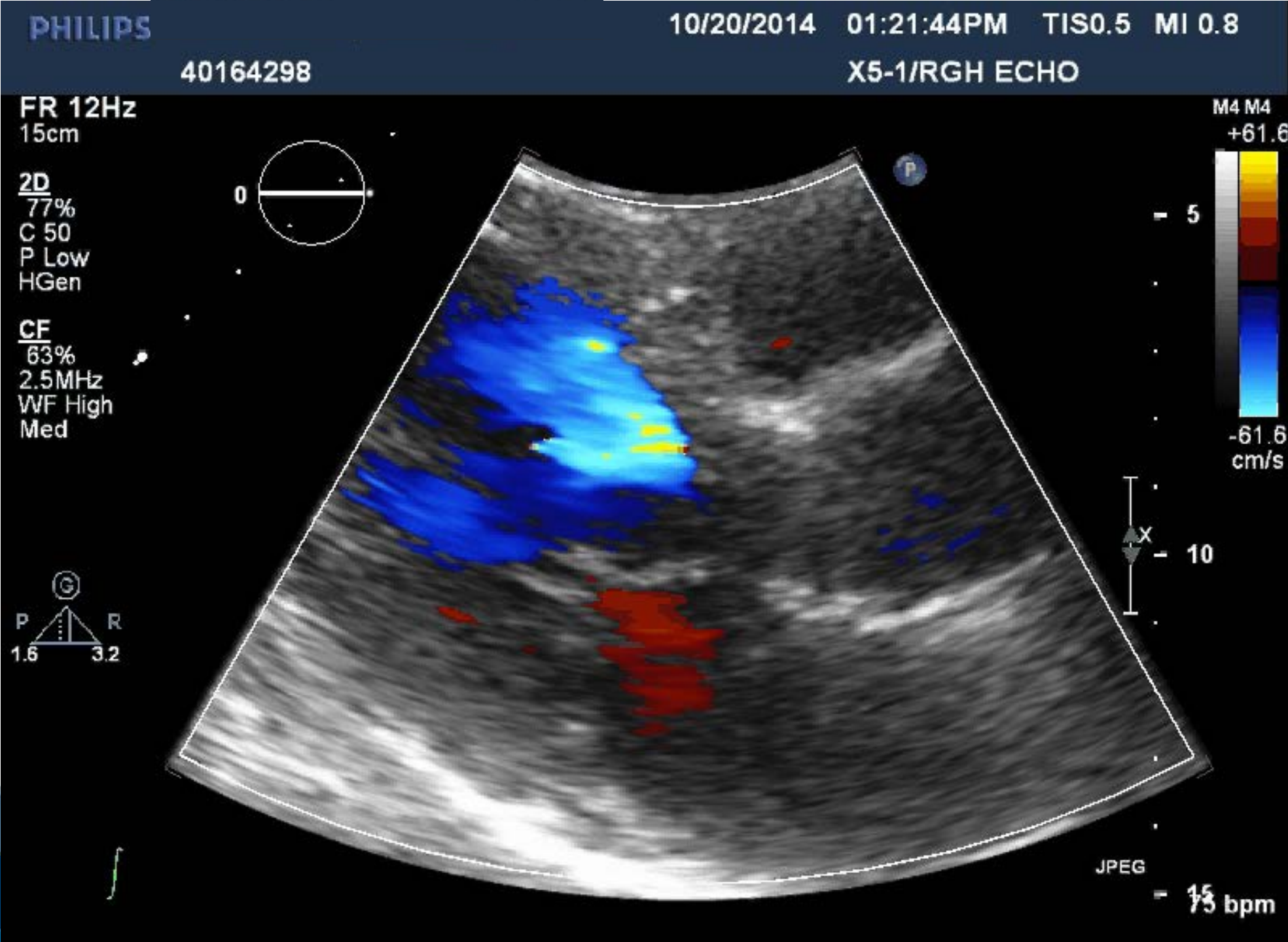
C 50
P Low
HGen
M4
0
5
10
15
P
R
1.6
3.2
JPEG
77 bpm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HGen
CF
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WF High
Med
M4 M4
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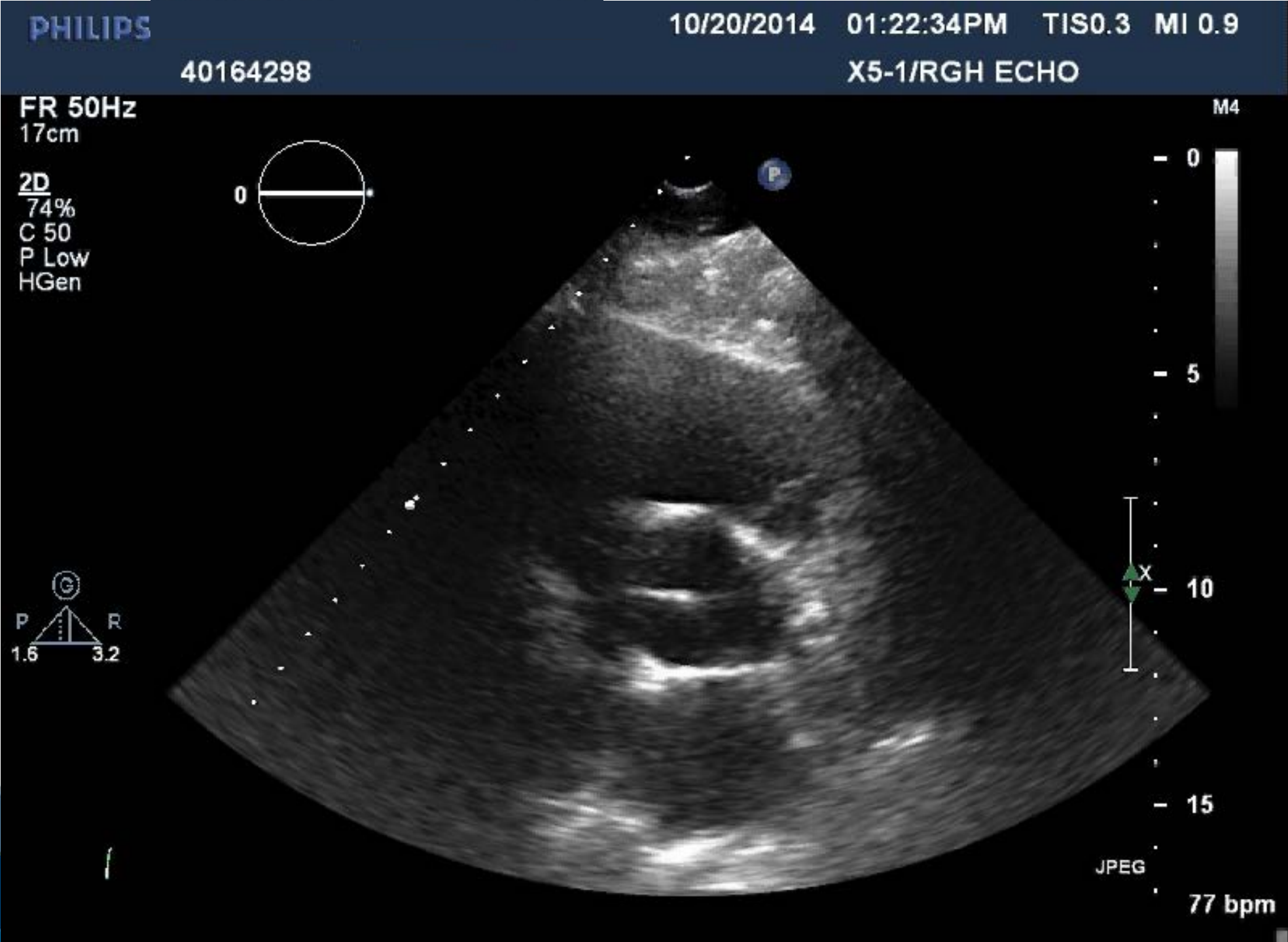
-61.6
cm/s
5
10
15
P
R
1.6
3.2
JPEG
75 bpm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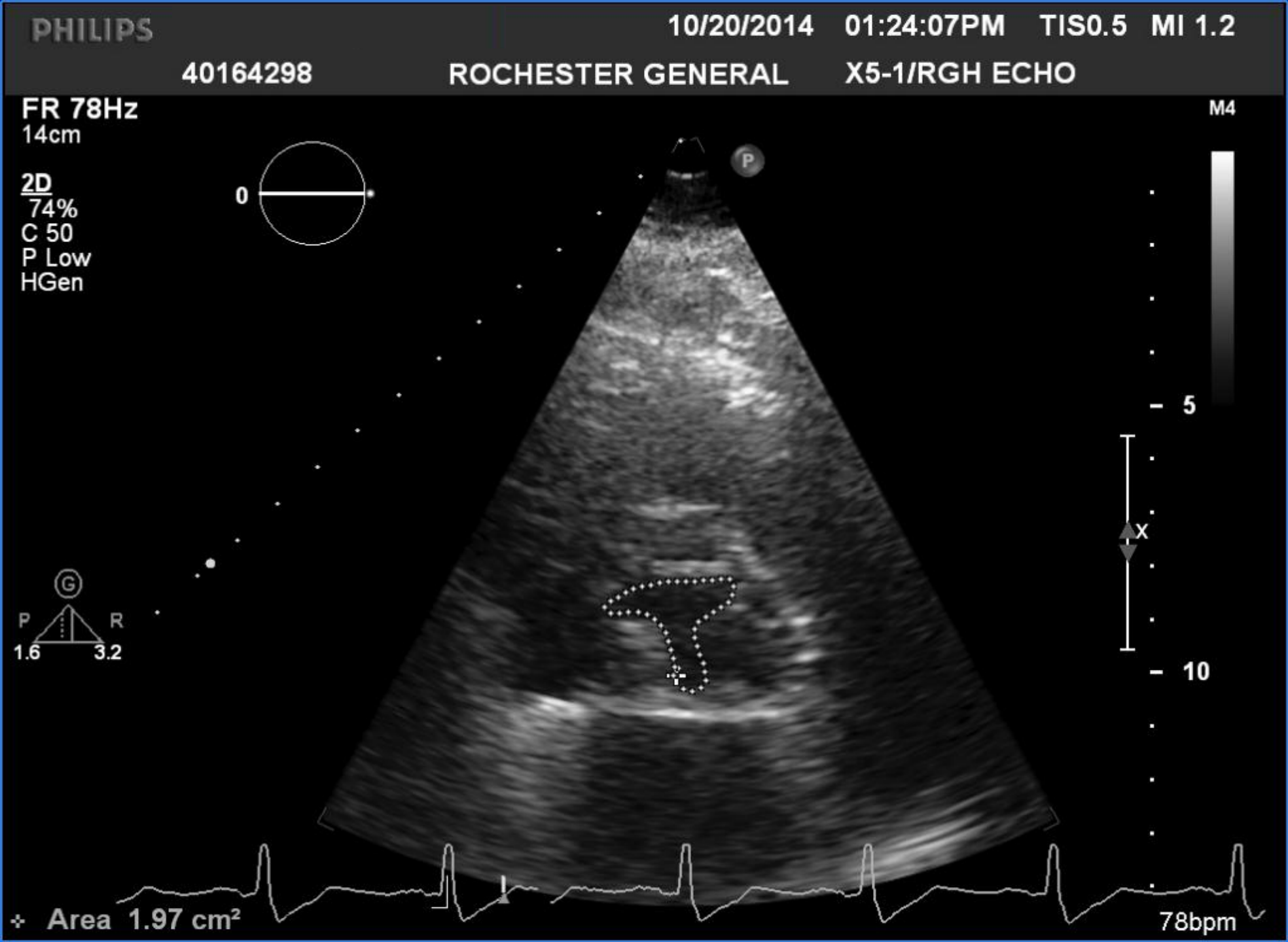
P
R
1.6
3.2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2D
74%
C 50
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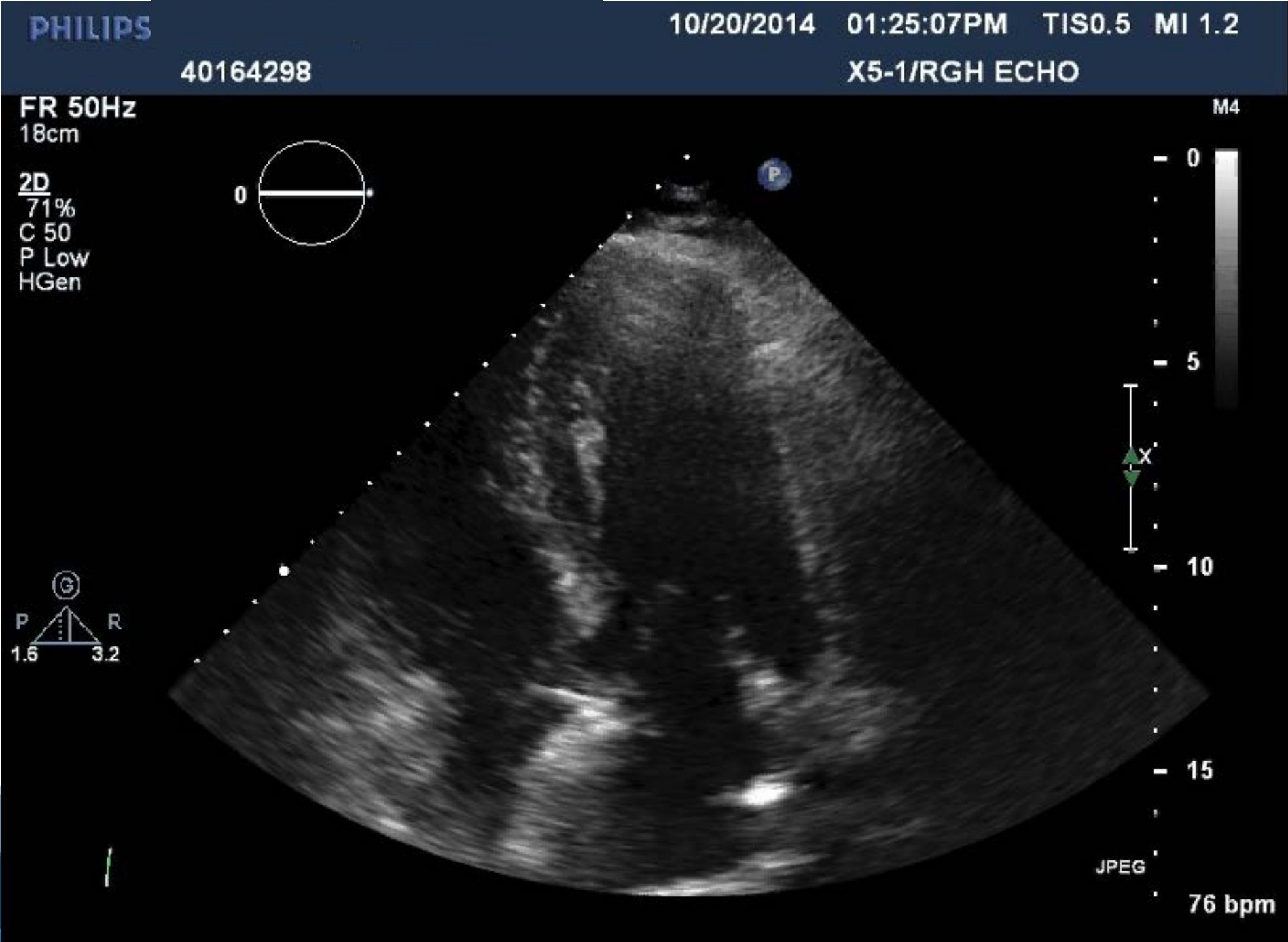
HGen
M4
0
P
5
10
X
G
P
R
1.6
3.2
Area 1.97 cm²
78bpm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5
10
15
X
G
P
R
1.6
3.2
JPEG
76 bpm


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2D
82%
C 50
P Low
HGen
M4
10
15
20
JPEG
74 bpm
P
R
1.6
3.2


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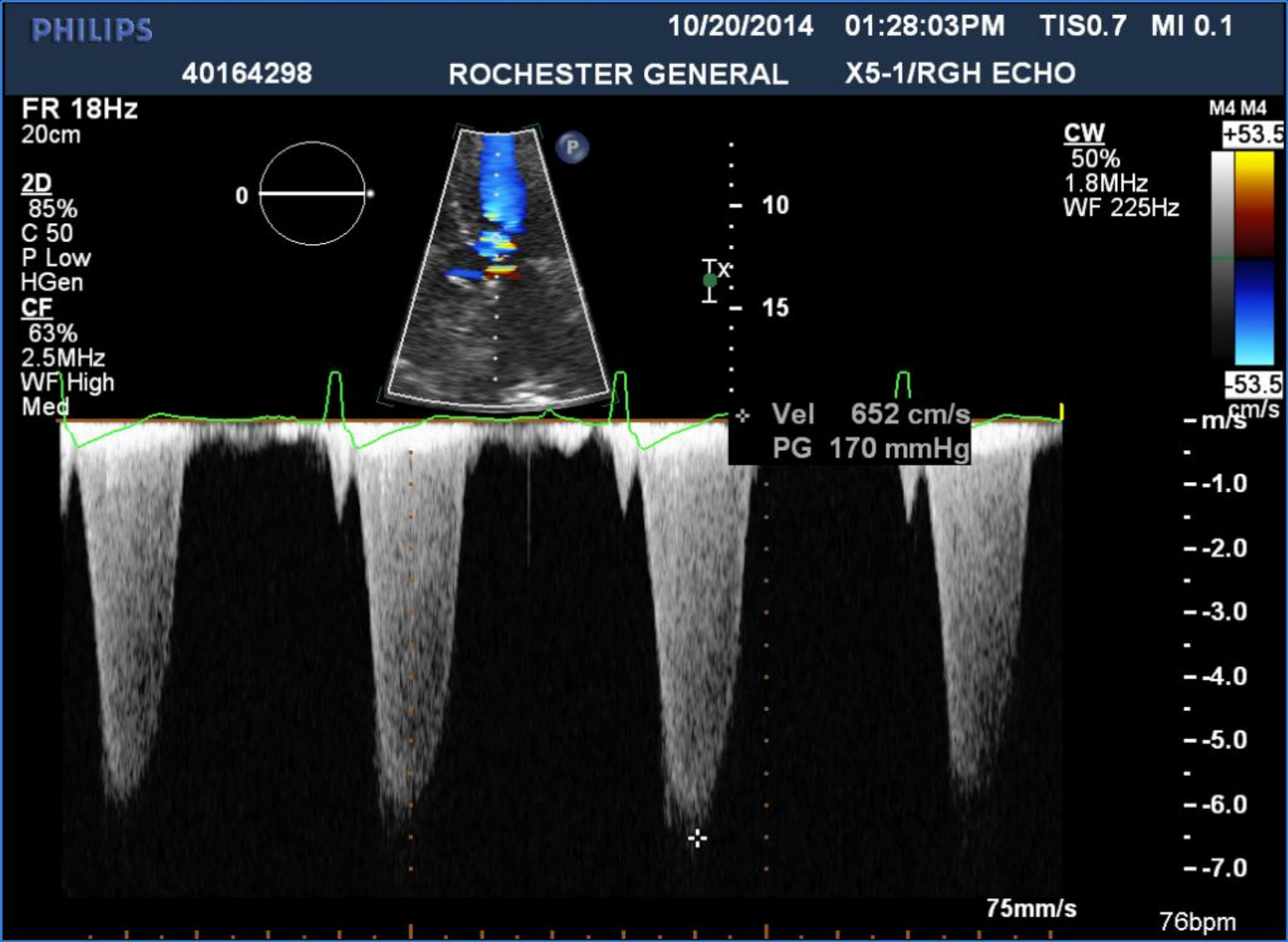
2D
85%
C 50
P Low
HGen
CF
63%
2.5MHz
WF High
Med
M4 M4
+53.5
-53.5
cm/s
10
15
20
P
R
1.6
3.2
JPEG
bpm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85%
C 50
P Low
HGen
CF
63%
2.5MHz
WF High
Med
CW
50%
1.8MHz
WF 225Hz
M4 M4
+53.5
-53.5
cm/s
Vel 652 cm/s
PG 170 mmHg
m/s
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
75mm/s
76bpm

Hypertrophic Obstructive Cardiomyopathy

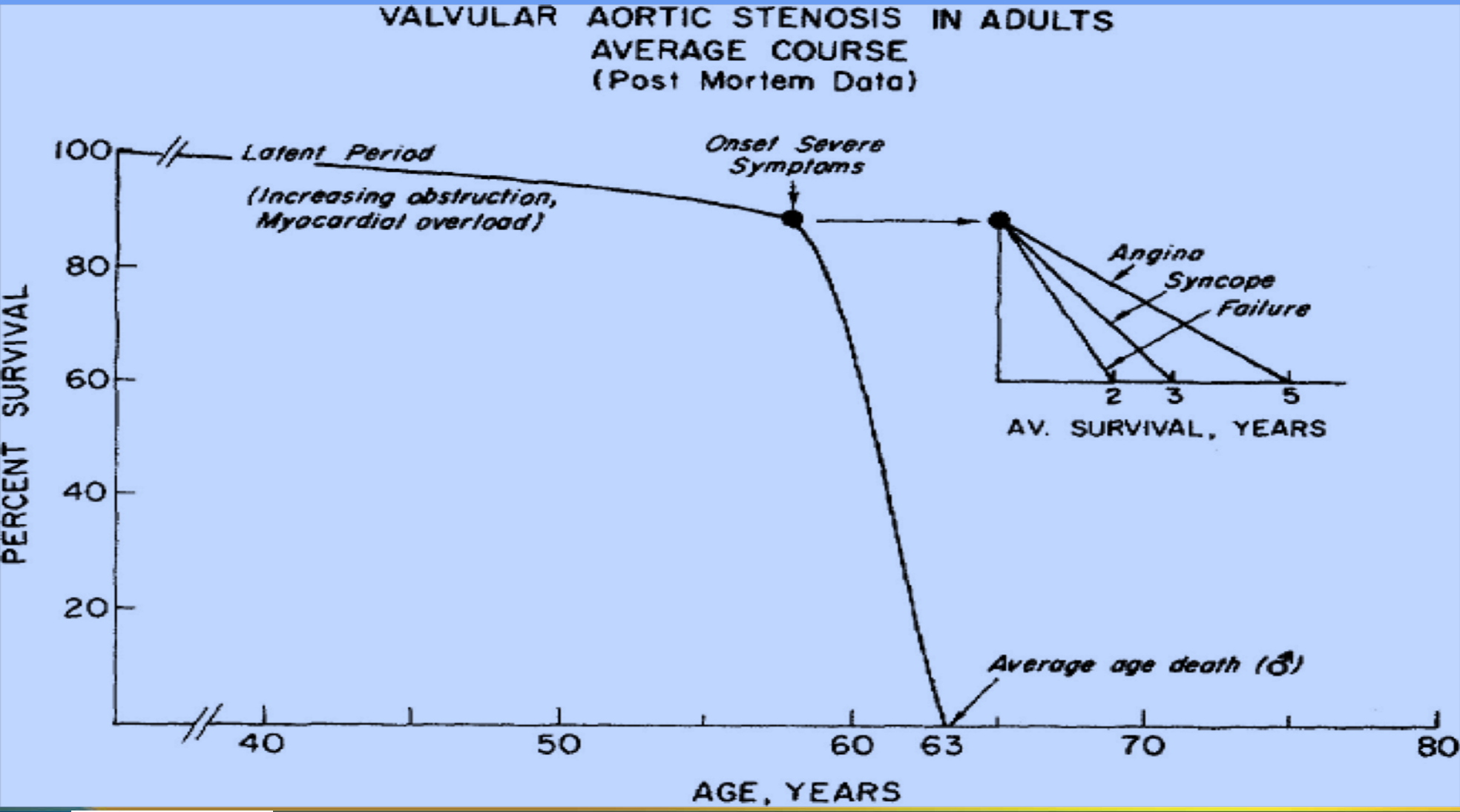
TREATMENT:

- **No AVR**
- **Beta blockers**
- **Calcium channel blockers**
- **Avoid Hypovolemia**
- **Surgical Myectomy or Percuneous Alcohol Septal Ablation**

Aortic Stenosis- Management Challenges

1. True or a mistaken diagnosis?
2. The asymptomatic patient with severe AS
3. Low flow-low gradient aortic stenosis
4. Indications for TAVR

The natural history of aortic stenosis, emphasizing a long presymptomatic period and the dismal outcome once symptoms begin.



Indications for AVR surgery

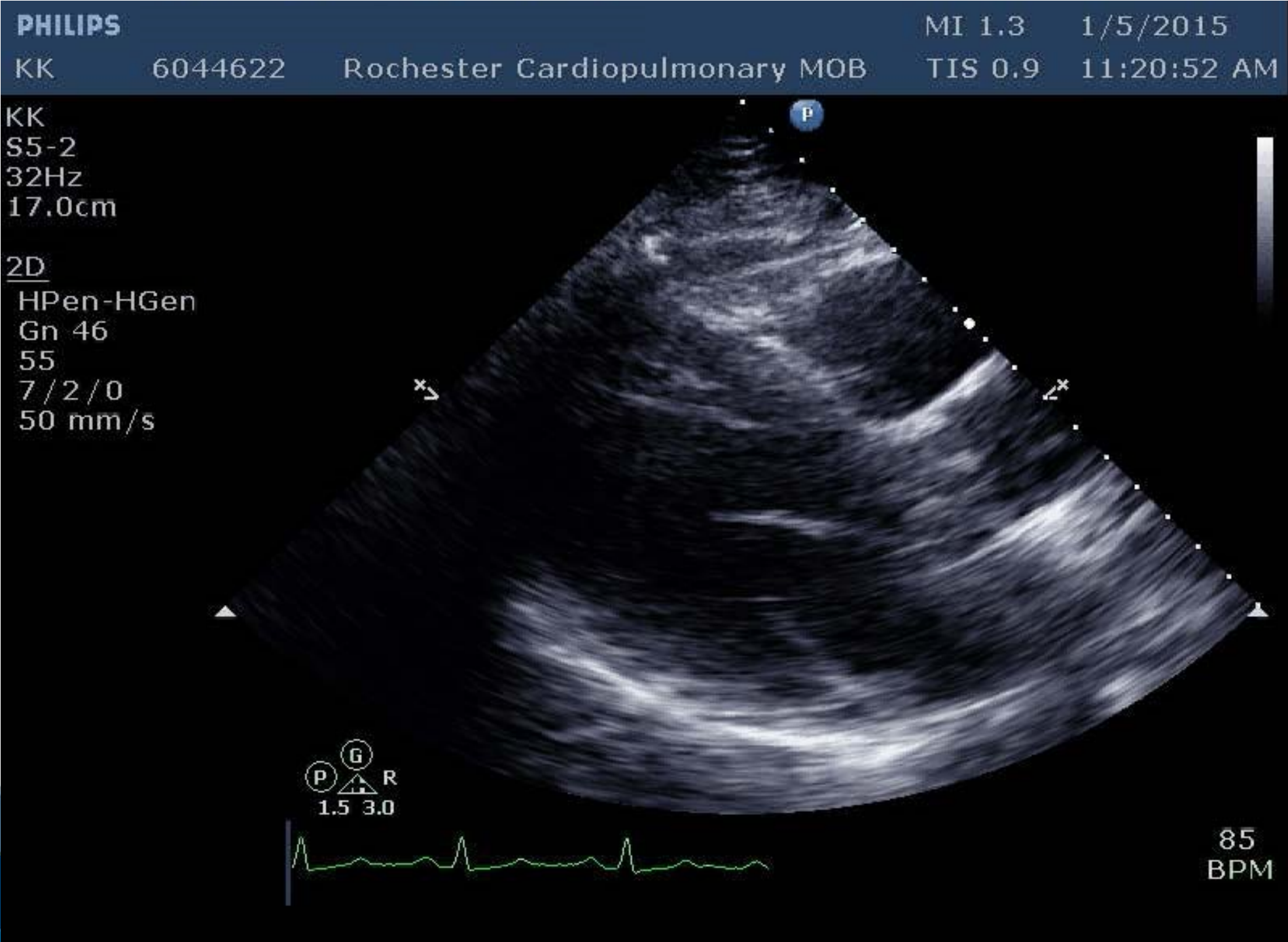
Symptomatic Patient with severe AS

Class 1 Indication

…if it is likely that the symptoms are cardiac in origin

Case #2

- A 52 year white male with known aortic stenosis asymptomatic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S5-2
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17.0cm
2D
HPen-HGen
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55
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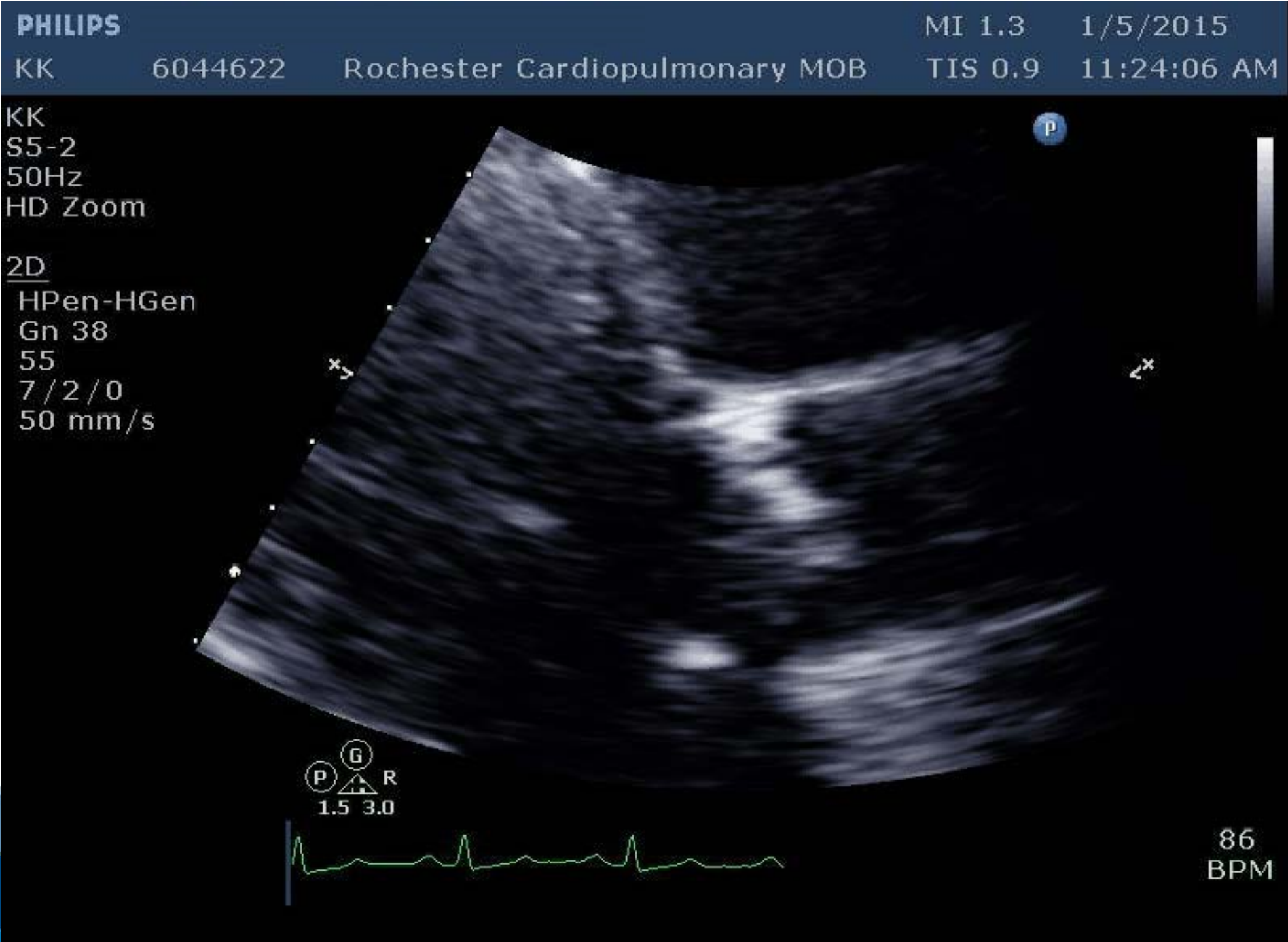
50 mm/s
P
G
P
R
1.5 3.0
85
BPM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G
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R
1.5 3.0
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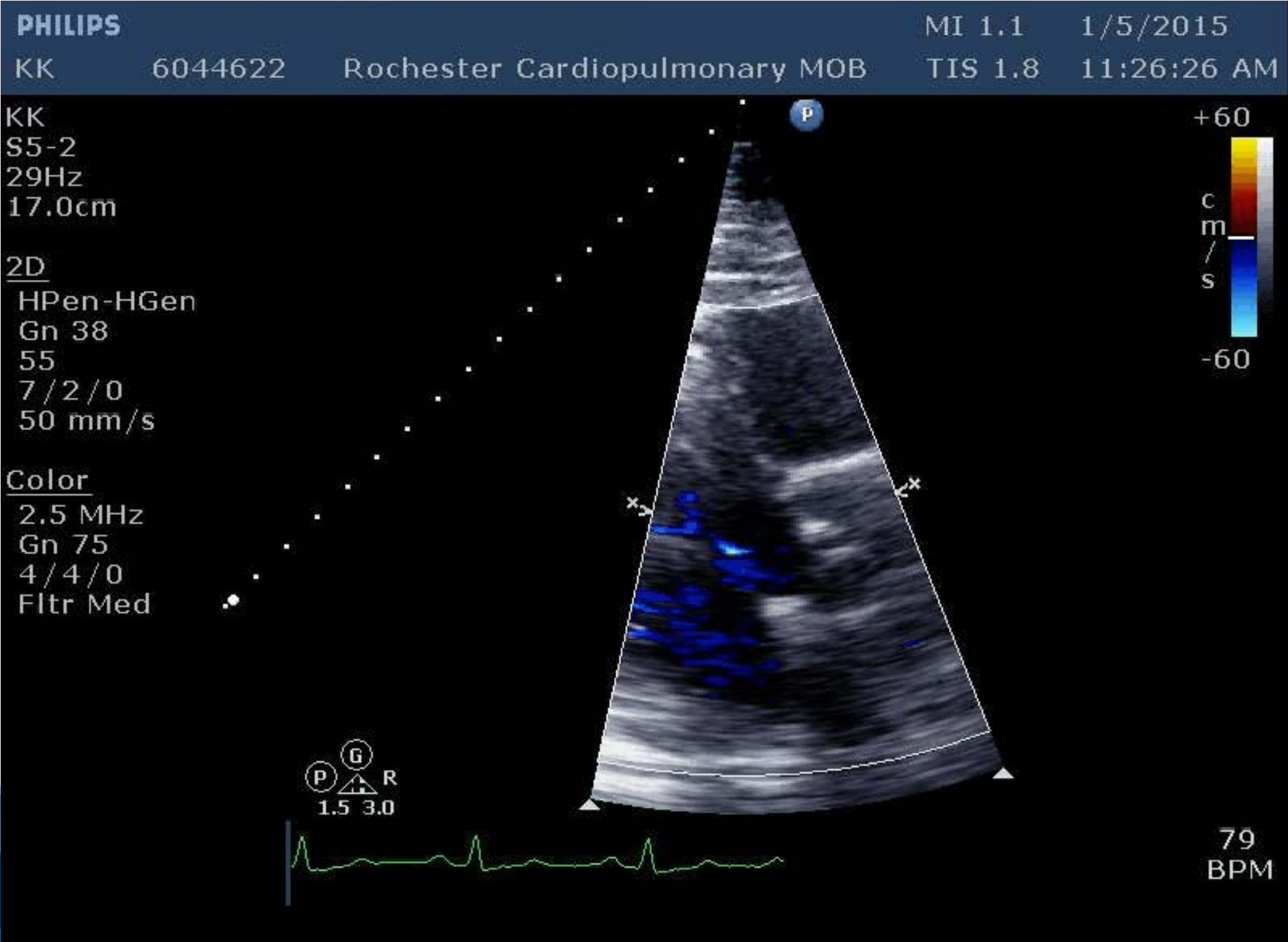
BPM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17.0cm
2D
HPen-HGen
Gn 38
55
7/2/0
50 mm/s
Color
2.5 MHz
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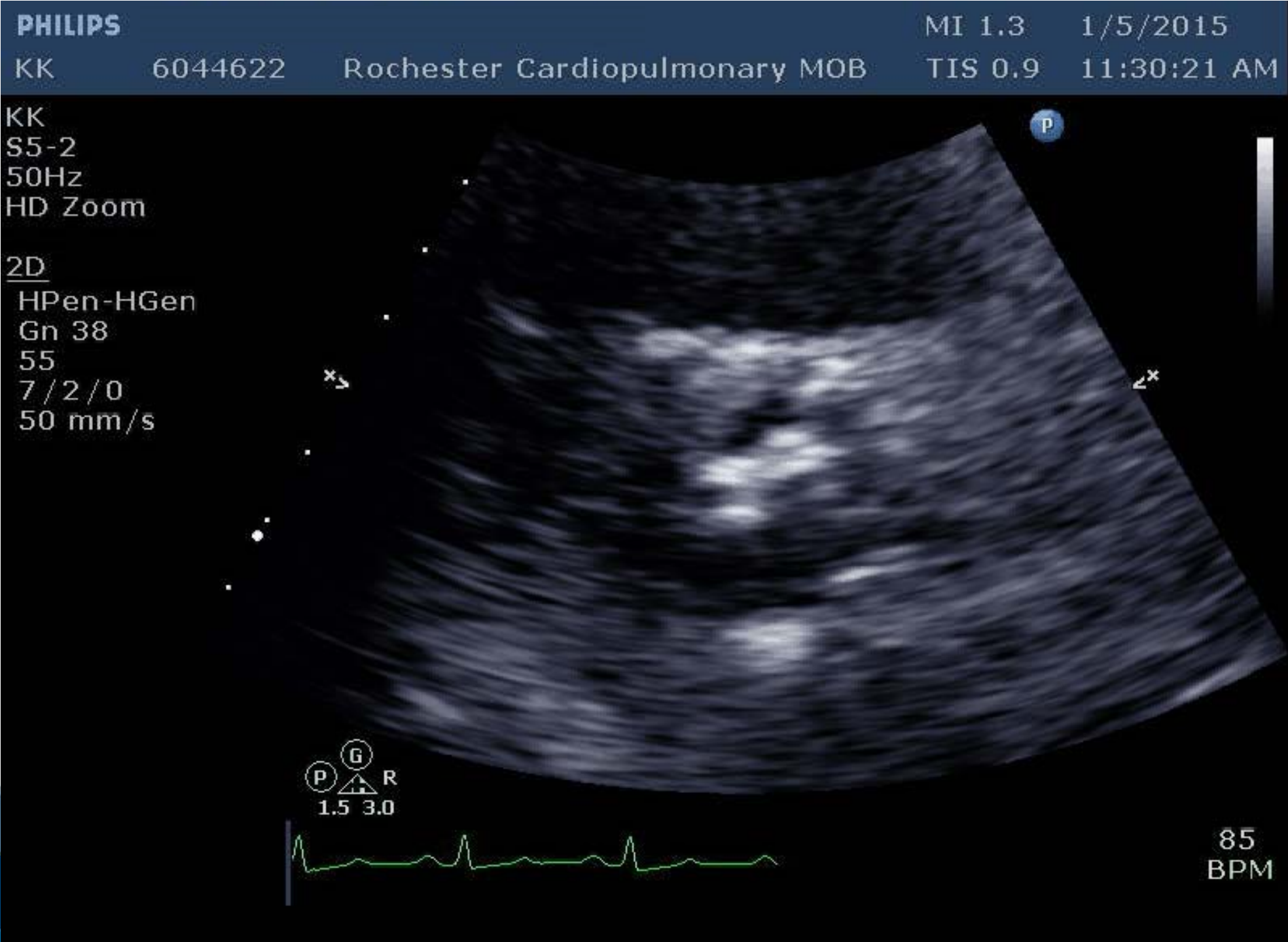
4/4/0
Fltr Med
+60
cm/s
-60
P
G
P
R
1.5 3.0
79
BPM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G
P
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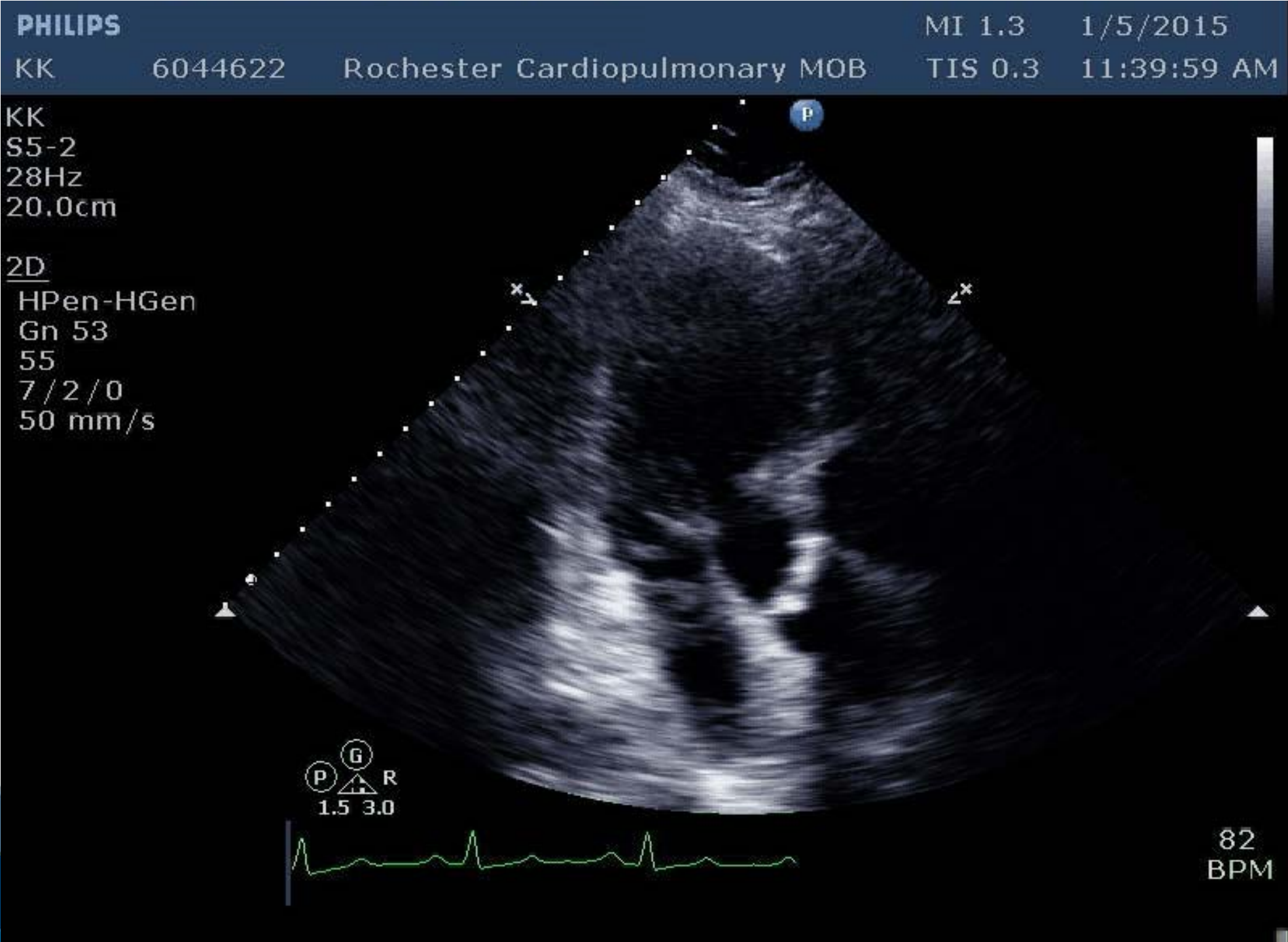
1.5 3.0
85
BPM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2D
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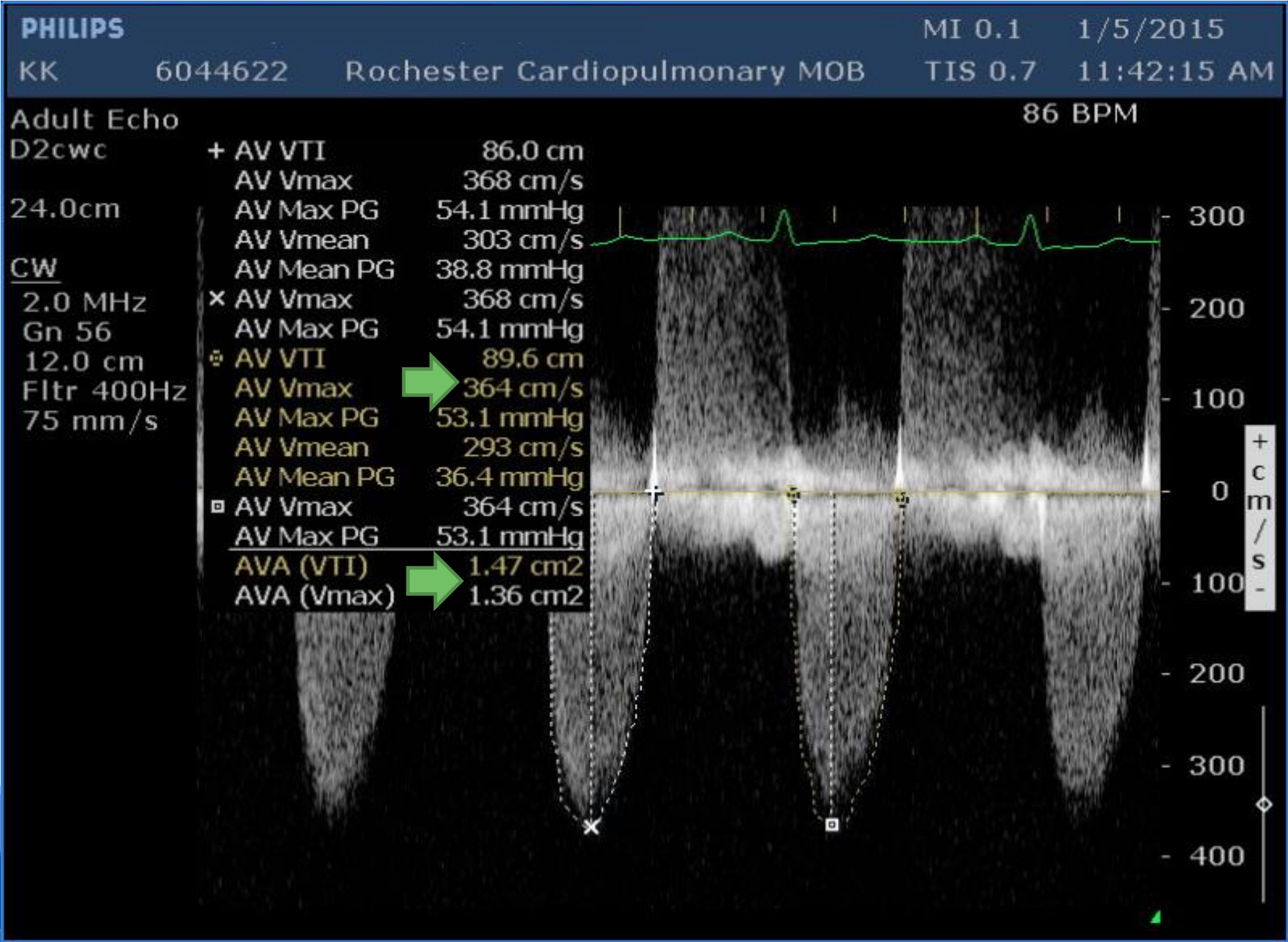
Gn 53
55
7/2/0
50 mm/s
P
G
P
R
1.5 3.0
82
BPM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CW
2.0 MHz
Gn 56
12.0 cm
Fltr 400Hz
75 mm/s
86 BPM
+ AV VTI 86.0 cm
AV Vmax 368 cm/s
AV Max PG 54.1 mmHg
AV Vmean 303 cm/s
AV Mean PG 38.8 mmHg
× AV Vmax 368 cm/s
AV Max PG 54.1 mmHg
AV VTI 89.6 cm
AV Vmax 364 cm/s
AV Max PG 53.1 mmHg
AV Vmean 293 cm/s
AV Mean PG 36.4 mmHg
AV Vmax 364 cm/s
AV Max PG 53.1 mmHg
AVA (VTI) 1.47 cm2
AVA (Vmax) 1.36 cm2
300
200
100
0
100
200
300
400
+ cm/s -

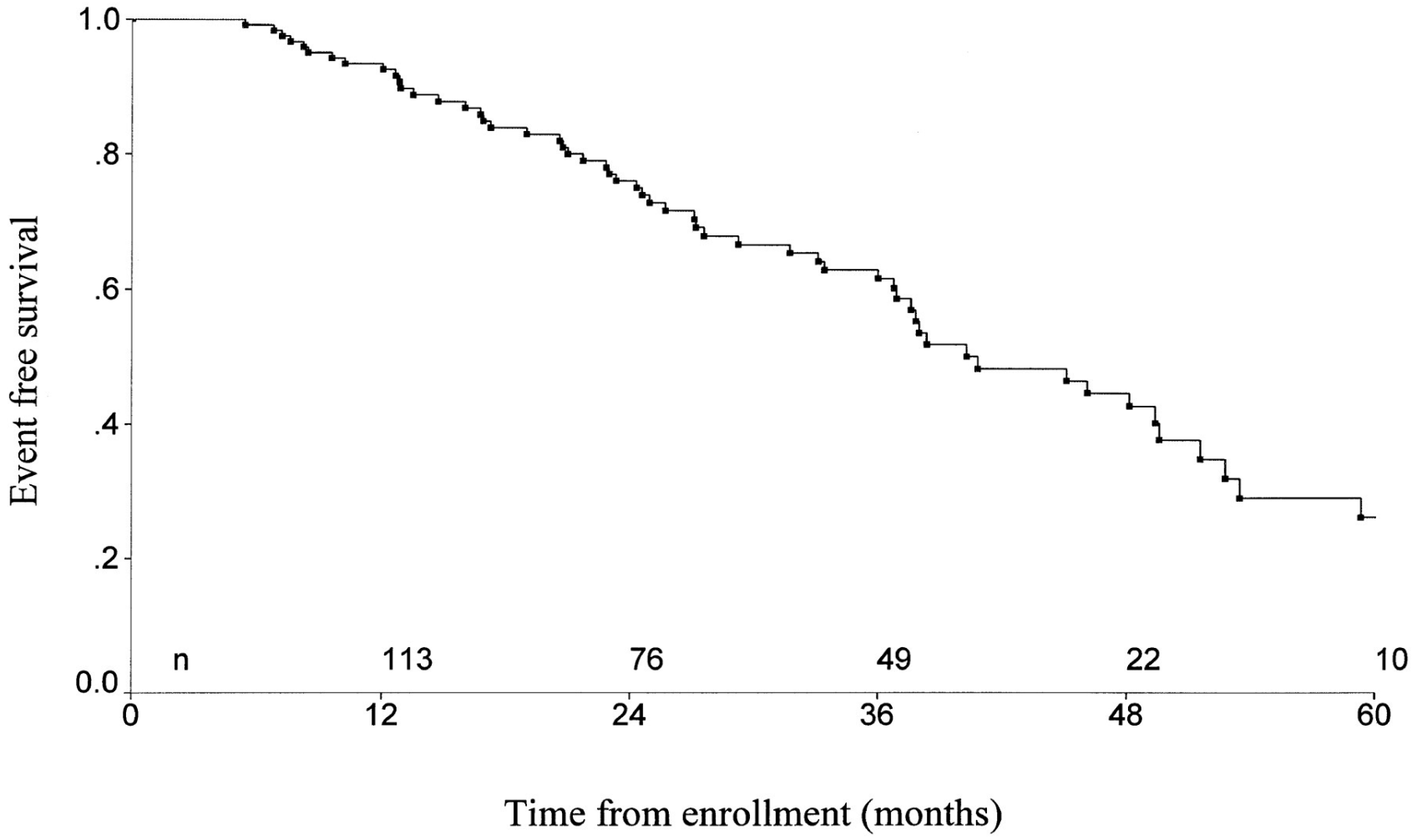
The Asymptomatic Patient with Severe AS

What are we waiting for?

Case #2

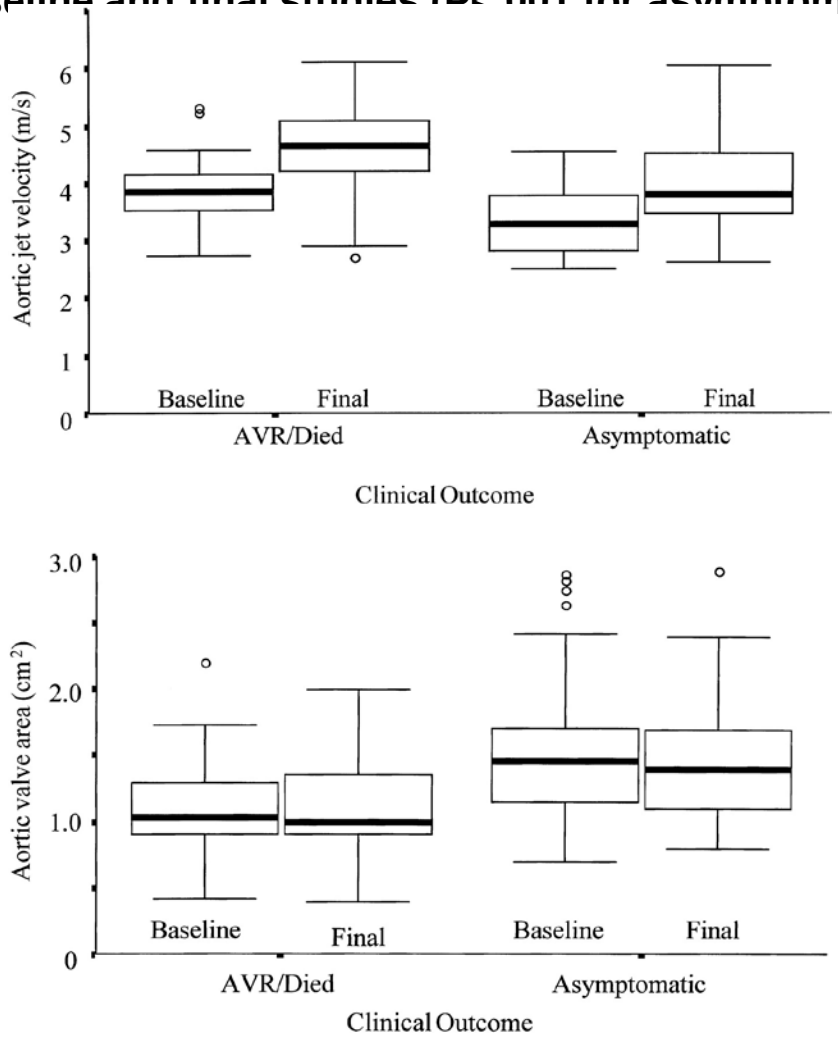
- Presented with Sudden Cardiac Death (Unity Hospital)
- Successfully resuscitated
- Coronary angiography; Normal coronaries
- EPS; Negative
- Underwent AVR surgery

Kaplan-Meier life-table analysis showing survival without valve replacement for 123 subjects with initially asymptomatic valvular aortic stenosis.



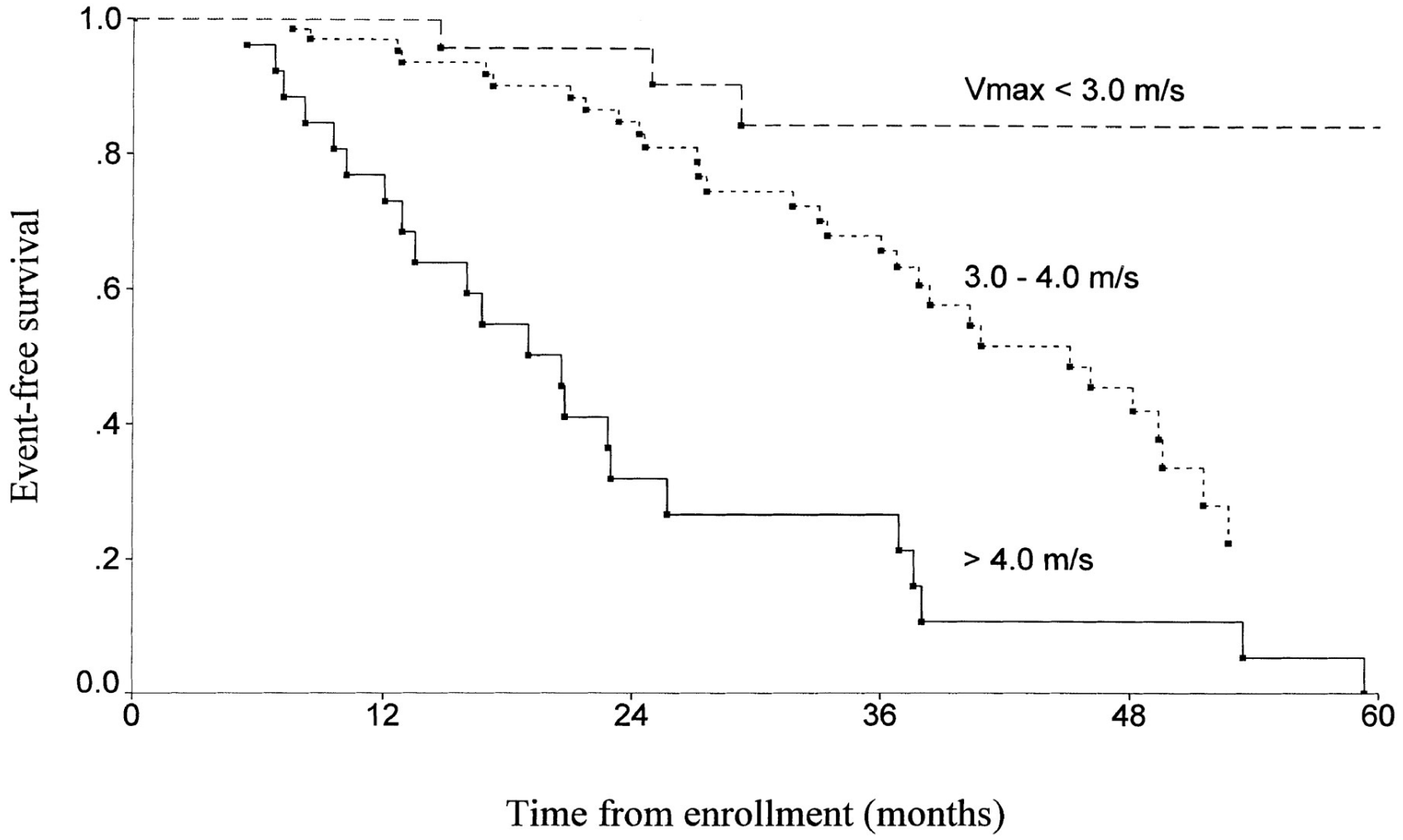
Catherine M. Otto et al. Circulation. 1997;95:2262-2270

Aortic jet velocity (top) and aortic valve area (bottom) in subjects who developed symptoms requiring aortic valve replacement or died (AVR/Died) are compared with those who remained asymptomatic for the baseline and final studies (P< 001 for asymptomatic vs those with an end



Catherine M. Otto et al. Circulation. 1997;95:2262-2270

Cox regression analysis showing event-free survival in groups defined by aortic jet velocity at entry (P<.0001 by log- rank test).



Catherine M. Otto et al. Circulation. 1997;95:2262-2270

Asymptomatic Aortic Stenosis
Indications for AVR

ACC/AHA

Very severe AS (Vmax >/ 5 m/s) **Class 2a**

Rapid progression (low surgical risk) **Class 2b**

ESC

Very severe AS (Vmax >5 m/s) **Class 2a**

Very severe calcification with rapid progression .(0.3 m/s per year) **Class 2a**

Markedly elevated BNP and exercise induced rise in gradient >20 mmHg **Class 2b**

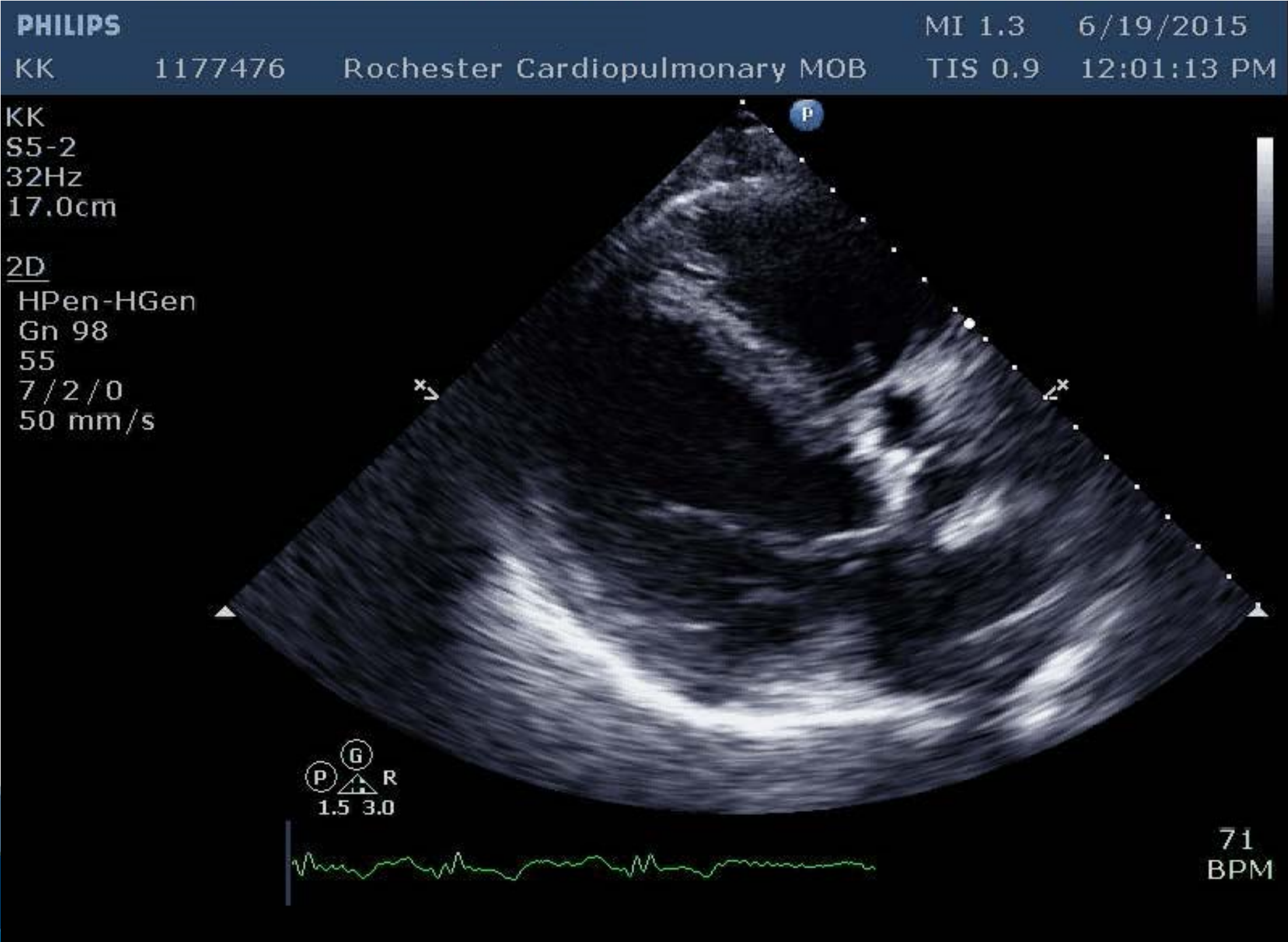
Excessive LVH Class 2b

Aortic Stenosis- Management Challenges

1. True or a mistaken diagnosis?
2. The asymptomatic patient with severe AS
3. Low flow-low gradient aortic stenosis
4. Indications for TAVR

Case # 3

- An 83 old male with asymptomatic severe aortic stenosis
- Routine follow up 6 months ago
- Echocardiogram was repeated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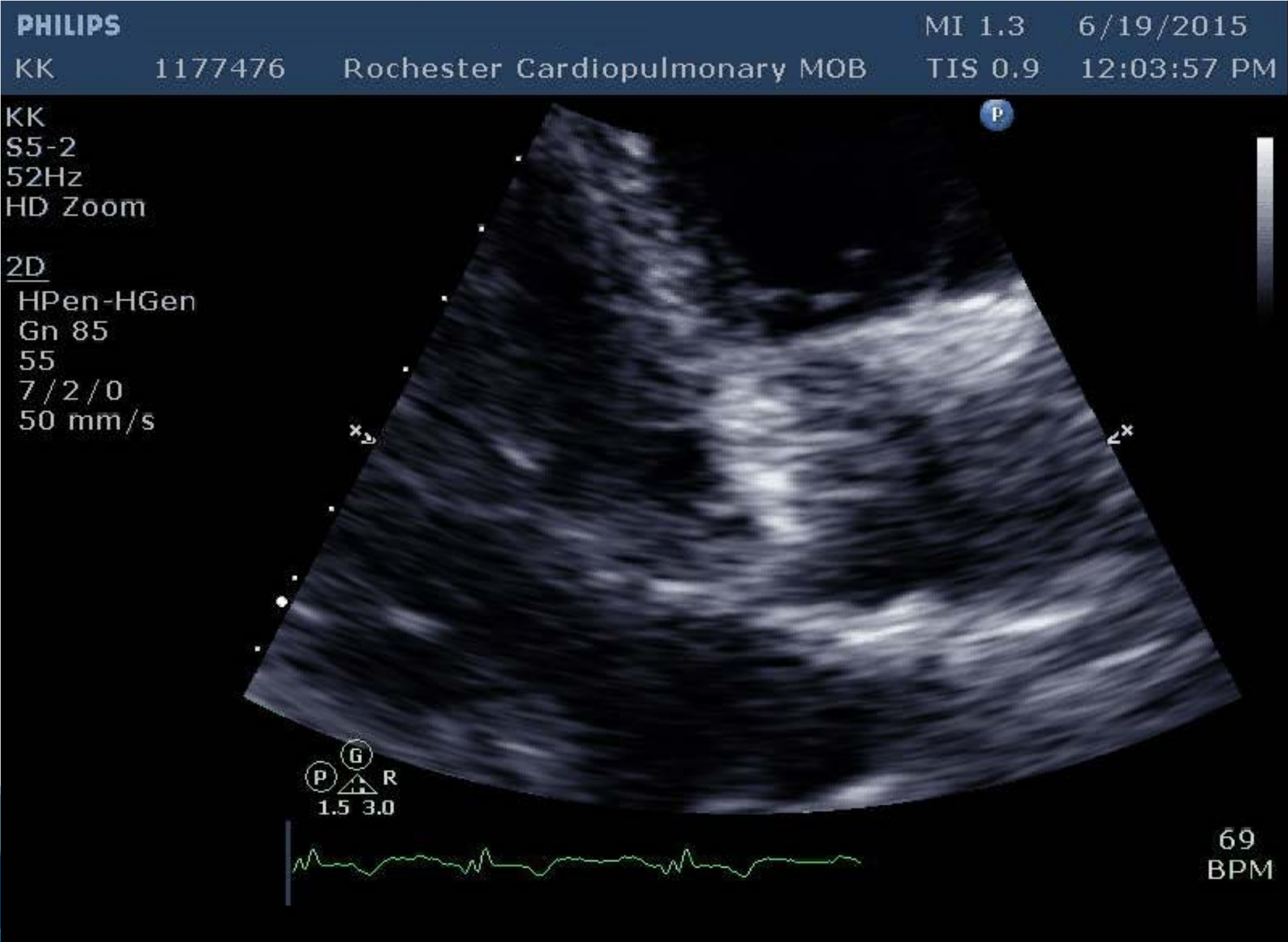
S5-2
32Hz
17.0cm
2D
HPen-HGen
Gn 98
55
7/2/0
50 mm/s
P
G
P
R
1.5 3.0
71
BPM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52Hz
HD Zoom
2D
HPen-HGen
Gn 85
55
7/2/0
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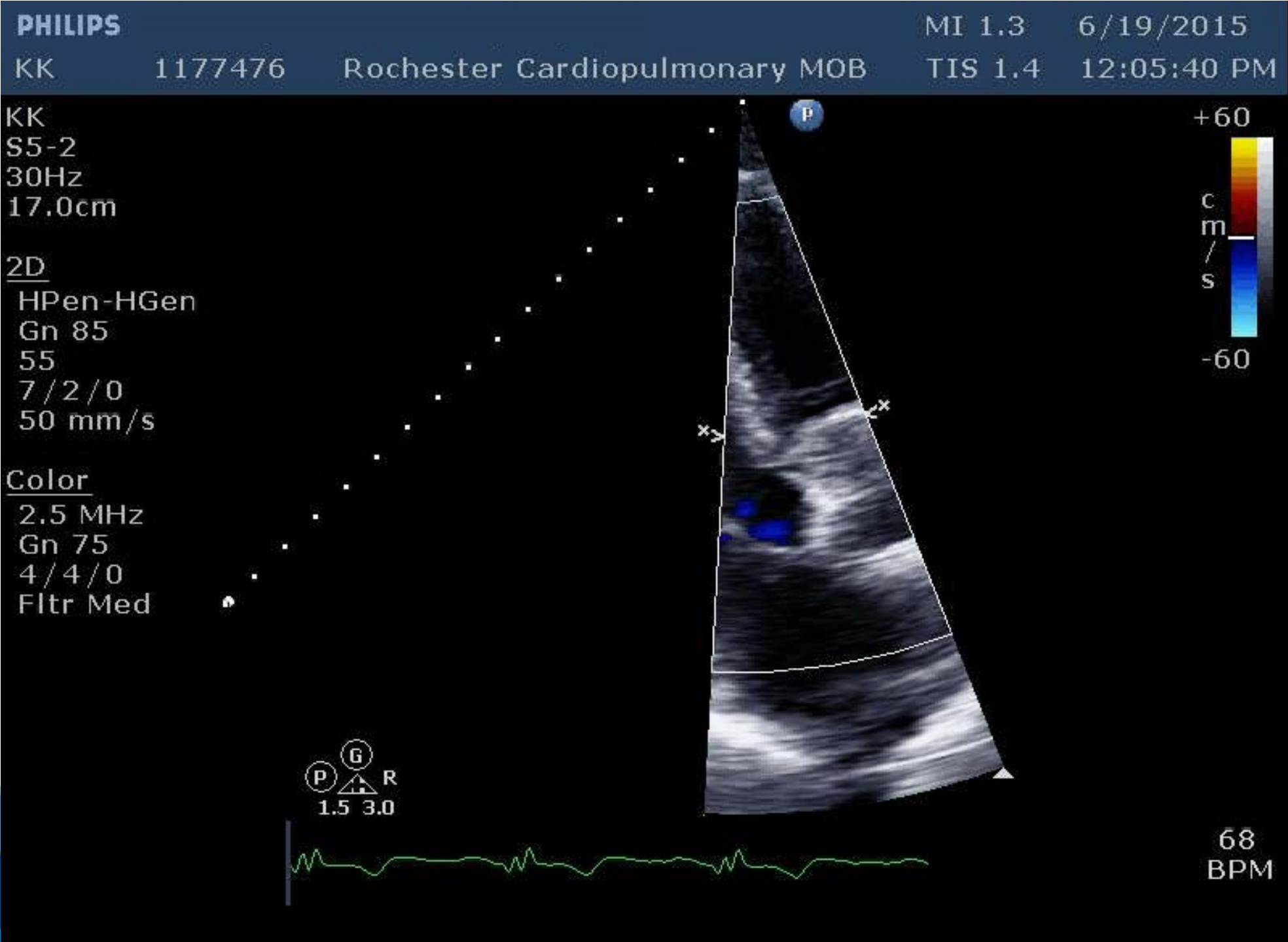
P
G
P
R
1.5 3.0
69
BPM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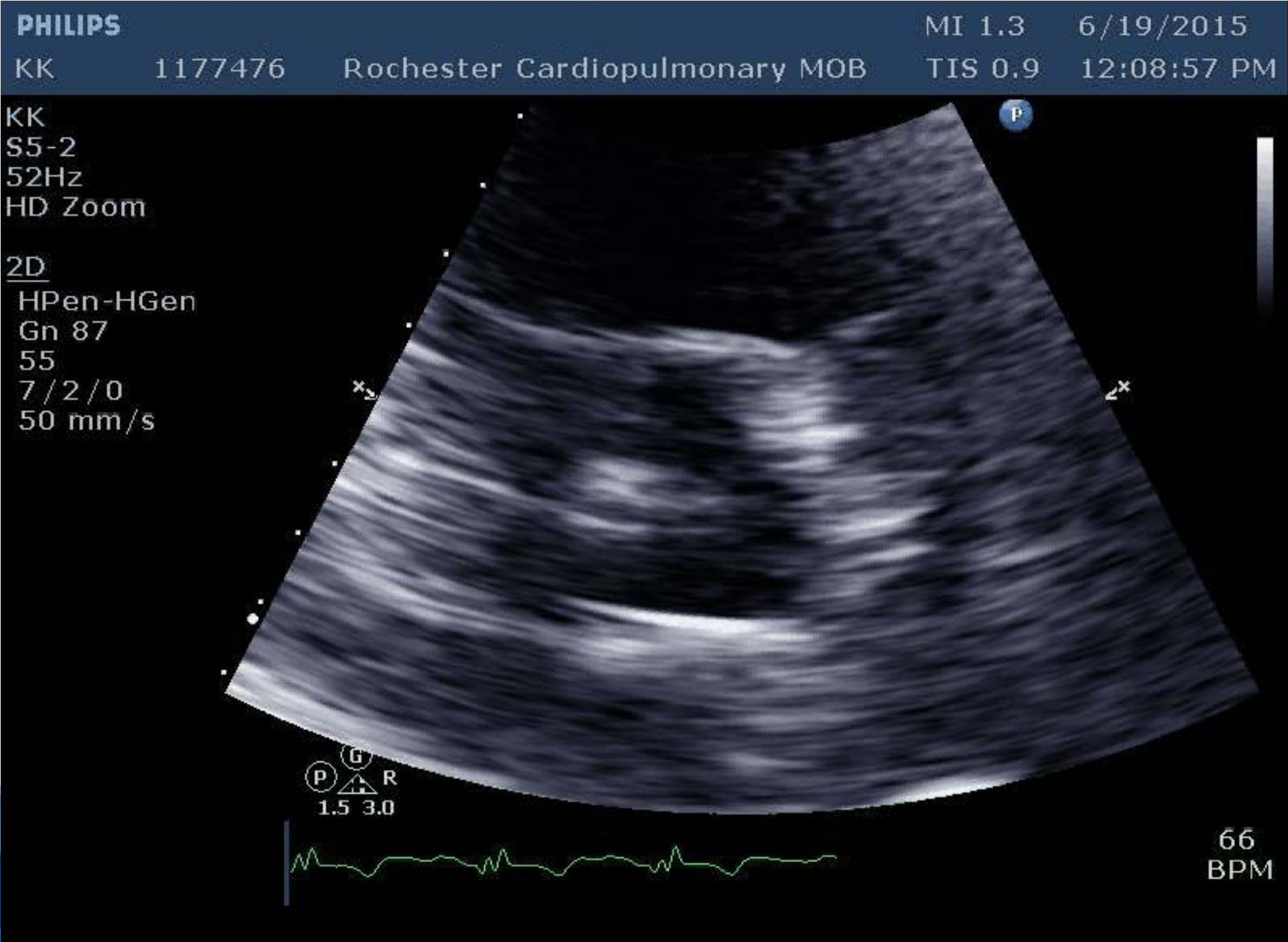
2D
HPen-HGen
Gn 85
55
7/2/0
50 mm/s
Color
2.5 MHz
Gn 75
4/4/0
Fltr Med
+60
cm/s
-60
P
G
P
R
1.5 3.0
68
BPM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HD Zoom
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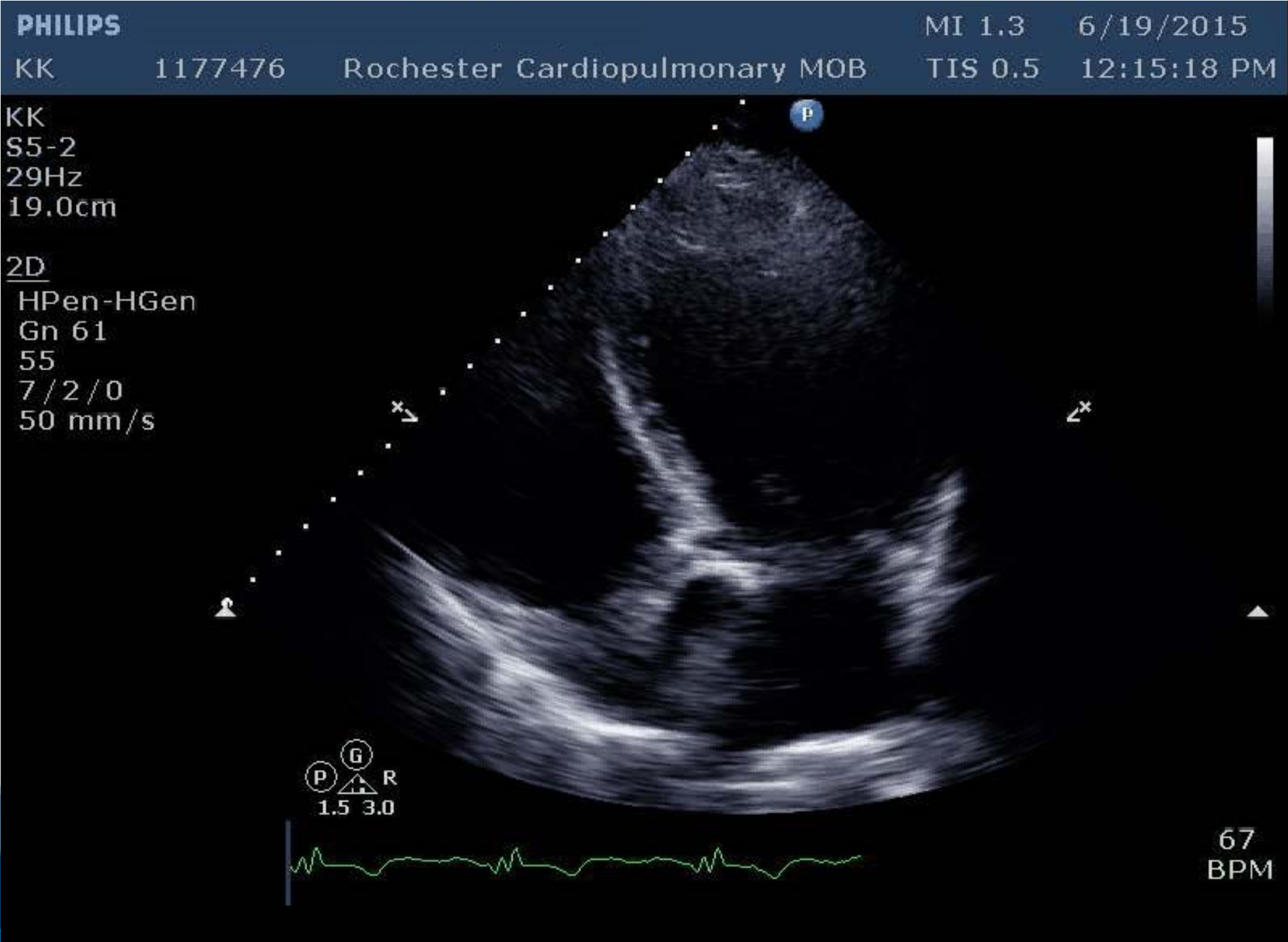
50 mm/s
P
G
P
R
1.5 3.0
66
BPM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P
G
P
R
1.5 3.0
67
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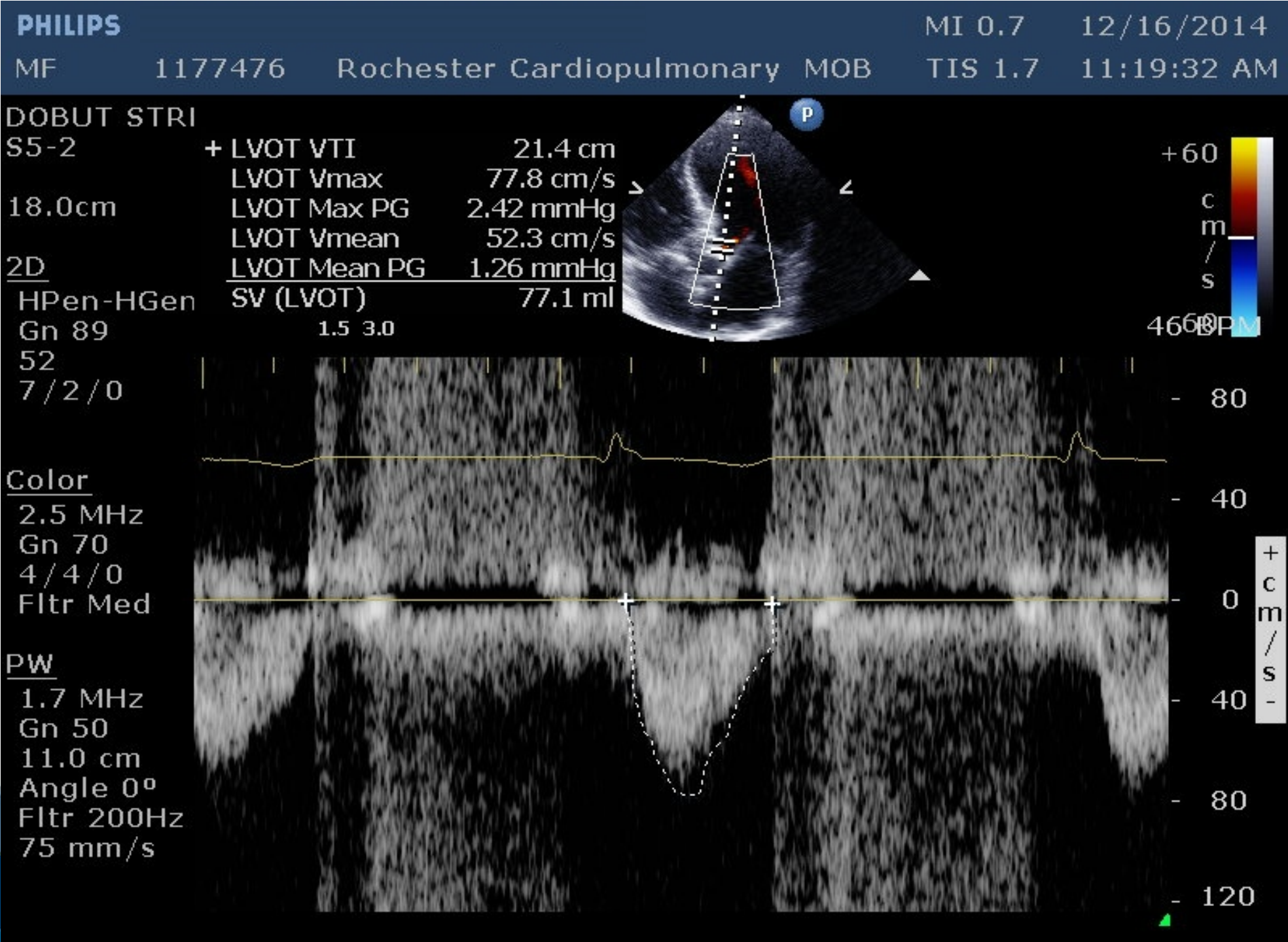
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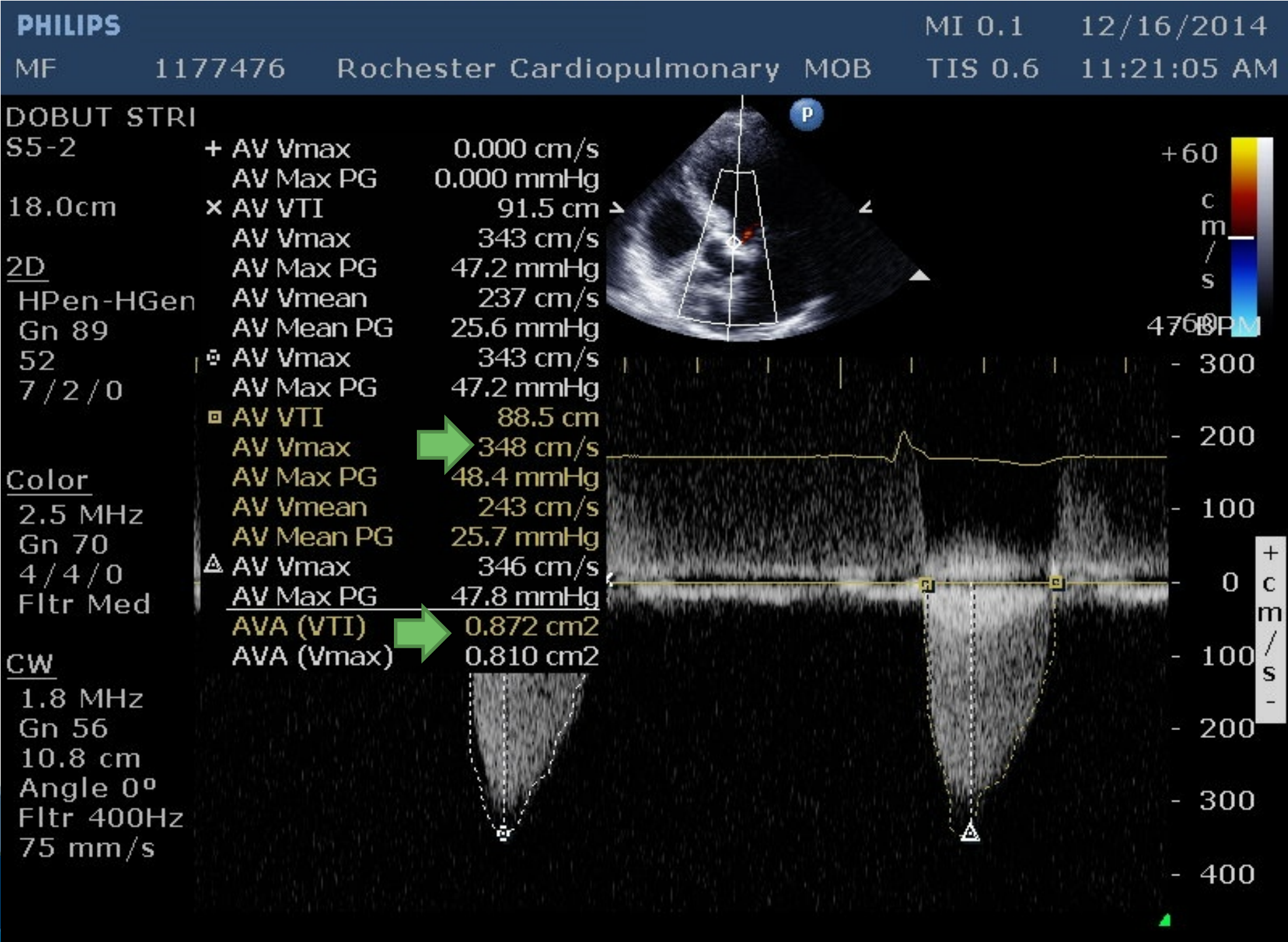
S5-2
18.0cm
2D
HPen-HGen
Gn 89
52
7/2/0
+ LVOT VTI 21.4 cm
LVOT Vmax 77.8 cm/s
LVOT Max PG 2.42 mmHg
LVOT Vmean 52.3 cm/s
LVOT Mean PG 1.26 mmHg
SV (LVOT) 77.1 ml
1.5 3.0
P
+60
cm/s
-60
466 BPM
Color
2.5 MHz
Gn 70
4/4/0
Fltr Med
PW
1.7 MHz
Gn 50
11.0 cm
Angle 0°
Fltr 200Hz
75 mm/s
80
40
0
40
80
120
+ cm/s -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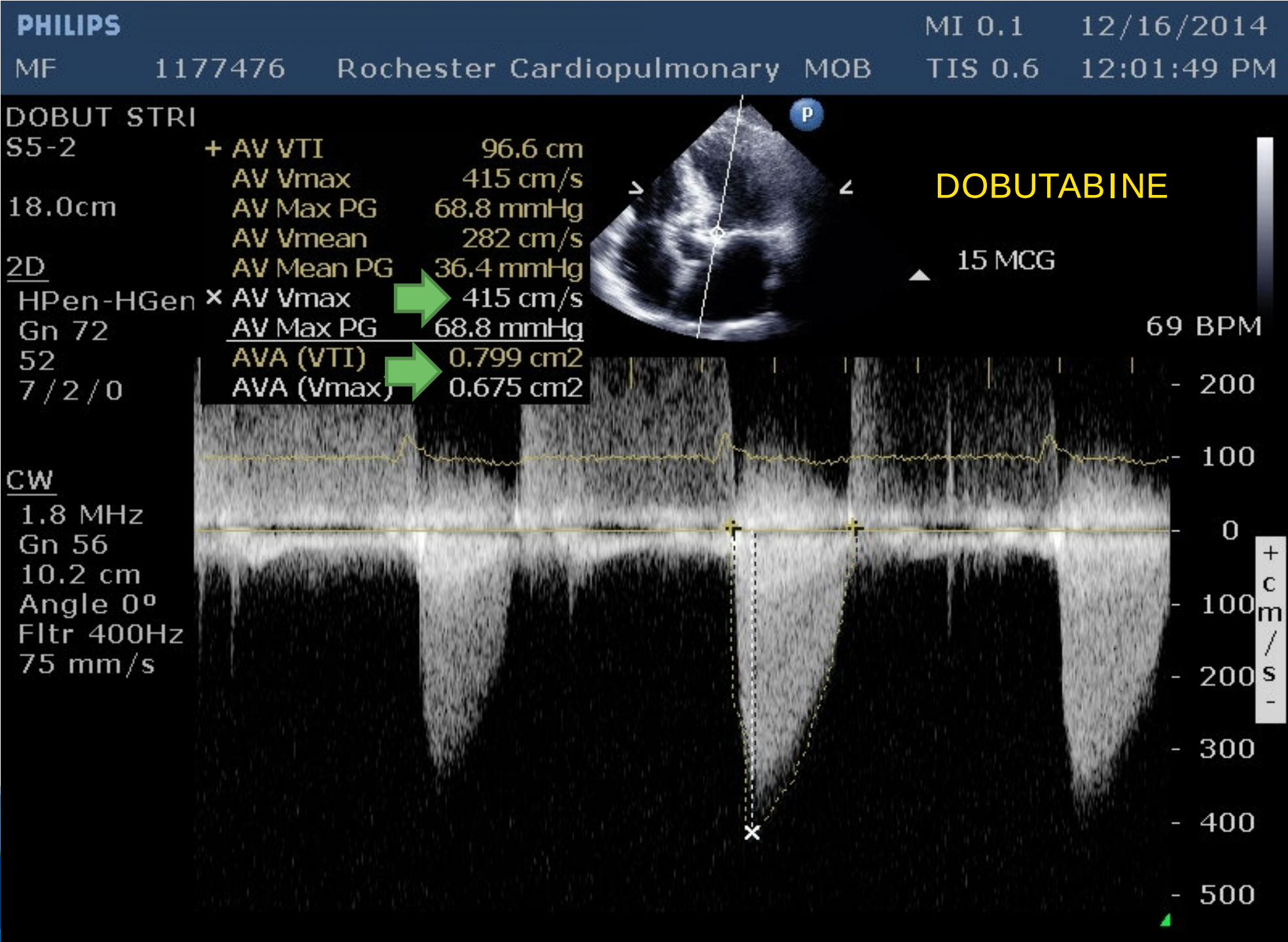
2D
HPen-HGen
Gn 89
52
7/2/0
Color
2.5 MHz
Gn 70
4/4/0
Fltr Med
CW
1.8 MHz
Gn 56
10.8 cm
Angle 0°
Fltr 400Hz
75 mm/s
AV Vmax 0.000 cm/s
AV Max PG 0.000 mmHg
AV VTI 91.5 cm
AV Vmax 343 cm/s
AV Max PG 47.2 mmHg
AV Vmean 237 cm/s
AV Mean PG 25.6 mmHg
AV Vmax 343 cm/s
AV Max PG 47.2 mmHg
AV VTI 88.5 cm
AV Vmax 348 cm/s
AV Max PG 48.4 mmHg
AV Vmean 243 cm/s
AV Mean PG 25.7 mmHg
AV Vmax 346 cm/s
AV Max PG 47.8 mmHg
AVA (VTI) 0.872 cm2
AVA (Vmax) 0.810 cm2
+60
cm/s
476 BPM
300
200
100
0
100
200
300
400
+ cm/s -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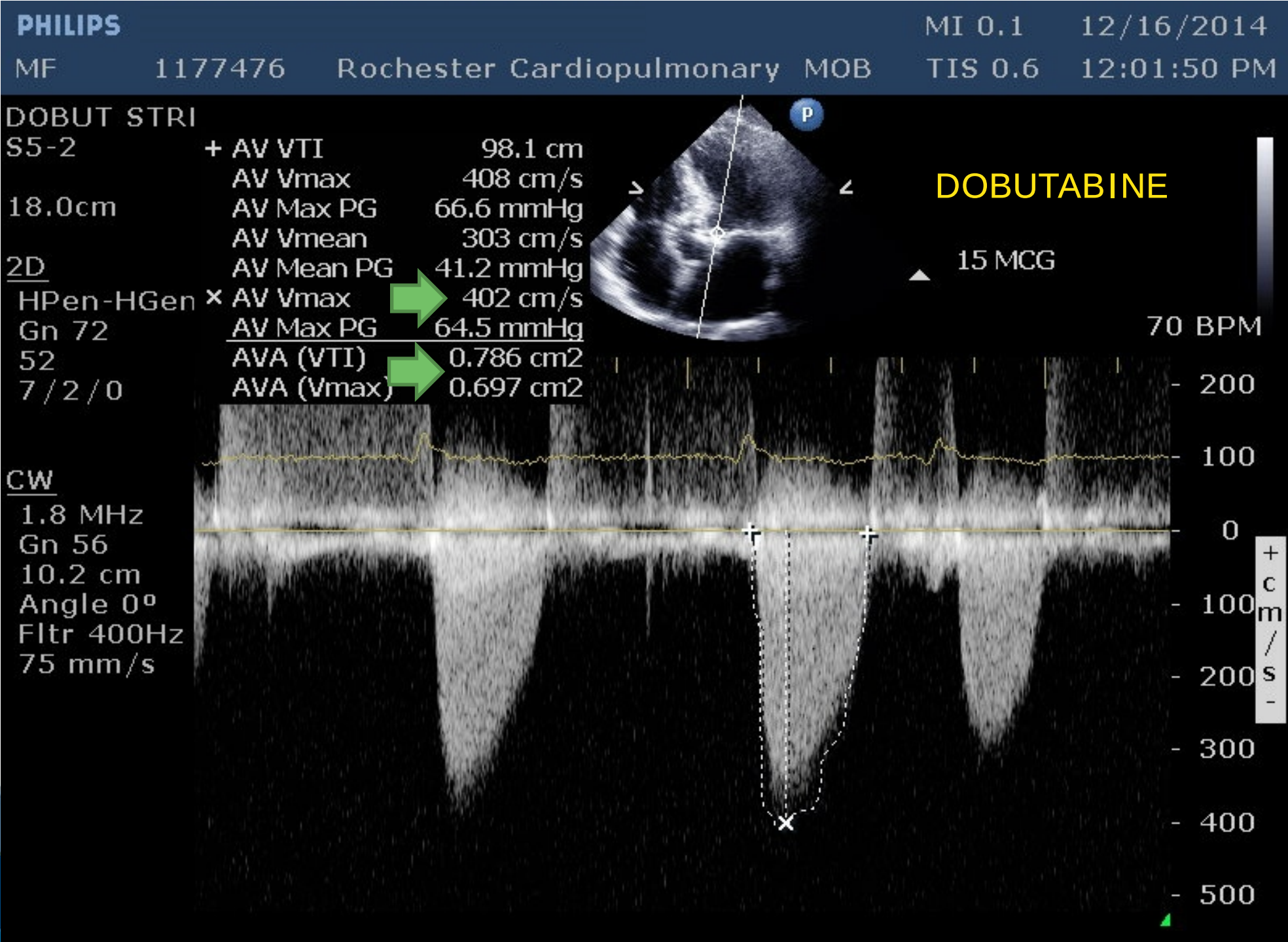
7/2/0
CW
1.8 MHz
Gn 56
10.2 cm
Angle 0°
Fltr 400Hz
75 mm/s
+ AV VTI 96.6 cm
AV Vmax 415 cm/s
AV Max PG 68.8 mmHg
AV Vmean 282 cm/s
AV Mean PG 36.4 mmHg
× AV Vmax 415 cm/s
AV Max PG 68.8 mmHg
AVA (VTI) 0.799 cm2
AVA (Vmax) 0.675 cm2
DOBUTABINE
15 MCG
69 BPM
200
100
0
100
200
300
400
500
+ cm/s -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7/2/0
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1.8 MHz
Gn 56
10.2 cm
Angle 0°
Fltr 400Hz
75 mm/s
+ AV VTI 98.1 cm
AV Vmax 408 cm/s
AV Max PG 66.6 mmHg
AV Vmean 303 cm/s
AV Mean PG 41.2 mmHg
× AV Vmax 402 cm/s
AV Max PG 64.5 mmHg
AVA (VTI) 0.786 cm2
AVA (Vmax) 0.697 cm2
DOBUTABINE
15 MCG
70 BPM
200
100
0
100
200
300
400
500
+ cm/s -

Low flow, Low Gradient Aortic Stenosis

- The symptomatic patient with LV dysfunction and low gradient stenosis.

- The symptomatic patient with normal LV function and paradoxical low flow, low gradient stenosis.

Paradoxical Low Flow Low Gradient AS(PLFLG)

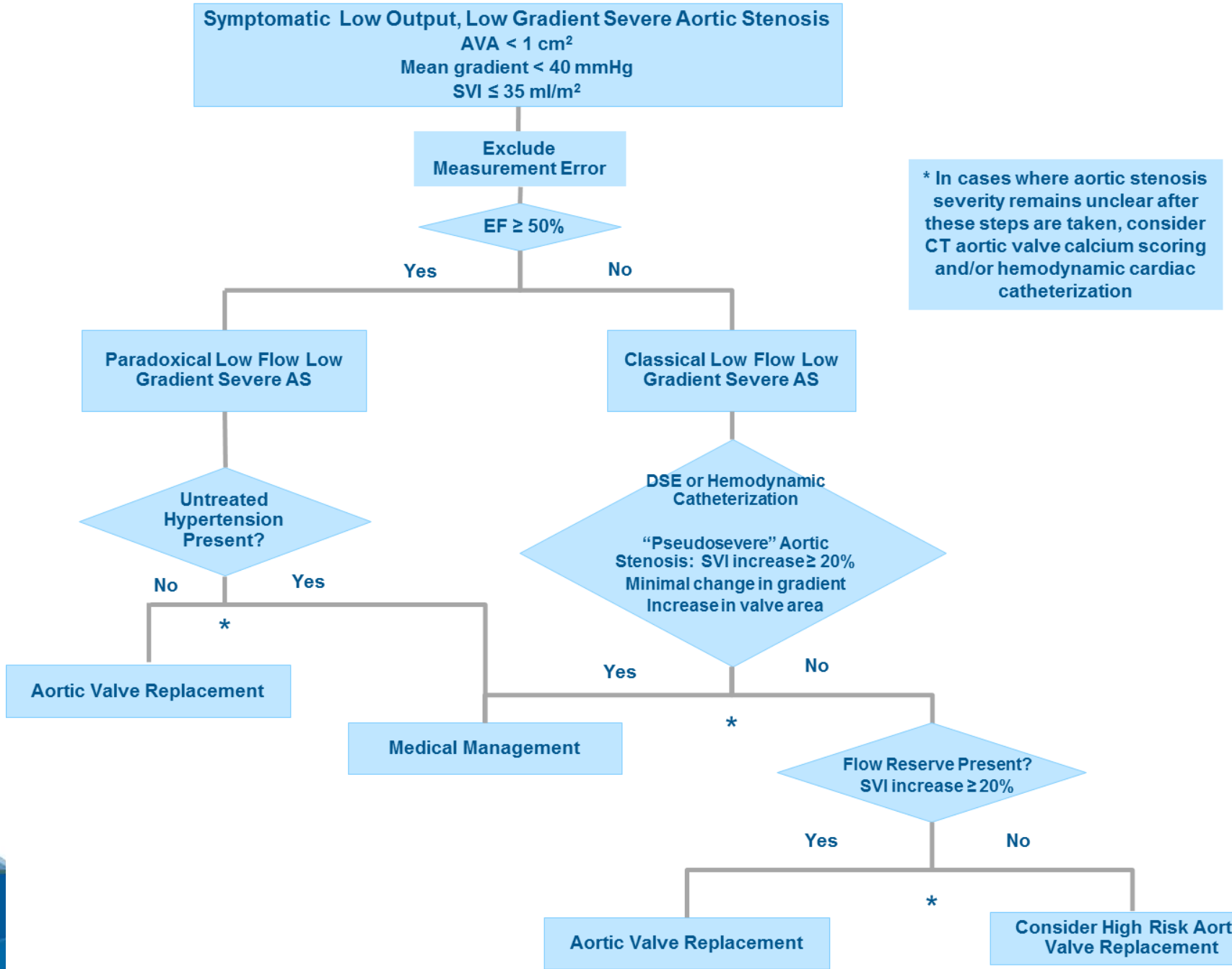
- A recently described entity
- Pronounced LV concentric remodeling
- Small LV cavity size
- Restrictive physiology leading to impaired LV filling
- Altered myocardial function
- Worse prognosis
- Proper diagnosis often require other diagnostic tests

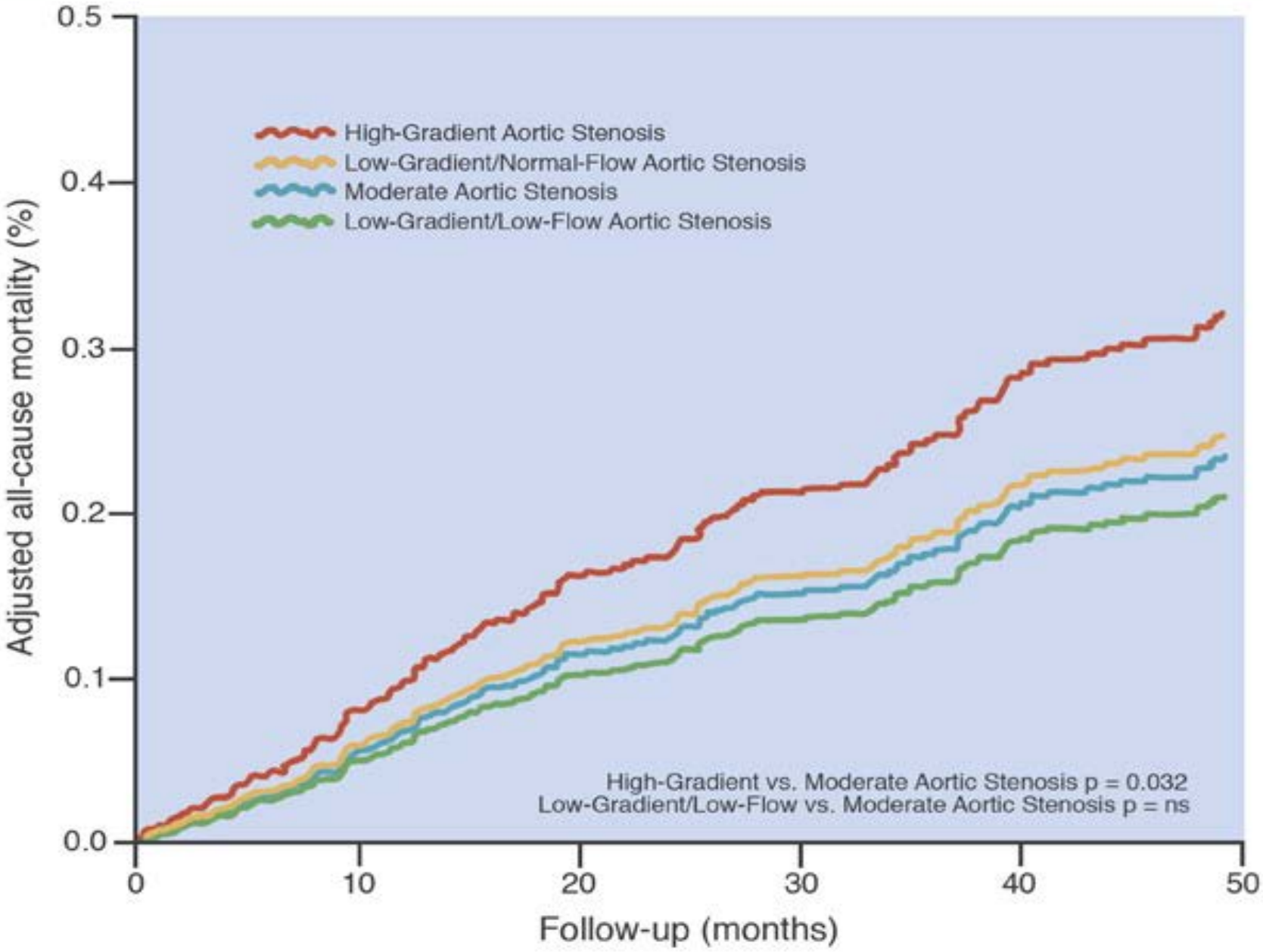
Low Flow, Low Gradient AS with Normal and Depressed LV Function

(Pibarot and Dumesnil ,Quebec City JACC 2012; 60 ;1850)

- Underestimation of transaortic flow by Doppler echocardiography,
- Inconsistency of grading criteria,
- A small body size must be carefully excluded.
- MRI and Cardiac Catheterization

Low Gradient Aortic Stenosis Management Algorithm





Tribouilloy, C. et al. J Am Coll Cardiol. 2015; 65(1):55-66.

Low Flow, Low Gradient Aortic Stenosis
Indications for surgery

ACC and AHA

Normal LV Function and Severe AS

If clinical, hemodynamic anatomic date support severe AS –

Class 2a

ECA

Normal LV function, Only after careful confirmation of severe AS

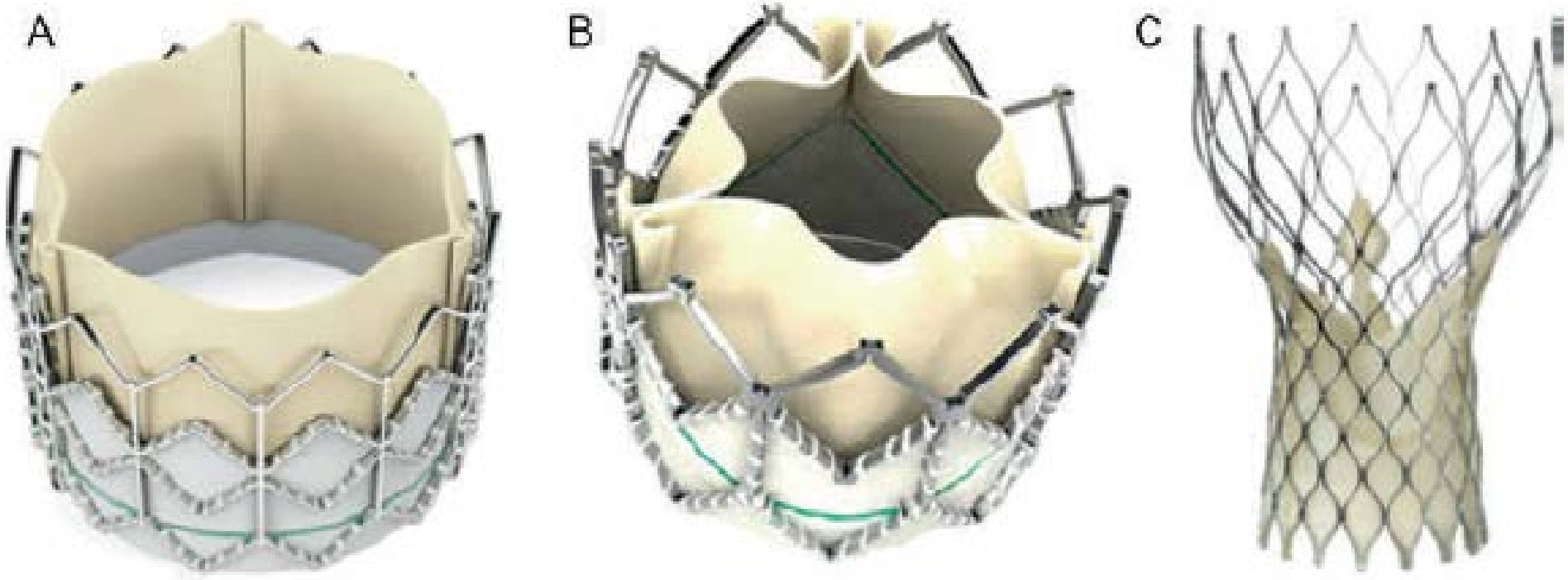
Class 2a

Aortic Stenosis- Management Challenges

1. True or a mistaken diagnosis?
2. The asymptomatic patient with severe AS
3. Low flow-low gradient aortic stenosis
4. Indications for TAVR

TAVR

Figure 1: The Edwards Sapien (A), Sapien XT (B) and Medtronic CoreValve (C)



Indications for TAVR vs Surgical AVR

ACC/AHA

Evaluation by a surgical team Class 1

Surgical AVR for patients with low to intermediate risk Class 1

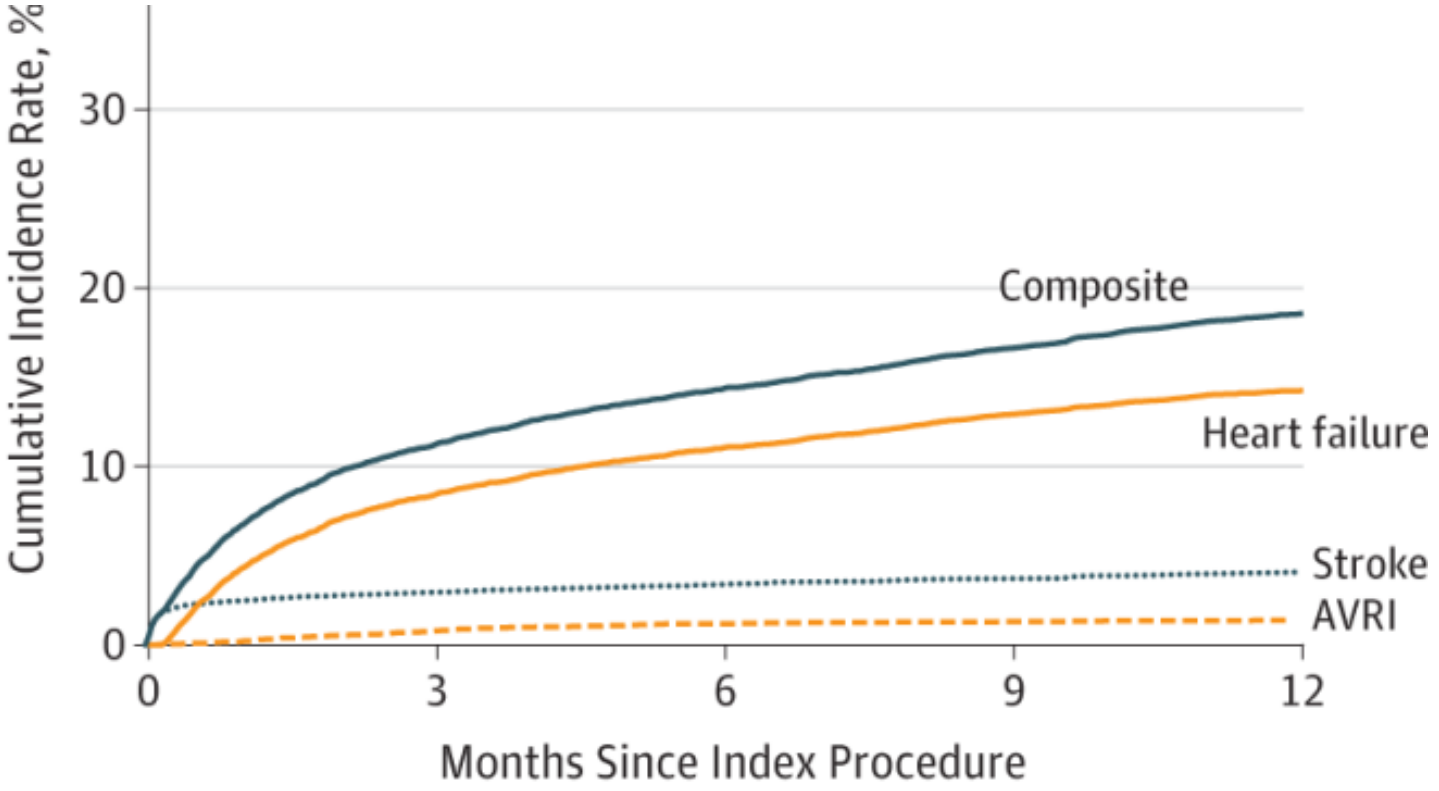
TAVR for patients with prohibitive surgical risk and life expectancy >12 months Class 1

ESC

TAVR alternative for surgical high risk. Class 2a

Balloon valvotomy as a bridge to TAVR or surgical AVR Class 2b

Clinical outcomes at 1 year following TAVR JAMA 2015 313,1019 David Holmes Mayo Clinic



No. at risk					
Stroke	12 182	9508	7585	6063	4681
Heart failure	12 182	8951	7007	5519	4239

From: **Clinical Outcomes at 1 Year Following Transcatheter Aortic Valve Replacement**

JAMA. 2015;313(10):1019-1028. doi:10.1001/jama.2015.1474

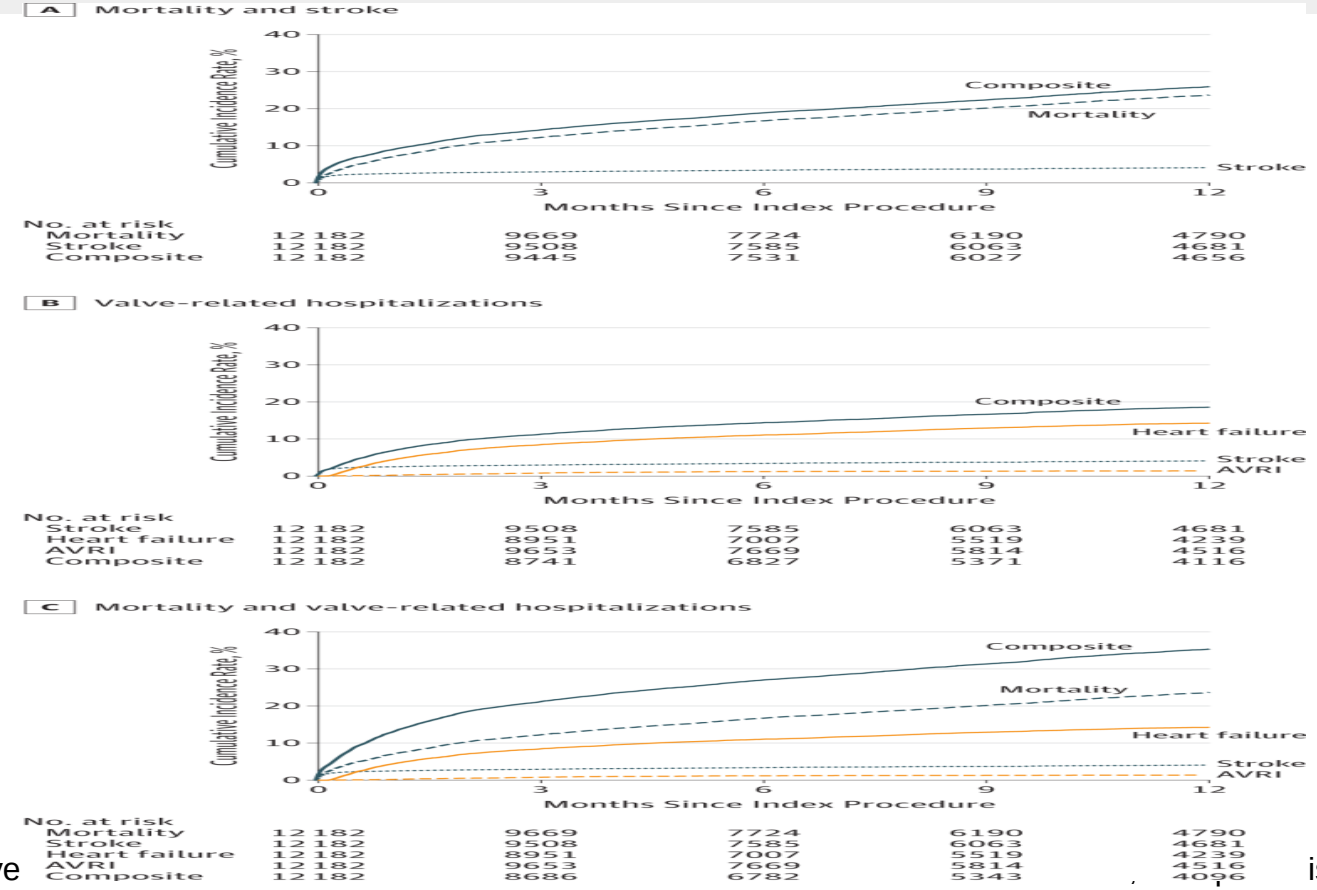


Figure Legend:

Cumulative is the combination of mortality and stroke outcomes. B, Composite is the combination of stroke, heart failure, and AVRI outcomes. C, Composite is the combination of mortality, stroke, heart failure, and AVRI outcomes.

TAVR for severe AS
Balancing Benefits, Risks and Expectations.

- TAVR represents a transformative technology with enormous potential
- Clinical efficacy and safety must temper with consumer expectations.
- Surgical AVR represents proven standard with safety, efficacy and durability for majority of patients
- Broad application of TAVR presents challenges in patient selection, cost effectiveness and need for dedicated heart valve centers.

Challenges in management of aortic stenosis; Have the Guidelines Filled the Gap?

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary

- Aortic stenosis is increasing in prevalence
- Clinical, echo and hemodynamic assessments are essential
- Improving outcomes of TAVR and AVR

Outcome data discussions with patients undergoing TAVR.

Thank You

UR
MEDICINE

MEDICINE *of* THE HIGHEST ORDER