Latest Treatments for Mitral Valve Disease 2.0

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Boulder Heart
303-500-1694

Boulder Community Health

Background

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- Trained in New York at Columbia Presbyterian Medical Center
- 21 years in Wisconsin
  - Mostly heart valve work, widely published
  - 65 cardiologists and 10 surgeons
  - Health care system 15 hospitals and 120 clinics
  - Case experience U.S. and International >6,000
- Boulder Heart October 2018
  - Director Cardiac Surgery
  - Chairman Operating Committee, BCH/BH
  - Cardiac Robotics Team/ Heart Team
  - Medical Director, Cardiovascular Service Line

Outline of Discussion 2.0

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- **Why** should we pay attention to the mitral valve? Especially if I feel fine?
- **What** is the mitral valve and how does it fail?
- **How** is it remedied?
- **When** is the right time?
- **Where** do I go?

Why are we here?

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- Avoid **heart failure** and **early death** from mitral valve disease

- …but won't I know if I'm dying or headed for heart failure?

Mitral Valve Disease: The Natural History

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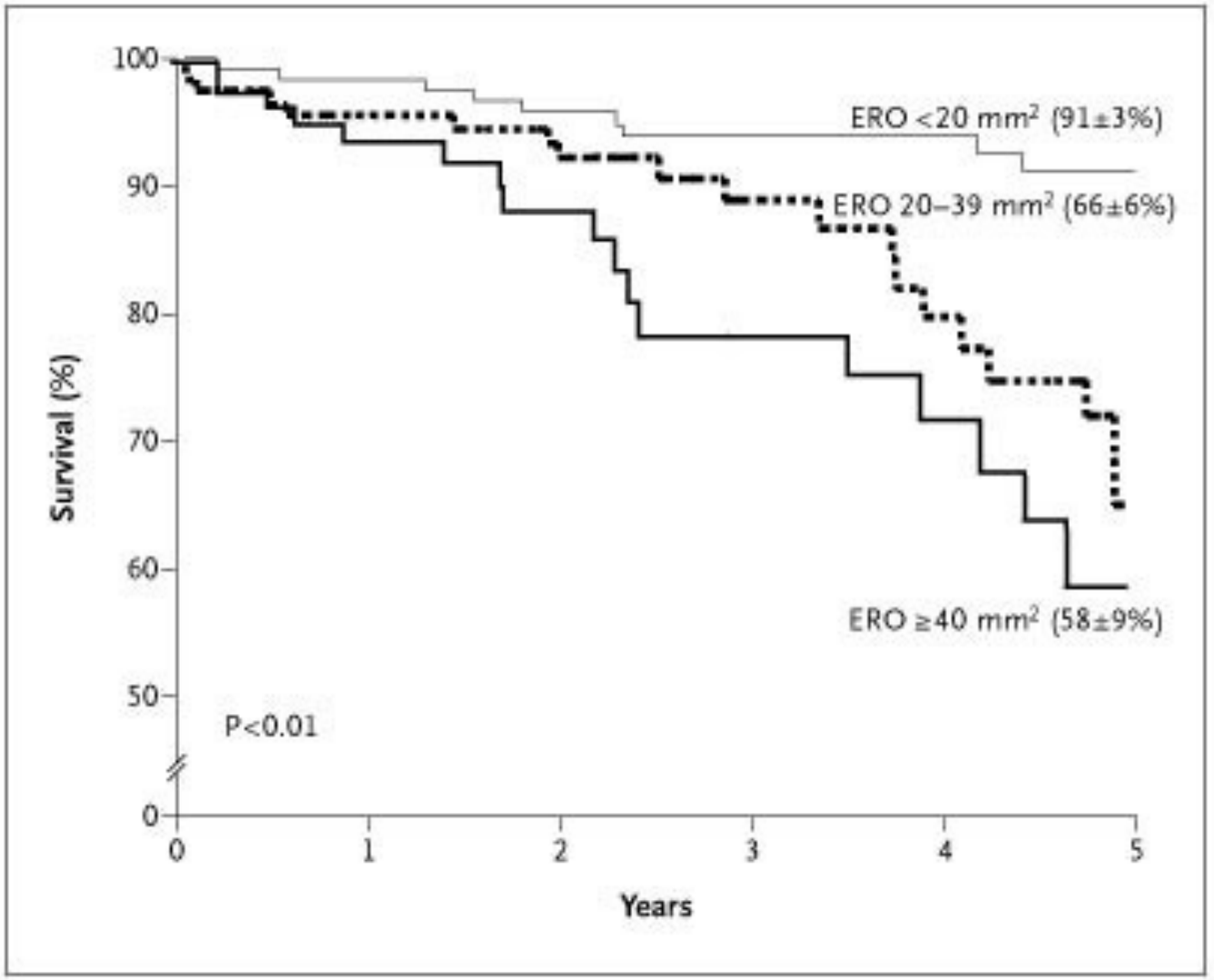
ORIGINAL ARTICLE

Quantitative Determinants of the Outcome of Asymptomatic Mitral Regurgitation

Maurice Enriquez-Sarano, M.D., Jean-François Avierinos, M.D., David Messika-Zeitoun, M.D., Delphine Detaint, M.D., Maryann Capps, R.D.C.S., Vuyisile Nkomo, M.D., Christopher Scott, M.S., Hartzell V. Schaff, M.D., and A. Jamil Tajik, M.D.

N Engl J Med 2005;352:875-883

Survival



Kaplan–Meier Estimates of the Mean (±SE) Rates of Overall Survival among Patients with Asymptomatic Mitral Regurgitation under Medical Management, According to the Effective Regurgitant Orifice (ERO).

Enriquez-Sarano M et al. N Engl J Med 2005;352:875-883.

What is the Mitral Valve Anatomy?

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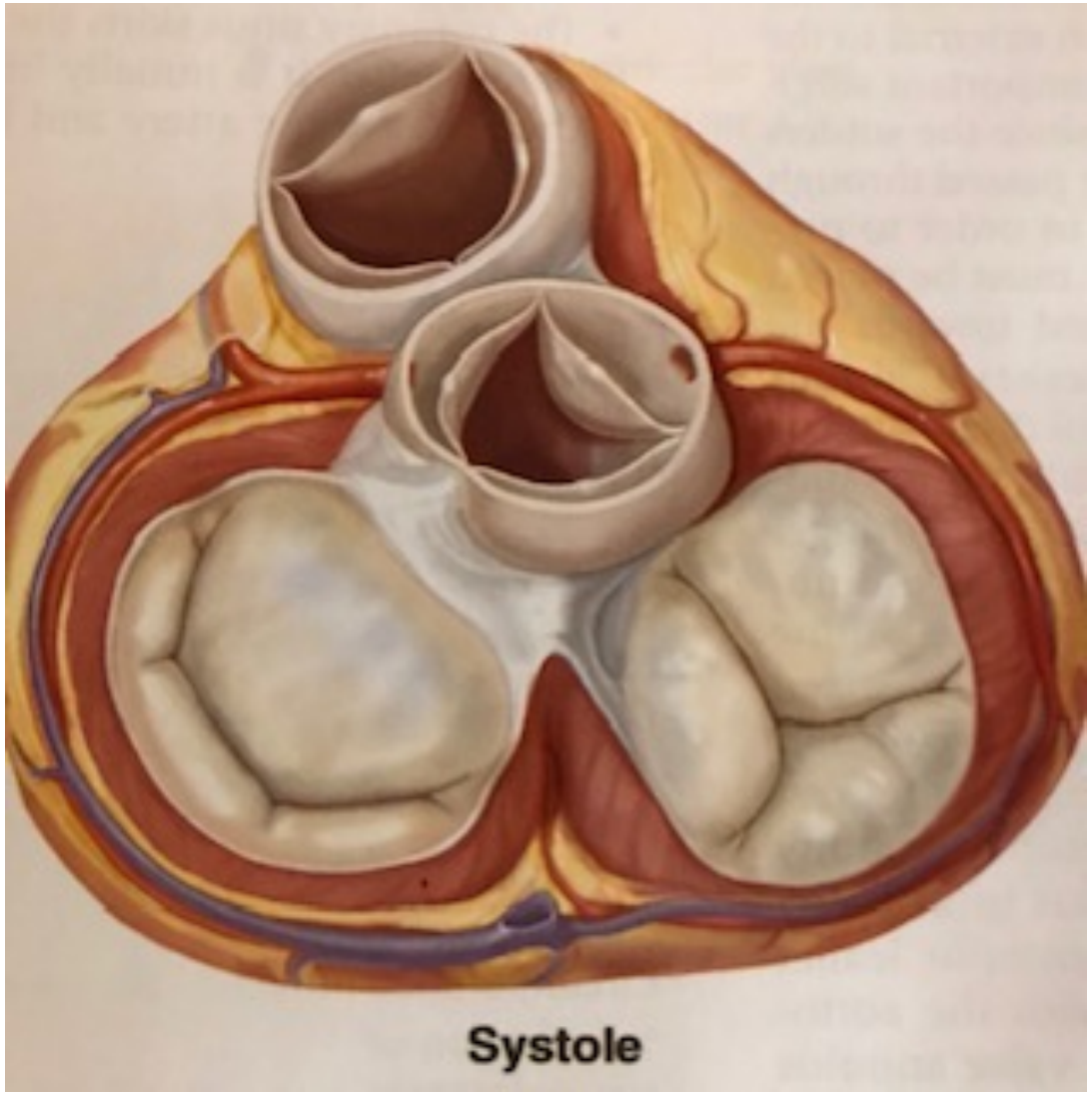

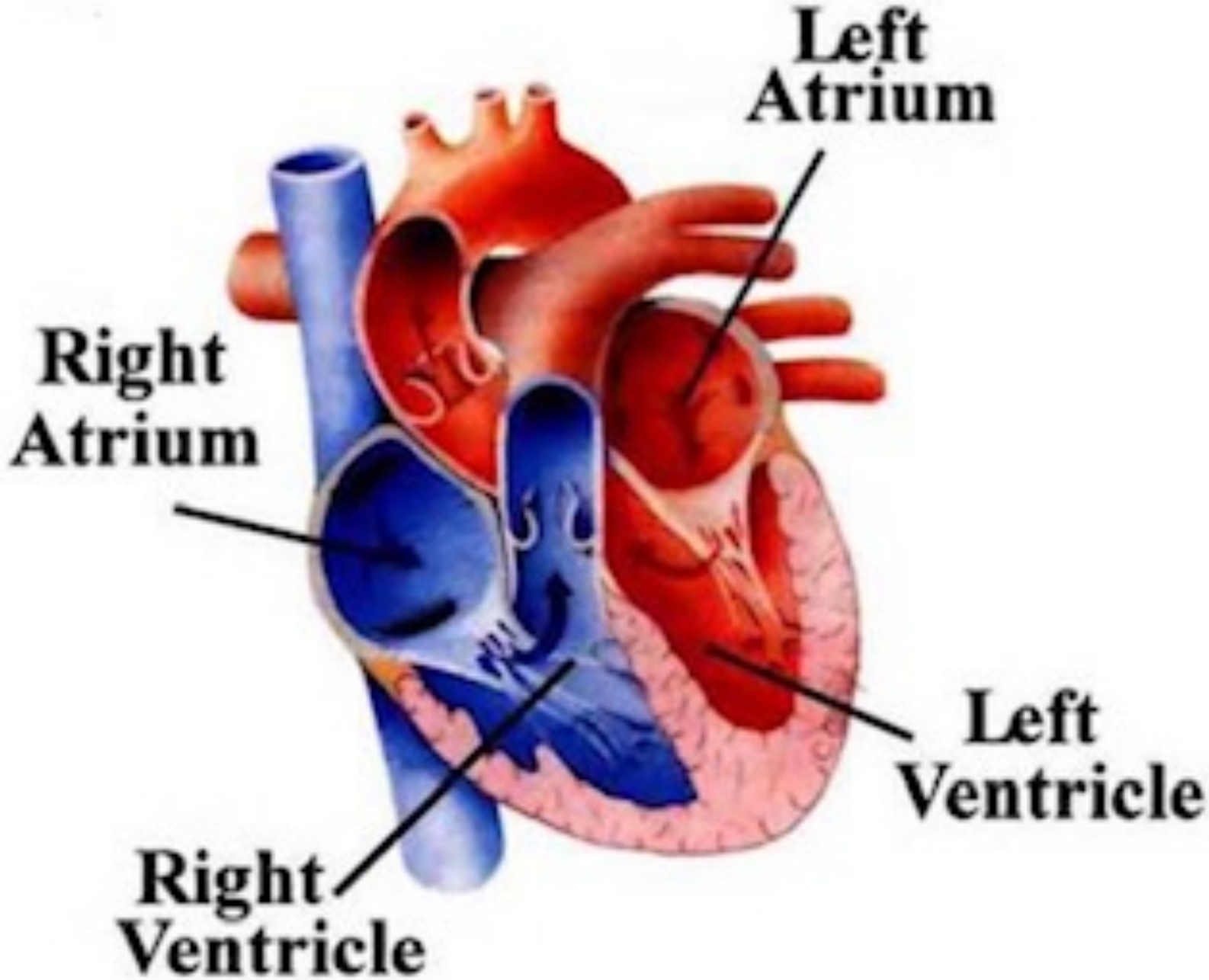
Left
Atrium
Right
Atrium
Left
Ventricle
Right
Ventricle

Mitral Valve Anatomy

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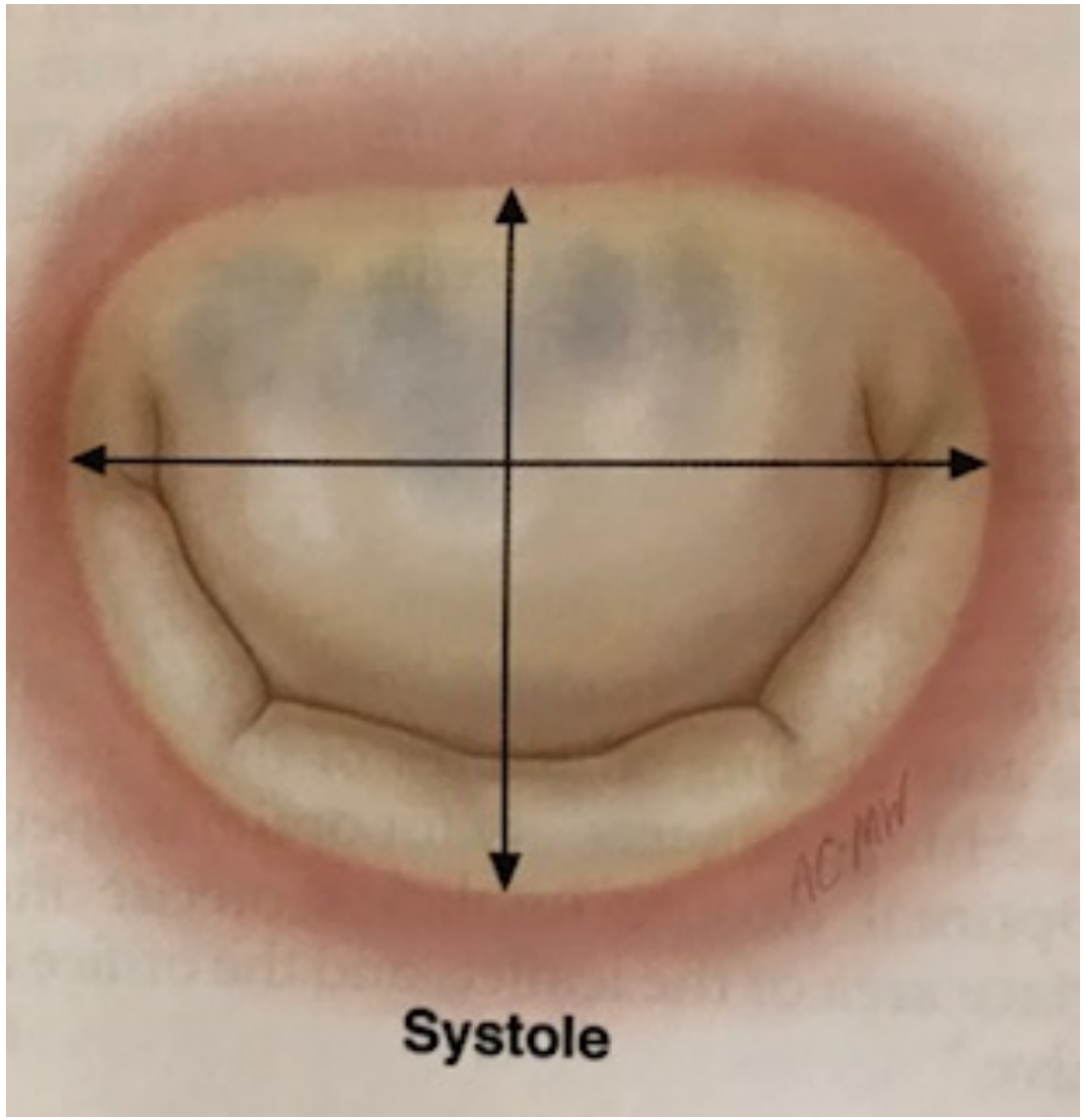

Mitral Valve Anatomy

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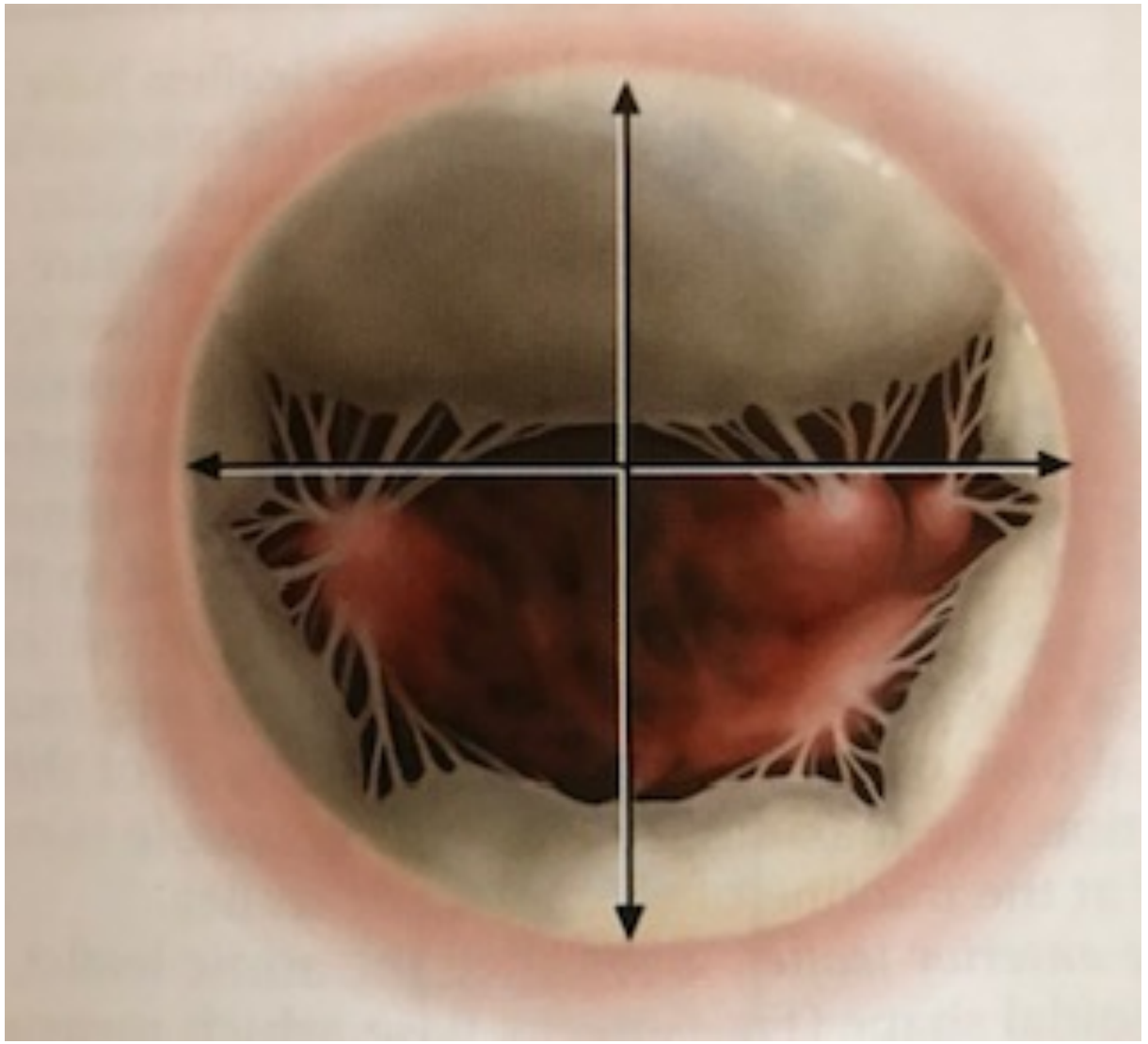

Mitral Valve Anatomy

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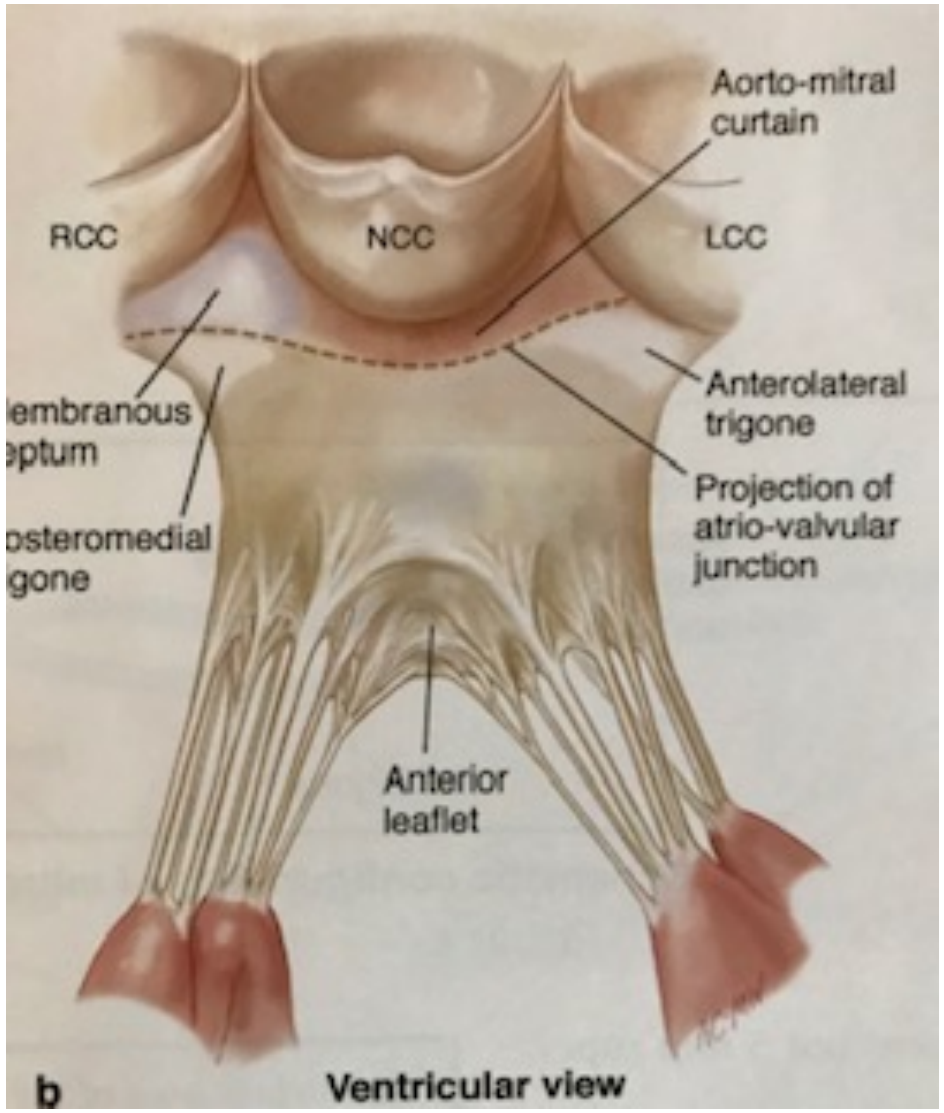

What is the Cause of Mitral Valve Disease?

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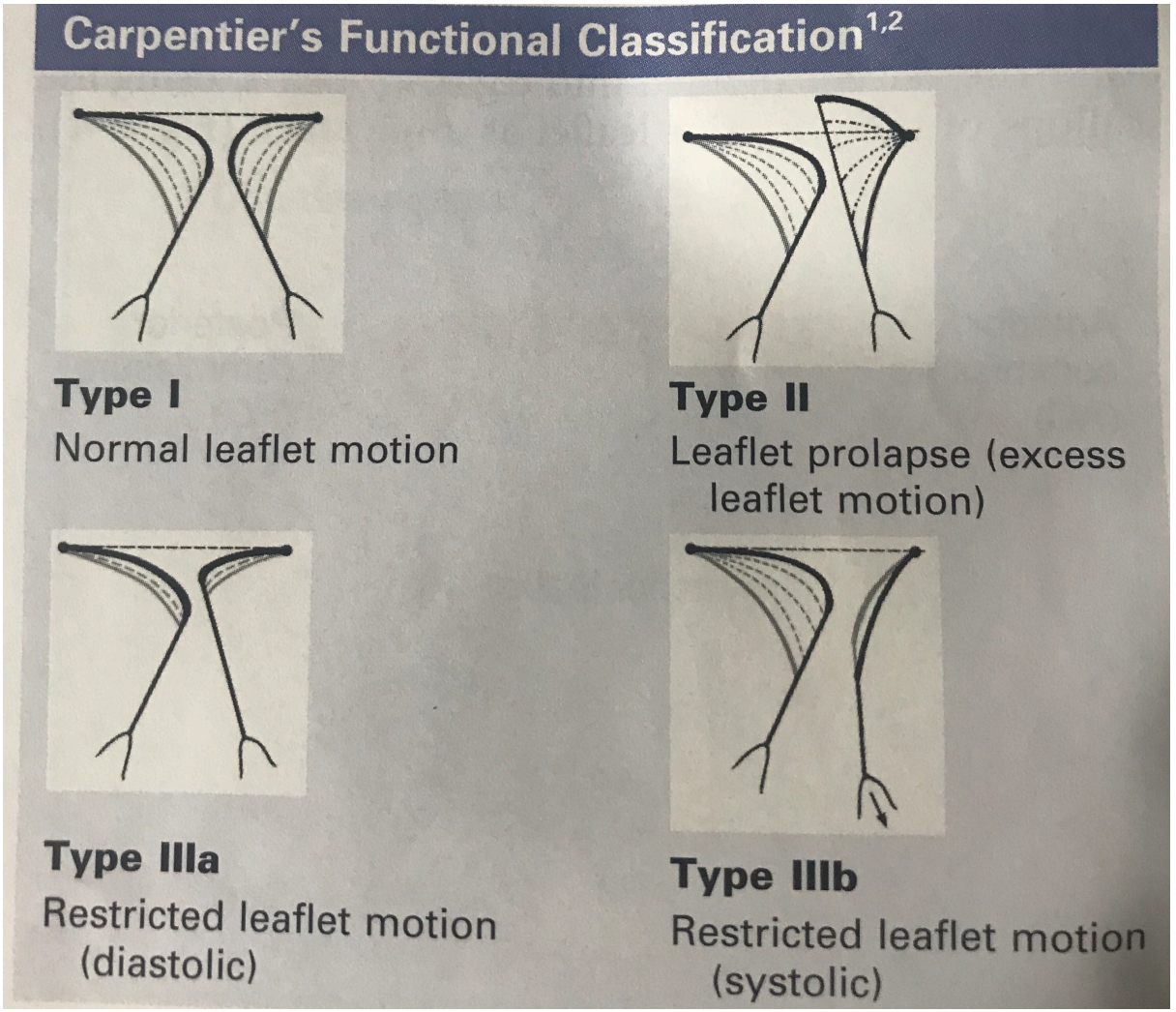
Carpentier's Functional Classification:

Normal motion

Excess motion

Restricted motion



How…Mitral Valve Repair

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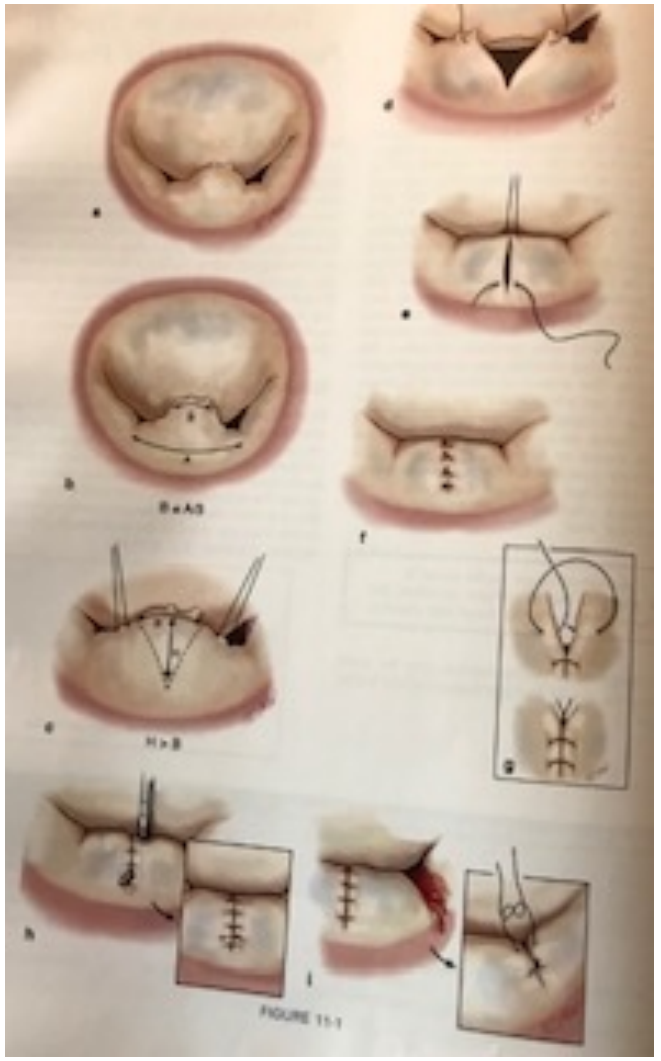

How Can it Be Remedied?

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Understanding Surgical Approach

- Standard
  - Translation “sternotomy”
- Mini Mitral
  - Translation “thoracotomy”
- Robotic
  - Translation “endoscopic”

Clinical Case 1. History

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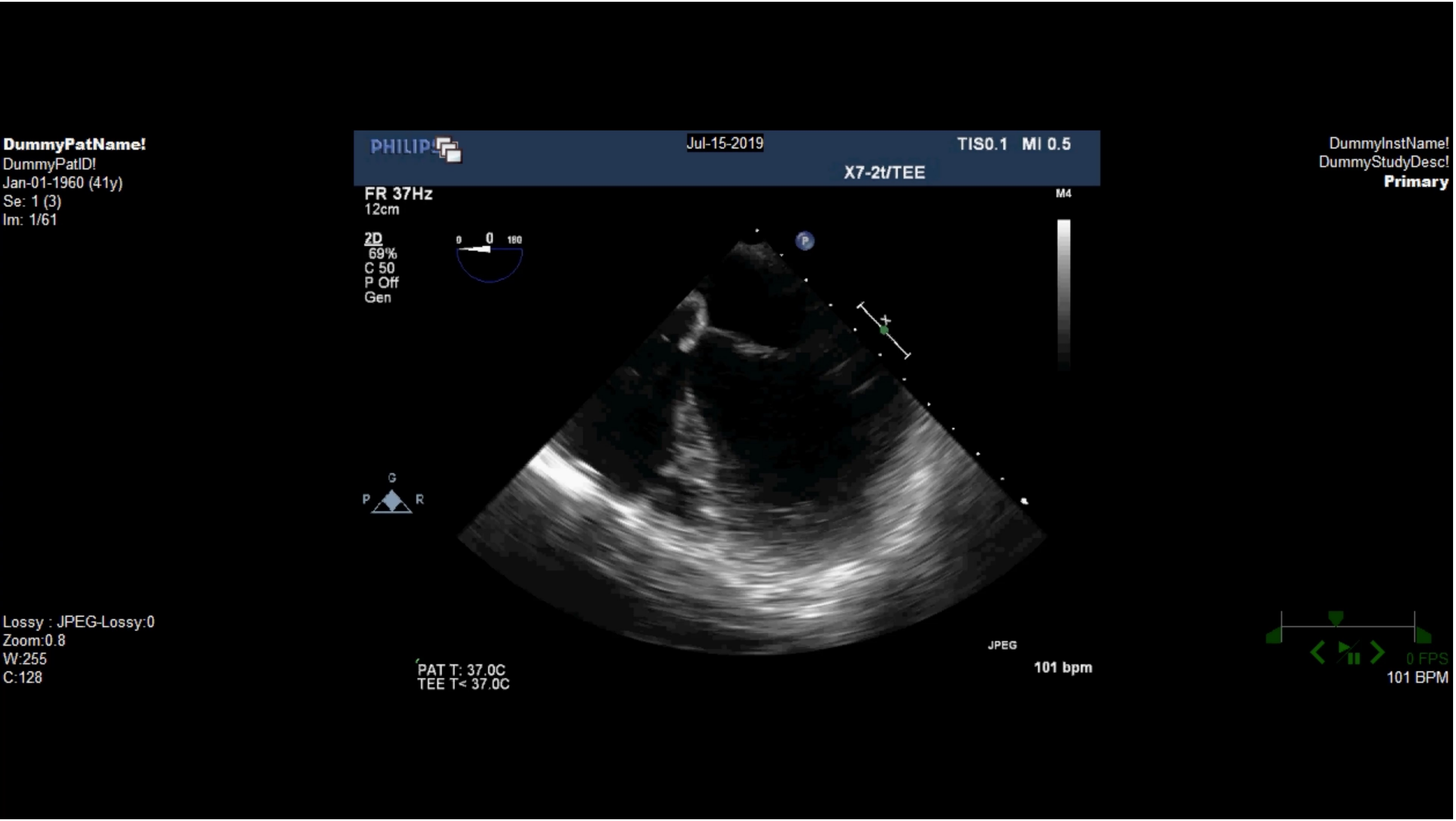
- Moderate/severe MR 2017
- No follow-up appointment
- 2019 went to elevation
- Profound shortness of breath
- ***Admission to hospital for Heart Failure***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DummyPatID!
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Se: 1 (3)
Im: 1/61
PHILIPS
Jul-15-2019
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X7-2t/TEE
DummyInstName!
DummyStudyDesc!
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FR 37Hz
12cm
2D
69%
C 50
P Off
Gen
M4
G
P
R
PAT T: 37.0C
TEE T< 37.0C
JPEG
101 bpm
Lossy : JPEG-Lossy:0
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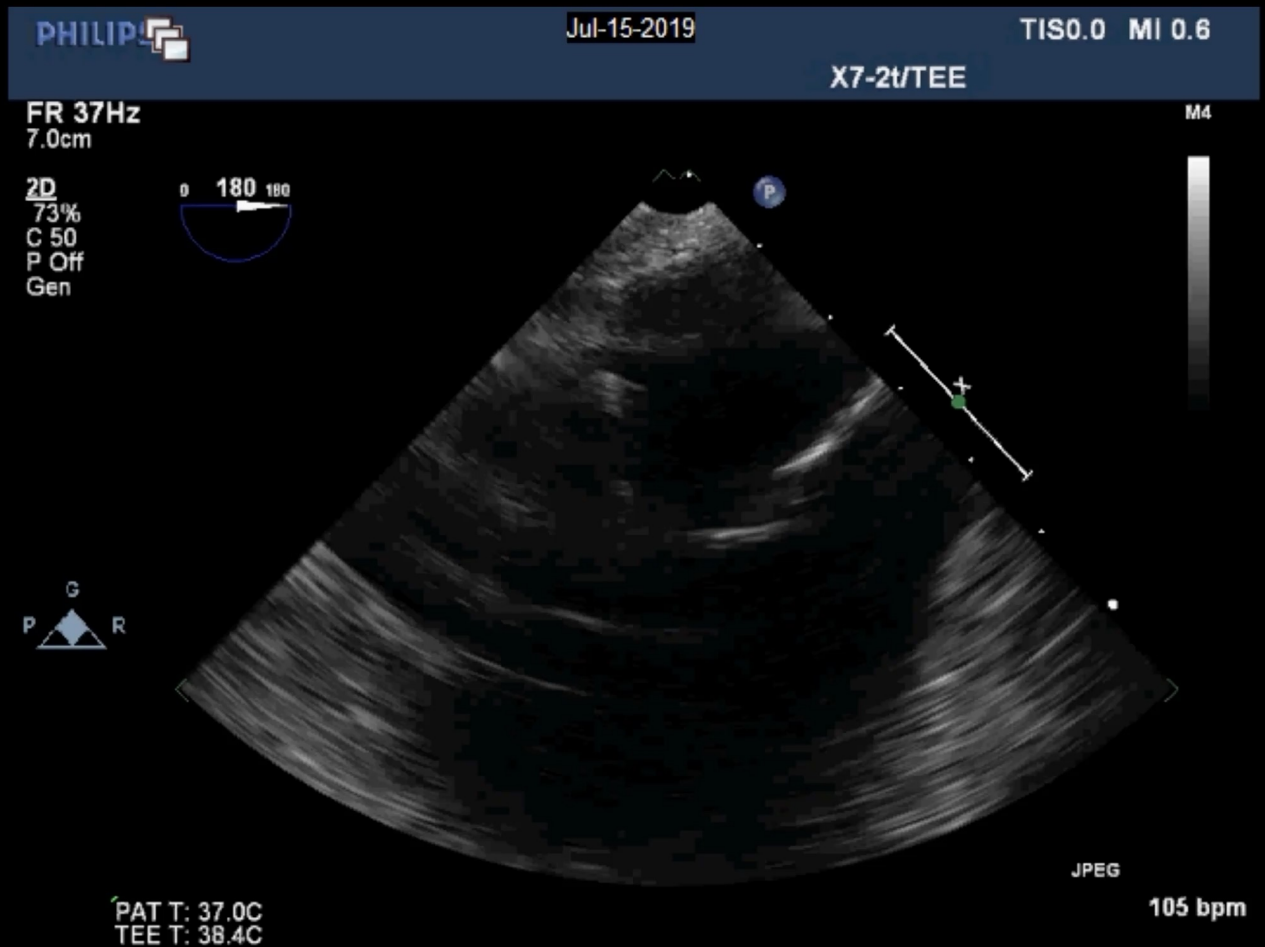

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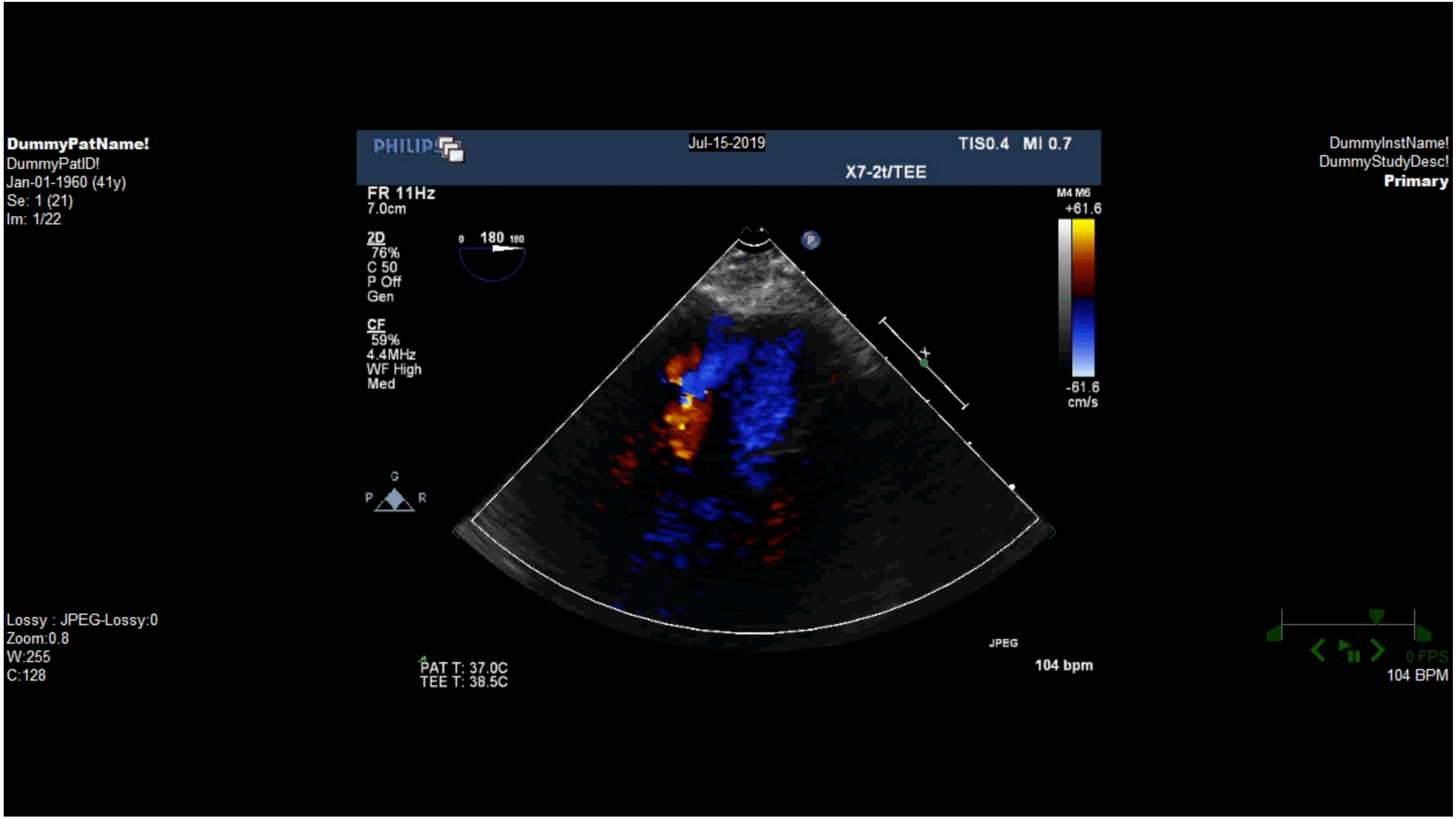
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2D
76%
C 50
P Off
Gen
CF
59%
4.4MHz
WF High
Med
0 180 180
M4 M6
+61.6
-61.6
cm/s
G
P
R
PAT T: 37.0C
TEE T: 38.5C
JPEG
104 bpm
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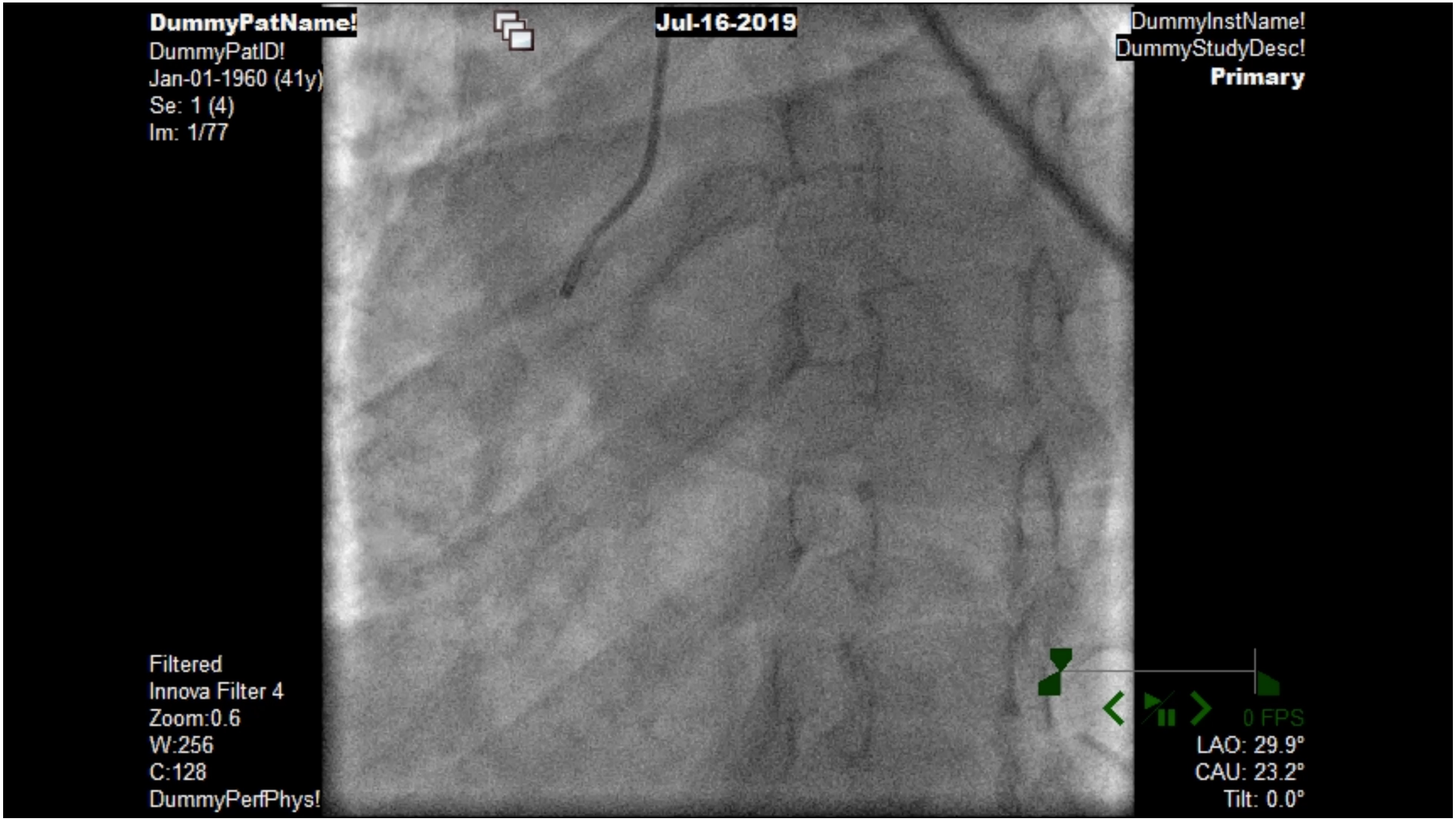
104 BPM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Innova Filter 4
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DummyPerfPhys!
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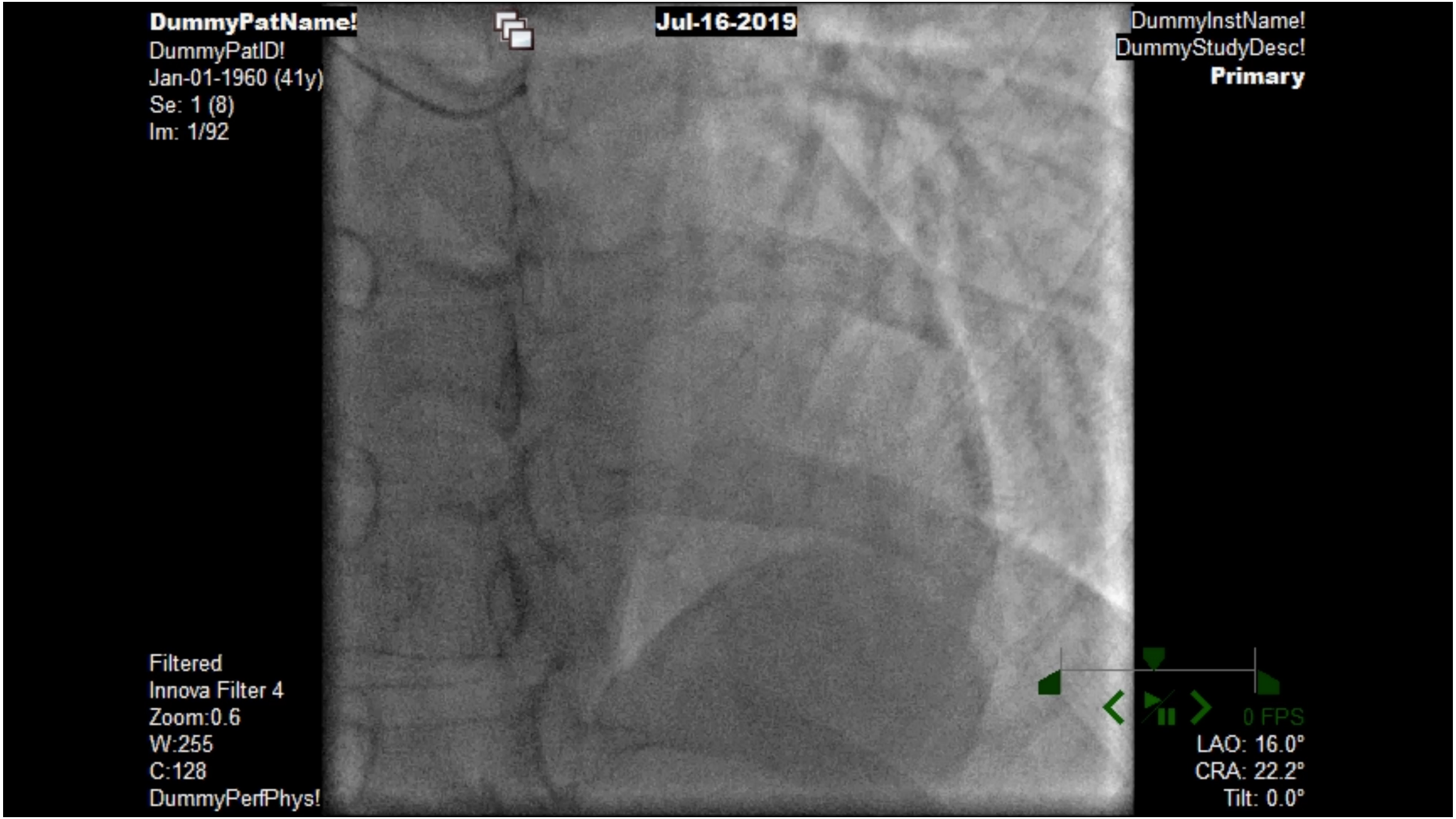
LAO: 29.9°
CAU: 23.2°
Tilt: 0.0°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Primary
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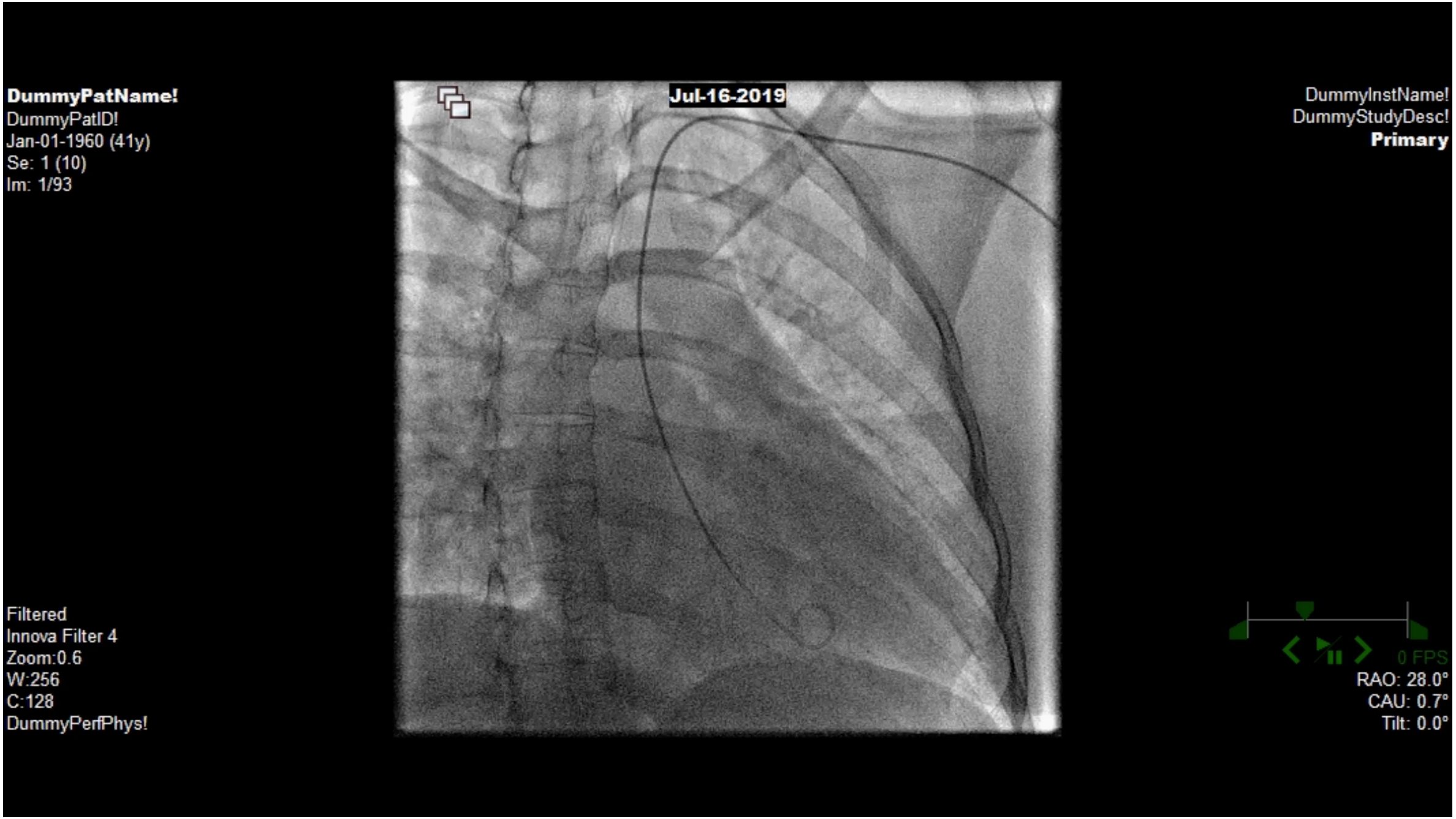
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Innova Filter 4
Zoom:0.6
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Careful Planning

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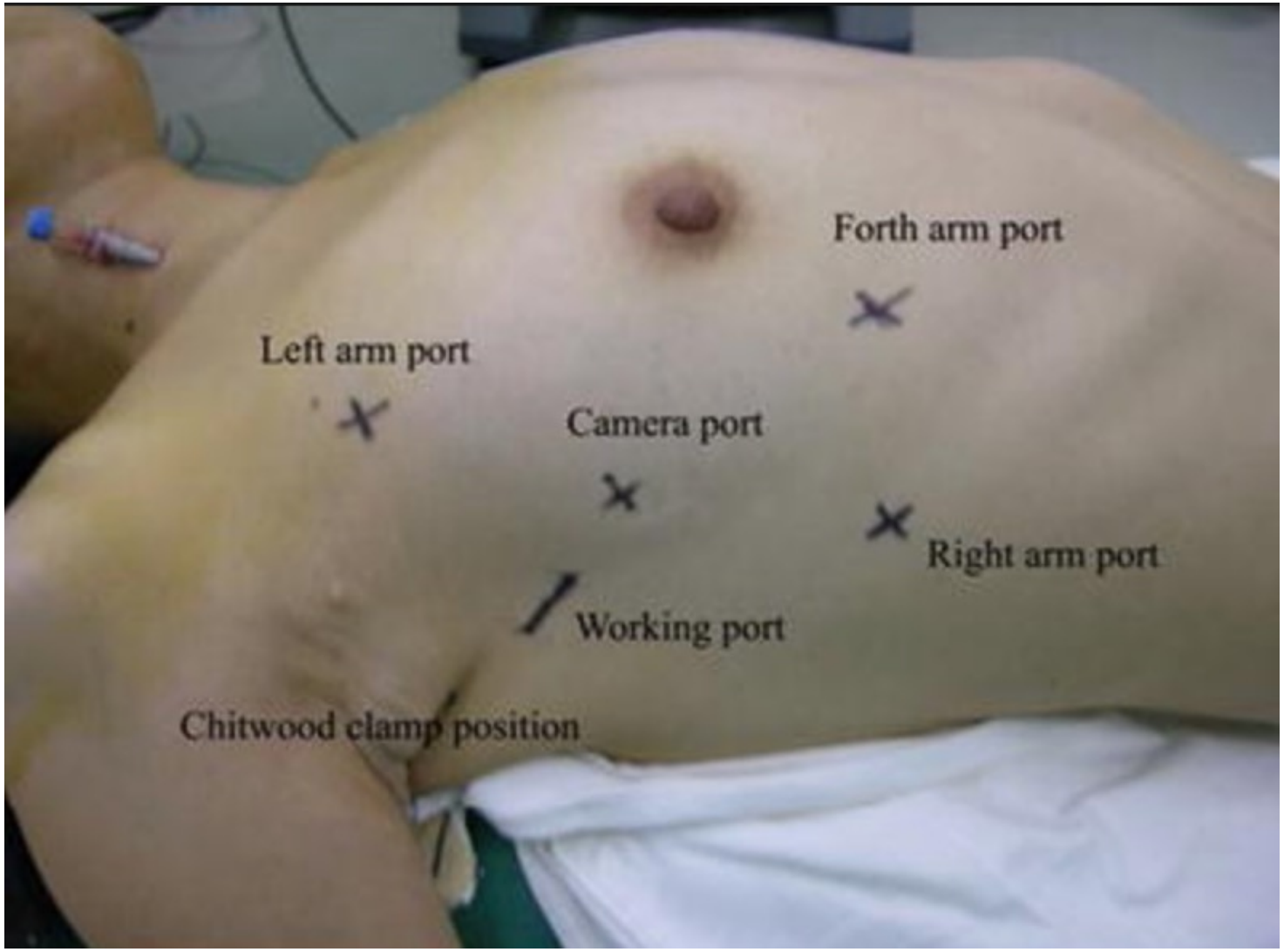

Ports for Scope and Instruments

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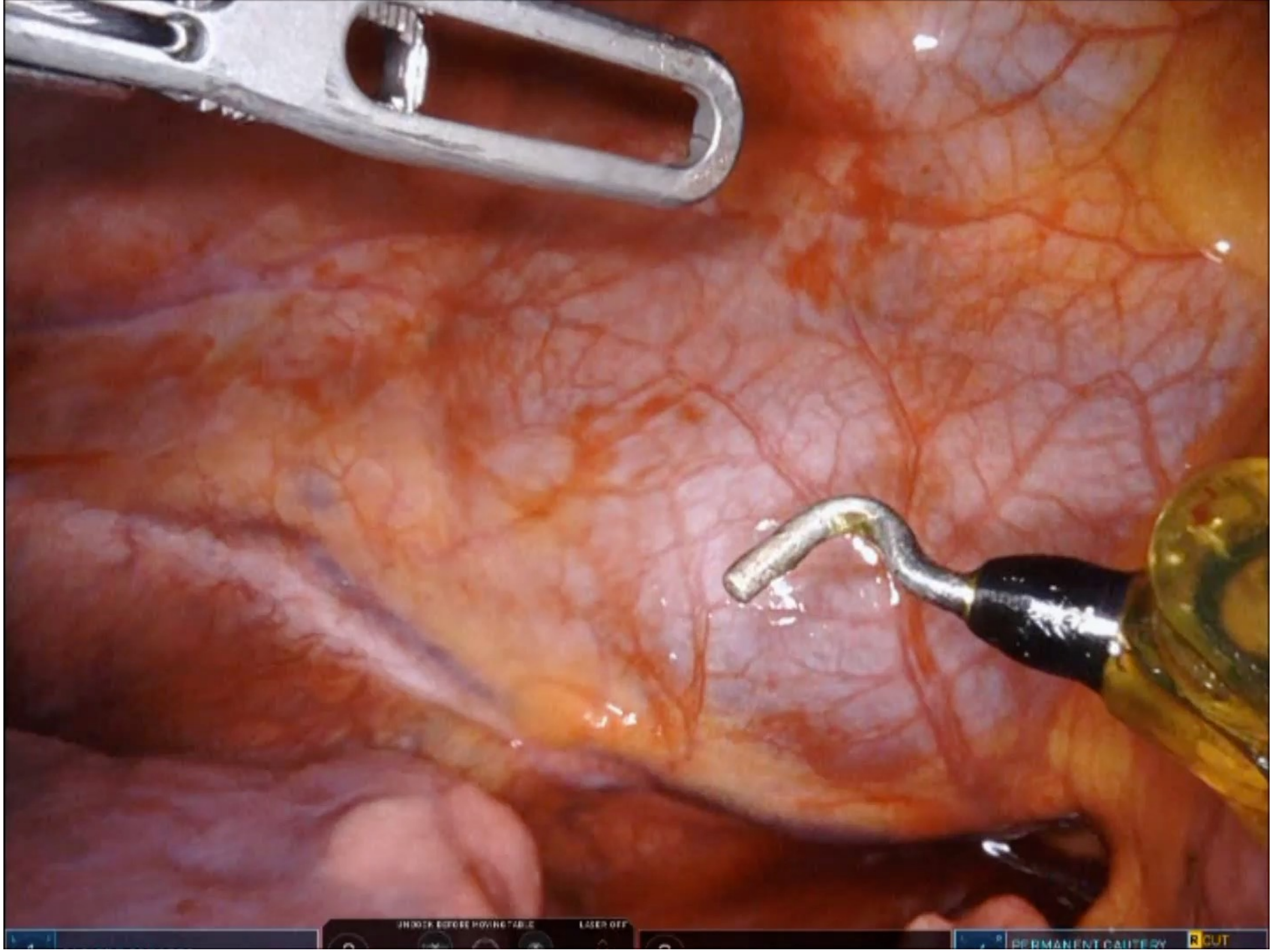
LASER OFF
PERMANENT CAUTERY
R CUT

P2 Segment, posterior mitral leaflet

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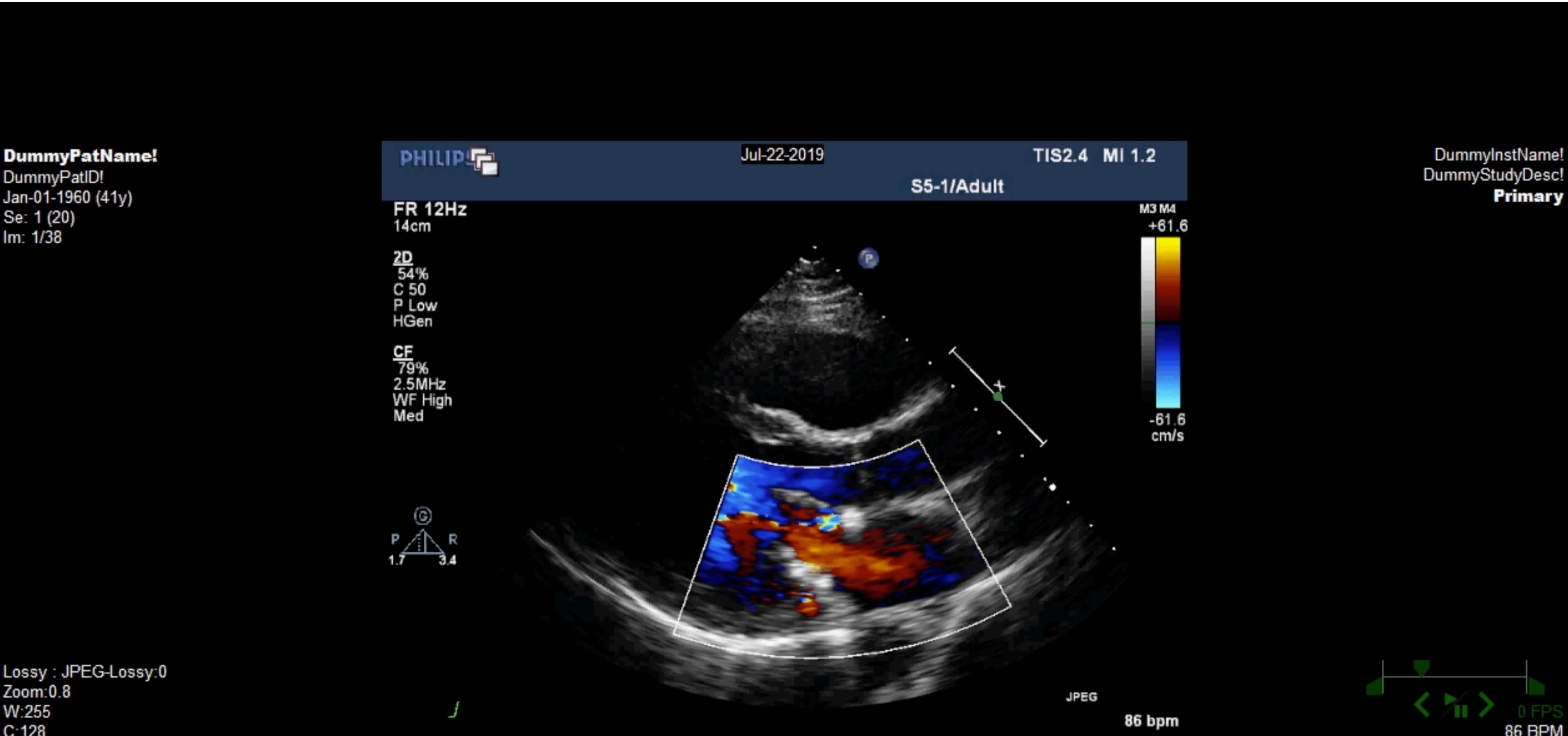
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Im: 1/38
PHILIPS
Jul-22-2019
TIS2.4 MI 1.2
S5-1/Adult
FR 12Hz
14cm
2D
54%
C 50
P Low
HGen
CF
79%
2.5MHz
WF High
Med
M3 M4
+61.6
-61.6
cm/s
P
R
1.7
3.4
JPEG
86 bpm
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DummyStudyDesc!
Primary
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C:128
0 FPS
86 BPM

Follow-up Boulder Heart Clinic

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When?

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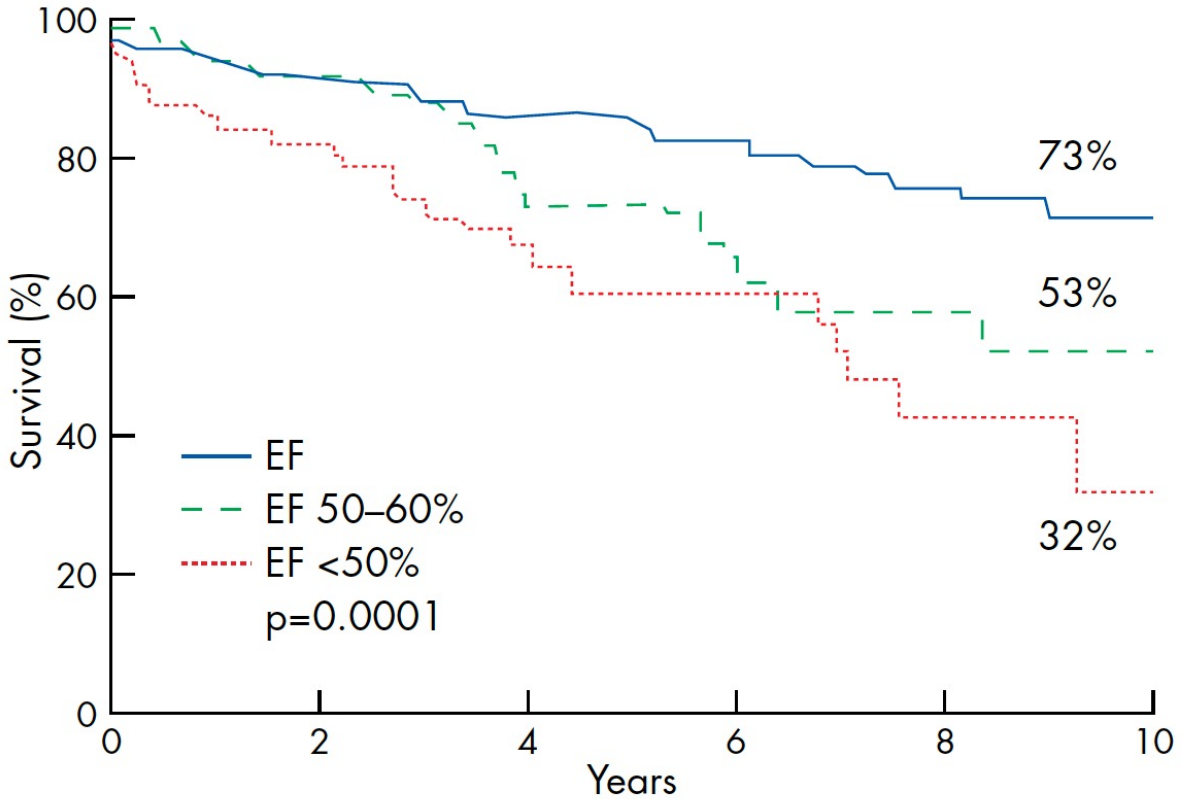

Figure 2 Long term postoperative survival according to the preoperative echocardiographic ejection fraction. Note the excess mortality in patients with ejection fraction < 50% but also with "low normal" ejection fraction 50–59%. Reproduced with the authorisation of the American Heart Association.

The Effect of Proper and Timely Treatment

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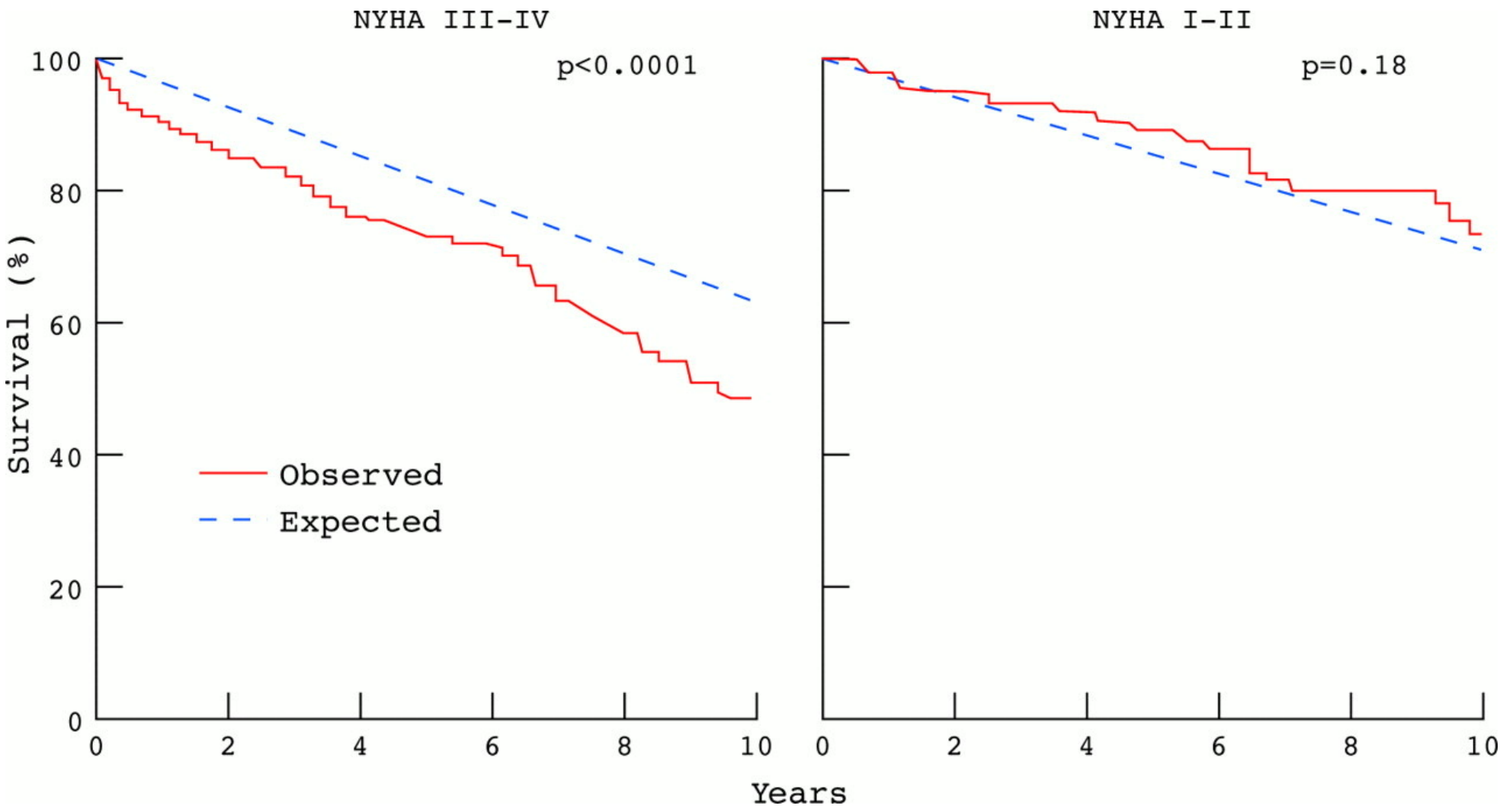

Conclusion

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Patients (with severe mitral regurgitation) have a significantly *increased risk of death* and *cardiac events* and should promptly be considered for cardiac surgery since ***surgery considerably…***

Conclusion

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Reduces the rate of death from cardiac causes

Decreases the risk of heart failure

Normalizes life expectancy.

NEJM 2005

Echocardiographic Prediction of Survival After Surgical Correction of Organic Mitral Regurgitation

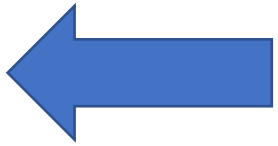
Maurice Enriquez-Sarano, MD; A. Jamil Tajik, MD; Hartzell V. Schaff, MD; Thomas A. Orszulak, MD; Kent R. Bailey, PhD; Robert L. Frye, MD

Background Left ventricular dysfunction is a frequent cause of death after successful surgical repair of mitral regurgitation. The role of preoperative echocardiographic left ventricular variables in the prediction of postoperative survival and thus their clinical implications remain uncertain.

Methods and Results The survival of 409 patients operated on between 1980 and 1989 for pure, isolated, organic mitral regurgitation and with a preoperative echocardiogram (within 6 months of operation) was analyzed. The overall survival was 75% at 5 years (90% of expected), 58% at 10 years (88% of expected), and 44% at 12 years (73% of expected). Operative mortality was 6.6% and markedly improved from 1980 to 1984 (10.7%) to 1985 to 1989 (3.7%). Multivariate analysis showed that age (P=.0003), date of operation (P=.003), and functional class (P=.016) but not left ventricular function were predictors of operative mortality. In the most recent period (1985 to 1989), operative mortality was 12.3% in patients age 75 years or older and 1.1% in patients younger than 75 years. Late survival was analyzed in the operative survivors. Multivariate analysis showed that the most powerful predictor was echocardiographic ejection fraction (EF) (P=.0004), followed by age (P=.0031), creatinine level (P=.0062), systolic blood pressure (P=.0164), and presence of coronary artery disease (P=.0237). The late survival at 10 years was 32±12% for patients with EF <50%, 53±9% for EF 50% to 60%, and 72±4% for EF ≥60%. The hazard ratio compared with EF ≥60% was 2.79 (95% confidence interval, 1.65 to 4.72) for EF <50% and 1.81 (95% confidence interval, 1.11 to 2.95) for EF 50% to 60%. Echocardiographic EF remained the best predictor of late survival, even when combined with left ventricular angiographic variables. The survival of patients with EF ≥60% was 100% of expected at 10 years but was better in patients in class I or II than in those in class III or IV (82±6% versus 59±6%, respectively, at 10 years; P=.0021). The preoperative predictors of operative and late mortality remained significant independent of the type of surgical correction performed in combined multivariate analyses.

Conclusions In organic mitral regurgitation, (1) operative mortality has markedly decreased recently, being at a low 1.1% in patients younger than 75 years, and is predicted by age and symptoms and not by left ventricular function, and (2) left ventricular EF measured by echocardiography is the most powerful predictor of late survival. These results suggest that surgical treatment should be considered early, even in the absence of severe symptoms, in patients with severe mitral regurgitation, before left ventricular dysfunction occurs. (***Circulation*. 1994;90:830-837.**)

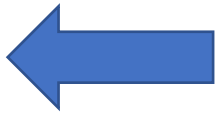
Key Words • ejection fraction • regurgitation • mitral valve



DURABILITY OF MITRAL VALVE REPAIR FOR DEGENERATIVE DISEASE

A. Marc Gillinov, MD[a]
Delos M. Cosgrove, MD[a]
Eugene H. Blackstone, MD[a,b]
Ramon Diaz, MD[a]
John H. Arnold, MD[a]
Bruce W. Lytle, MD[a]
Nicholas G. Smedira, MD[a]
Joseph F. Sabik, MD[a]
Patrick M. McCarthy, MD[a]
Floyd D. Loop, MD[a]

Background: **Degenerative mitral valve disease is the most common cause of mitral regurgitation in the United States. Mitral valve repair is applicable in the majority of these patients and has become the procedure of choice.** ***Objective:*** **This study was undertaken to identify factors influencing the durability of mitral valve repair.** ***Patients and methods:*** **Between 1985 and 1997, 1072 patients underwent primary isolated mitral valve repair for valvular regurgitation caused by degenerative disease. Repair durability was assessed by multivariable risk factor analysis of reoperation. It was supplemented by a search for valve-related risk factors for death before reoperation. Three hospital deaths occurred (0.3%); complete follow-up (4152 patient-years) was available in 1062 of 1069 hospital survivors (99.3%).** ***Results:*** **At 10 years, freedom from reoperation was 93%. Among 30 patients who required reoperation for late mitral valve dysfunction, the repair failed in 16 (53%) as a result of progressive degenerative disease. Durability of repair was adversely affected by pathologic conditions other than posterior leaflet prolapse, use of chordal shortening, annuloplasty alone, and posterior leaflet resection without annuloplasty. Durability was greatest after quadrangular resection and annuloplasty for posterior leaflet prolapse and was enhanced by the use of intraoperative echocardiography. Death before reoperation was increased in patients having isolated anterior leaflet prolapse or valvular calcification and by use of chordal shortening or annuloplasty alone.** ***Conclusions:*** **Repair durability is greatest in patients with isolated posterior leaflet prolapse who have posterior leaflet resection and annuloplasty. Chordal shortening, annuloplasty alone, and leaflet resection without annuloplasty jeopardize late results. (J Thorac Cardiovasc Surg 1998;116:734-43)**



Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis

James S. Gammie, MD, Joanna Chikwe, MD, Vinay Badhwar, MD, Dylan P. Thibault, MS, Sreekanth Vemulapalli, MD, Vinod H. Thourani, MD, Marc Gillinov, MD, David H. Adams, MD, J. Scott Rankin, MD, Mehrdad Ghoreishi, MD, Alice Wang, MD, Gorav Ailawadi, MD, Jeffrey P. Jacobs, MD, Rakesh M. Suri, MD, Steven F. Bolling, MD, Nathaniel W. Foster, BS, and Rachael W. Quinn, PhD

Division of Cardiac Surgery, University of Maryland School of Medicine, Baltimore, Maryland; Department of Cardiothoracic Surgery, Mount Sinai Medical Center, New York, New York; Department of Cardiovascular and Thoracic Surgery, West Virginia University, Morgantown, West Virginia; Duke Clinical Research Institute, Durham, North Carolina; Division of Cardiothoracic Surgery, Emory University, Atlanta, Georgia; Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio; University of Virginia, Charlottesville, Virginia; Division of Cardiovascular Surgery, Johns Hopkins All Children's Heart Institute, St. Petersburg, Florida; and Department of Cardiac Surgery, University of Michigan, Ann Arbor, Michigan

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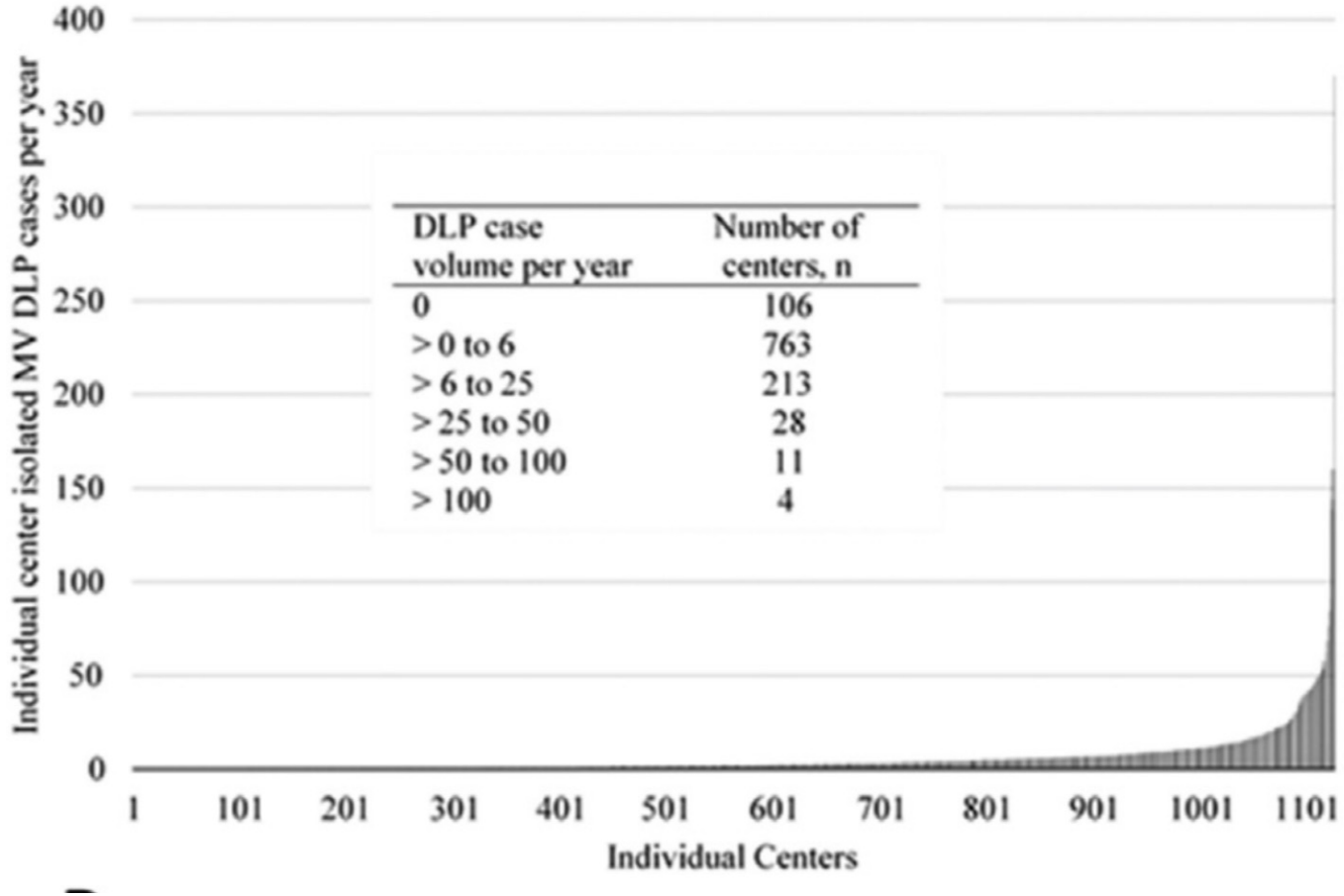
THE SOCIETY OF THORACIC SURGEONS ADULT CARDIAC SURGERY DATABASE: UPDATE ON OUTCOMES AND RESEARCH

STS Adult Cardiac Surgery Database: 2021 Update on Outcomes, Quality, and Research

Michael E. Bowdish, MD, MS, Richard S. D'Agostino, MD, Vinod H. Thourani, MD, Thomas A. Schwann, MD, Carole Krohn, MPH, BSN, Nimesh Desai, MD, David M. Shahian, MD, Felix G. Fernandez, MD, MSc, and Vinay Badhwar, MD

Department of Surgery, Keck School of Medicine of USC, University of Southern California, Los Angeles, California; Division of Thoracic and Cardiovascular Surgery, Lahey Hospital and Medical Center, Burlington, Massachusetts; Department of Surgery, Division of Cardiothoracic Surgery, Tufts University School of Medicine, Boston, Massachusetts; Department of Cardiovascular Surgery, Marcus Valve Center, Piedmont Heart Institute, Atlanta, Georgia; Division of Cardiac Surgery, University of Massachusetts Medical School – Baystate, Springfield, Massachusetts; The Society of Thoracic Surgeons, Chicago, Illinois; Department of Surgery, Division of Cardiovascular Surgery, University of Pennsylvania, Philadelphia, Pennsylvania; Division of Cardiac Surgery, Department of Surgery and Center for Quality and Safety, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts; Division of Cardiothoracic Surgery, Emory University School of Medicine, Atlanta, Georgia; and Department of Cardiovascular and Thoracic Surgery, West Virginia University, Morgantown, West Virginia

Mitral Valve Case Volume by U.S. Centers



DLP case volume per year	Number of centers, n
0	106
> 0 to 6	763
> 6 to 25	213
> 25 to 50	28
> 50 to 100	11
> 100	4

1125 U.S Centers

869 (77%) 0-6 cases.

25 + cases/yr. = Top 4%

Mitral Valve Repair Outcomes

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BENEFITS OF ROBOTIC MITRAL VALVE SURGERY FOR YOUR PATIENTS		
COMPARATIVE METRICS *(n=53, 2019-2021)*		
	STS1,2	**Dr. Daniel O'Hair**
Mean Length of Stay	7 Days	3 Days
Transfusion Rate	33%	22%
New Onset Atrial Fibrillation	29%	17%
Readmission within 30 Days	11%	8%
Stroke	1%	0%
Renal Failure	2%	0%
Prolonged Intubation	5%	0%
Postoperative Pacemaker	6%	6%
Operative Times - Open vs. Robot		
Cardiopulmonary Bypass, Median	117	132
Cross Clamp, Median	85	100
HOSPITAL SPECIFIC METRICS		
Conversion to Sternotomy		0%
Mitral Valve Repair Success Rate		96%
Home by Day 2		42%

Conclusion

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- Excellence in mitral valve repair is available in Boulder.
- We have the largest, most experienced robotics team in Colorado for heart care.
- We offer expedited second opinions.
- Our results far exceed the published national data from the STS database.

- 303-500-1694: Ask for Sally Brennan.