

Asymptomatic Severe Mitral Regurgitation



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Early surgical intervention - PRO

Dr. A. Sestito

**Policlinico Gemelli-
Roma**





European Society of Cardiology Guidelines

Asymptomatic Severe Primary Mitral Regurgitation

	Class	Level
Surgery is indicated in asymptomatic patients with <u>LV dysfunction</u> (LVESD \geq 45 mm and/or LVEF \leq 60%).	I	C
Surgery should be considered in asymptomatic patients with preserved LV function and <u>new onset of atrial fibrillation or pulmonary hypertension</u> (systolic pulmonary pressure at rest $>$ 50 mmHg).	IIa	C
Surgery should be considered in asymptomatic patients with preserved LV function, <u>high likelihood of durable repair, low surgical risk and flail leaflet and LVESD \geq 40 mm.</u>	IIa	C
Surgery may be considered in asymptomatic patients with preserved LV function, high likelihood of durable repair, low surgical risk, and: <ul style="list-style-type: none">• left atrial dilatation (volume index \geq 60 ml/m² BSA) and sinus rhythm, or• pulmonary hypertension on exercise (SPAP \geq 60 mmHg at exercise).	IIb	C



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Circulation

Cardiovascular Surgery

Comparison of Early Surgery Versus Conventional Treatment in Asymptomatic Severe Mitral Regurgitation

Duk-Hyun Kang, MD, PhD; Jeong Hoon Kim, MD; Ji Hye Rim, MD; Mi-Jeong Kim, MD;
Sung-Cheol Yun, PhD; Jong-Min Song, MD, PhD; Hyun Song, MD, PhD; Kee-Joon Choi, MD, PhD;
Jae-Kwan Song, MD, PhD; Jae-Won Lee, MD, PhD



In the conventional treatment group, baseline grade of pulmonary hypertension (hazard ratio 1.87, 95% CI 1.22 to 2.87, $P=0.003$), age (hazard ratio 1.02, 95% CI 1.01 to 1.04, $P=0.005$), and effective regurgitant orifice area (hazard ratio 2.06, 95% CI 1.11 to 3.82, $P=0.02$) were independent variables that predicted late development of surgical indications or congestive heart failure on Cox multivariate analysis.

Kang DH et al. Comparison of early surgery versus conventional treatment in asymptomatic severe mitral regurgitation. Circulation 2009;119:797-804.



Compared with conservative management, the strategy of early surgery was associated with an improved long-term event rate by decreasing cardiac mortality and congestive heart failure hospitalization more effectively in patients with severe degenerative mitral regurgitation.

Early surgery may therefore further improve clinical outcomes in asymptomatic severe mitral regurgitation with preserved left ventricular systolic function and a high likelihood of mitral valve repair.

Kang DH et al. Comparison of early surgery versus conventional treatment in asymptomatic severe mitral regurgitation. Circulation 2009;119:797-804.



***Assessment of severity of
regurgitation:***

***QUANTIFICATION OF MITRAL
REGURGITATION***



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The NEW ENGLAND
JOURNAL *of* MEDICINE

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.



Overall survival

Cardiac events

100

70

Quantitative grading of mitral regurgitation is a powerful predictor of the clinical outcome of asymptomatic mitral regurgitation.

Patients with an effective regurgitant orifice of at least 40 mm² should promptly be considered for cardiac surgery.

Management, according to the Effective Regurgitant Orifice (ERO).

Values in parentheses are survival rates at five years.

failure, or new atrial fibrillation. Values in parentheses are survival rates at five years.

Enriquez-Sarano M et al. Quantitative determinants of the outcome of asymptomatic mitral regurgitation. N Engl J Med 2005;352:875-83.



European Heart Journal

Journal of the European Society of Cardiology

Impact of ageing on presentation and outcome of mitral regurgitation due to flail leaflet: a multicentre international study

Jean-François Avierinos^{1*}, Christophe Tribouilloy², Francesco Grigioni³, Rakesh Suri⁴, Andrea Barbieri⁵, Hector I. Michelena⁴, Teresa Ionico³, Dan Rusinaru², Sébastien Ansaldi¹, Gilbert Habib¹, Catherine Szymanski², Roch Giorgi⁶, Douglas W. Mahoney⁴, and Maurice Enriquez-Sarano⁴.



- ***Both older and younger patients*** incurred excess risk of complications.
- Older patients suffered excess mortality, AF, and HF, whereas younger incurred excess morbidity linked to subsequent long-term excess mortality.
- ***The excess risks of uncorrected degenerative MR should be considered in deliberating surgical management, which significantly reduced mortality in older patients and HF in younger patients.***

Avierinos JF et al. Impact of ageing on presentation and outcome of mitral regurgitation due to flail leaflet: a multicentre international study. *Eur Heart J.* 2013;34:2600-9.



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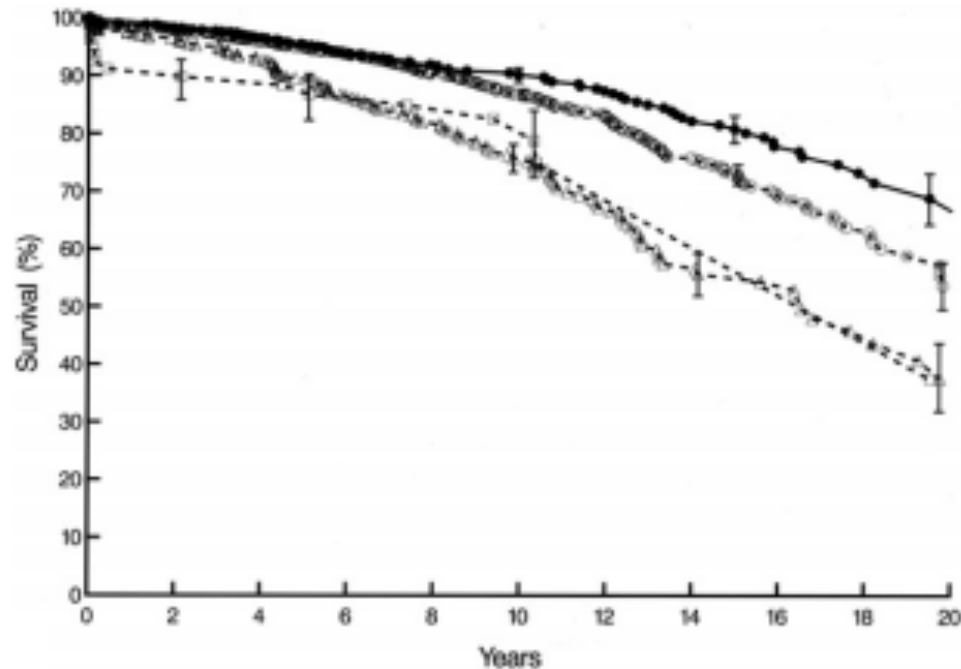
THE ANNALS OF THORACIC SURGERY

*Official Journal of The Society of Thoracic Surgeons
and the Southern Thoracic Surgical Association*

Should Patients With Severe Degenerative Mitral Regurgitation Delay Surgery Until Symptoms Develop?

A. Marc Gillinov, MD, Tomislav Mihaljevic, MD, Eugene H. Blackstone, MD,
Kristopher George, MD, Lars G. Svensson, MD, Edward R. Nowicki, MD, MS,
Joseph F. Sabik III, MD, Penny L. Houghtaling, MS, and Brian Griffin, MD

Departments of Thoracic and Cardiovascular Surgery and Cardiovascular Medicine, Heart and Vascular Institute, and Department
of Quantitative Health Sciences, Research Institute, Cleveland Clinic, Cleveland, Ohio



Survival according to New York Heart Association (NYHA) functional class. (A) Unadjusted survival. (Solid circles class I; open circles class II; triangles class III; squares class IV.) (B)

Gillinov AM et al. Should patients with severe degenerative mitral regurgitation delay surgery until symptoms develop? Ann Thorac Surg. 2010;90:481-8.



In patients with severe degenerative mitral regurgitation, the development of even mild symptoms by the time of surgical referral is associated with deleterious changes in cardiac structure and function.

Therefore, particularly because successful repair is highly likely, early surgery is justified in asymptomatic patients with degenerative disease and severe mitral regurgitation



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International Journal of Cardiology 137 (2009) 145–150

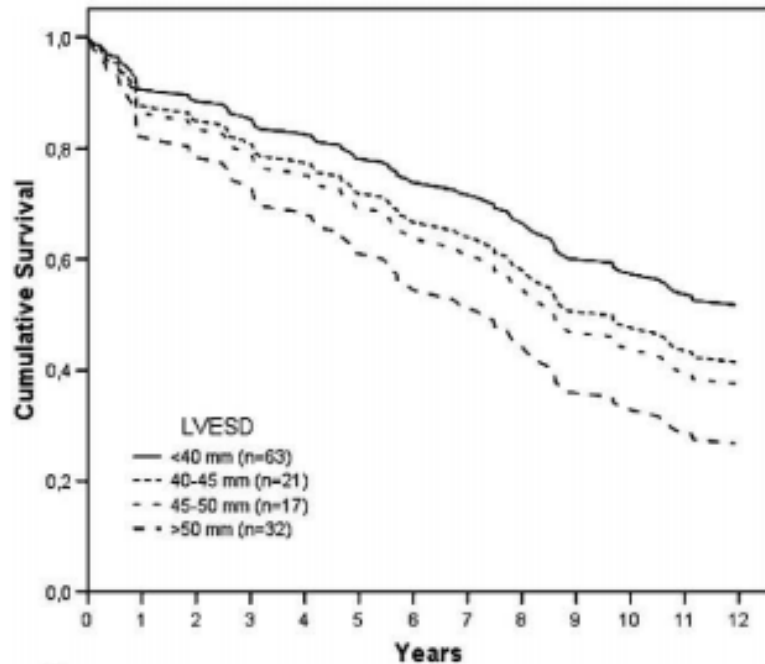
International Journal of
Cardiology

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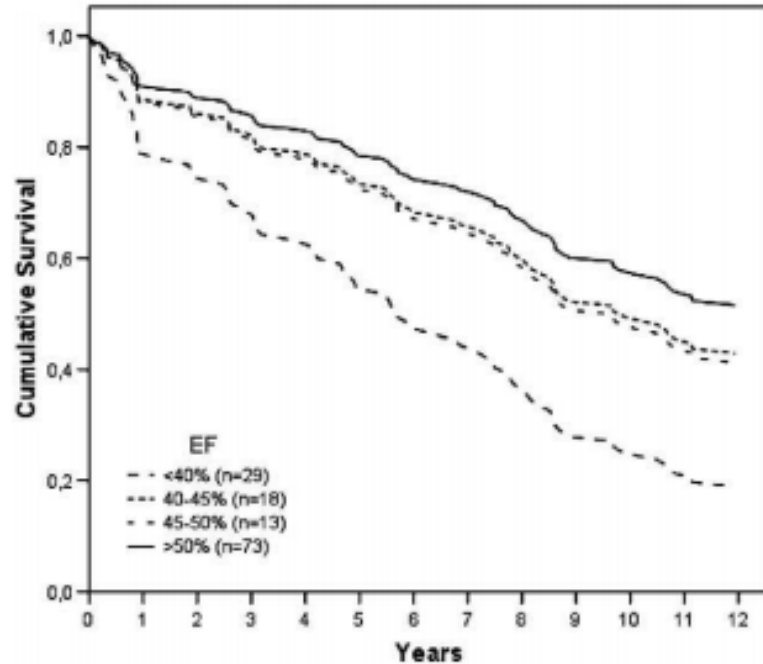
Long-term follow-up of mitral valve regurgitation—Importance of mitral valve pathology and left ventricular function on survival

Krister Lindmark ^{a,*}, Stefan Söderberg ^a, Dag Teien ^b, Ulf Näslund ^a

LVEDS



LVEF



Independently from MR degree. Age and sex adjusted survival.

Lindmark K et al. Long-term follow-up of mitral valve regurgitation - importance of mitral valve pathology and left ventricular function on survival. Int J Cardiol. 2009; 137:145-50.

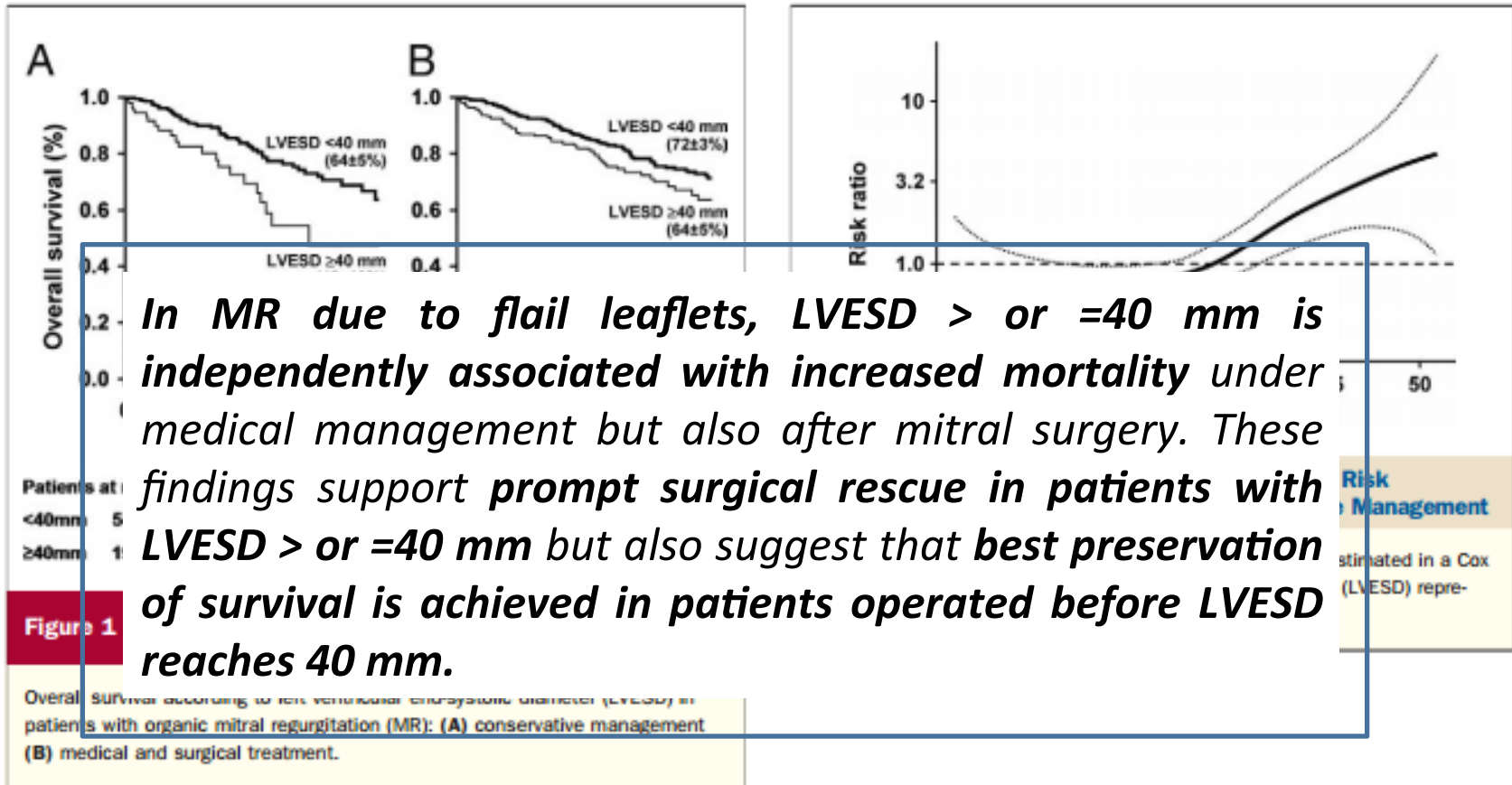


Survival Implication of Left Ventricular End-Systolic Diameter in Mitral Regurgitation Due to Flail Leaflets

A Long-Term Follow-Up Multicenter Study

Christophe Tribouilloy, MD, PhD,* Francesco Grigioni, MD, PhD,† Jean François Avierinos, MD,‡
Andrea Barbieri, MD,§ Dan Rusinaru, MD,* Catherine Szymanski, MD,* Marinella Ferlito, MD,†
Laurence Tahanelli, MD,‡ Francesca Bursi, MD,§ Faouzi Trojette, MD,* Angelo Branzi, MD,†
Gilbert Habib, MD,‡ Maria G. Modena, MD,§ Maurice Enriquez-Sarano, MD,||
on behalf of the MIDA Investigators

Amiens and Marseille, France; Bologna and Modena, Italy; and Rochester, Minnesota



Tribouilloy C et al. MIDA Investigators. Survival implication of left ventricular end-systolic diameter in mitral regurgitation due to flail leaflets a long-term follow-up multicenter study. *J Am Coll Cardiol.* 2009;54:1961-8.



European Heart Journal (2011) **32**, 751–759
doi:10.1093/eurheartj/ehq294

CLINICAL RESEARCH

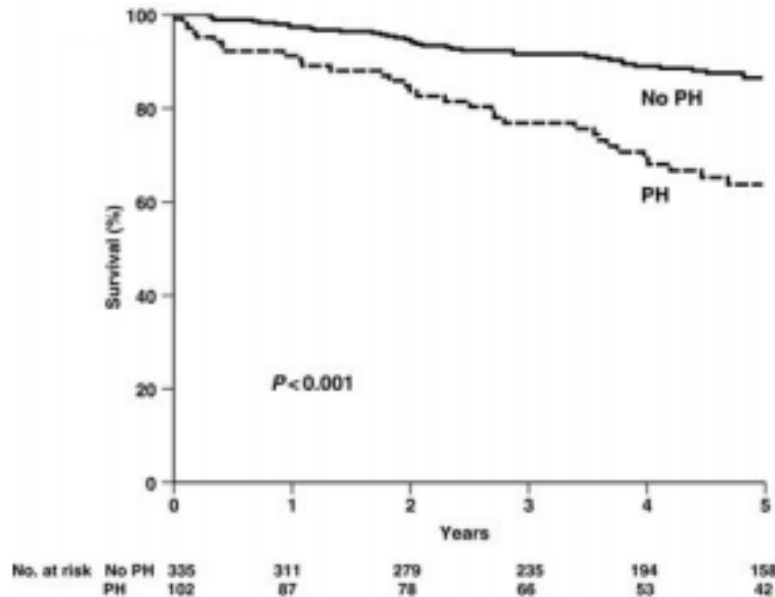
Pulmonary circulation

Prognostic and therapeutic implications of pulmonary hypertension complicating degenerative mitral regurgitation due to flail leaflet: A Multicenter Long-term International Study

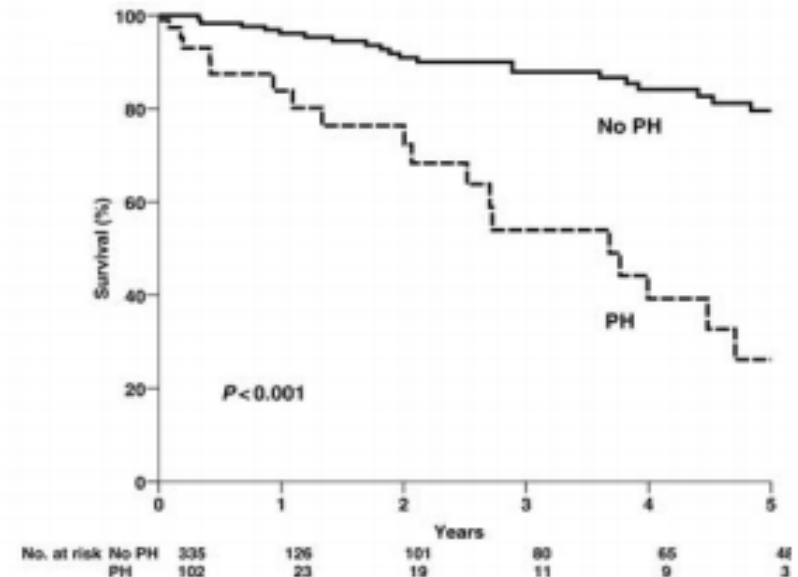
Andrea Barbieri¹, Francesca Bursi¹, Francesco Grigioni², Christophe Tribouilloy³, Jean Francois Avierinos⁴, Hector I. Michelena⁵, Dan Rusinaru³, Catherine Szymansky³, Antonio Russo², Rakesh Suri⁵, Maria Letizia Bacchi Reggiani², Angelo Branzi², Maria Grazia Modena¹, and Maurice Enriquez-Sarano^{5*}, on behalf of the Mitral Regurgitation International DAtabase (MIDA) Investigators



Medical + Surgical therapy



Conservative management



Survival curves according to a cut-off value of pulmonary artery systolic pressure > 50 mmHg in patients with mitral regurgitation due to flail leaflet.

Barbieri A et al.; MIDA Investigators. Prognostic and therapeutic implications of pulmonary hypertension complicating degenerative mitral regurgitation due to flail leaflet: a multicenter long-term international study. Eur Heart J. 2011;32:751-9.



Pulmonary hypertension is a frequent complication of significant MR due to flail leaflet and is associated with major outcome implications, approximately doubling the risk of death and heart failure after diagnosis.

Mitral valve surgery performed during follow-up is beneficial but does not completely abolish the adverse effects of PH once it is established and is particularly beneficial in patients without PH. These data support relieving PH secondary to MR due to flail leaflet, but also careful consideration for mitral surgery before PH is established.

Barbieri A et al.; MIDA Investigators. Prognostic and therapeutic implications of pulmonary hypertension complicating degenerative mitral regurgitation due to flail leaflet: a multicenter long-term international study. Eur Heart J. 2011;32:751-9.



Circulation



CONTROVERSIES IN CARDIOVASCULAR MEDICINE



Is early surgery recommended for mitral regurgitation?

Early Surgery Is Recommended for Mitral Regurgitation

Maurice Enriquez-Sarano, MD; Thoralf M. Sundt III, MD



1. In Patients With Organic MR, Surgery Is Almost Unavoidable

With an average of $\approx 20\%$ per year, 10 years after diagnosis, 90% of patients either are dead or have undergone surgery. Thus, only a small fraction of patients may remain alive and not operated on long

term Patients With Organic MR, Surgery Is Almost Unavoidable

With an average of $\approx 20\%$ per year  ***, 10 years after diagnosis, 90% of***

heads, the question in both young or older patients is not “if” but “when” surgery should be performed

*Enriquez-Sarano M1, Sundt TM 3rd. Early surgery is recommended
regurgitation*

for mitral



2. Class I Indications of Mitral Surgery Are Associated With Outcome Consequences

Class I indications for isolated organic MR are for symptomatic patients or those with an ejection fraction (EF) $\leq 60\%$ or LV end-systolic dimension ≥ 40 mm.

Although it is satisfying to relieve symptoms by surgery, this approach implies considerable risk with markedly higher operative and late postoperative mortality, resulting overall in an 80% increase in mortality after surgery compared with those with no or minimal symptoms

Enriquez-Sarano M1, Sundt TM 3rd. Early surgery is recommended for mitral regurgitation. *Circulation* 2004;110:1123-1130.

TM 3rd.

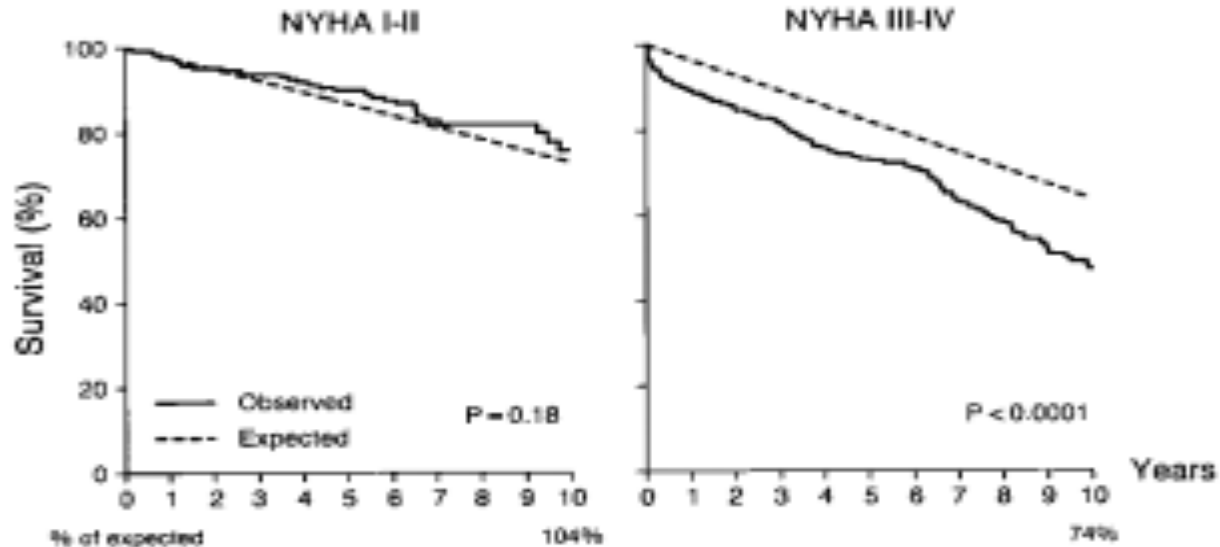


Figure 2. Comparison of observed with expected survival after surgery of patients in NYHA class I/II (left) and in class III/IV (right). Numbers at bottom indicate percentage of expected survival achieved. Note that for patients in class I/II before surgery, postoperative survival is not different from expected survival (73% at 10 years), whereas it is lower than expected survival (64% at 10 years) in patients in class III/IV before surgery.



No studies in the modern era have shown significant survival benefit for patients undergoing surgery for asymptomatic severe MR if they have good left ventricular (LV) function.

The ***progression rate to surgery*** on developing symptoms is ***10% per year*** in these patients.

Ling et al. reported a ***63% incidence of congestive heart failure*** and ***30% incidence of chronic atrial fibrillation (AF) at 10 years for conservative treatment***, during which period ***90% either underwent surgery or died***. In addition, one study of 478 patients with good LV operated on in the 1980s showed ***a 76% 10-year survival in patients who were NYHA I/II but only a 48% 10-year survival in patients with NYHA III/IV*** although this group was older and had more AF.

Early surgery has very good peri- and postoperative survival rates, and the American Heart Association currently recommend that these patients may be operated on if the chance of repair is about 90%.



3. Restorative Surgery Is Possible in Most Patients With Organic MR in Western Countries

Repair is **highly feasible** regardless of age because most organic MR in the Western world is **degenerative with mitral valve prolapse (type 2 of Carpentier)**. Valve repair is now associated with minimal operative mortality (close to 0%) in the context of early surgery.

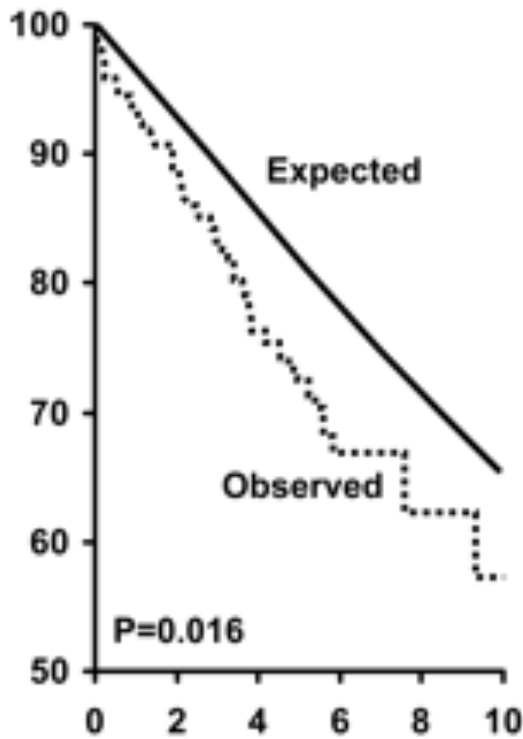
Valve repair also provides **survival superior to valve replacement** regardless of the type of prolapse (anterior versus posterior prolapse), **preserves the normal valvular-ventricular interaction** and results in **better LV function**, is associated with **less postoperative heart failure**, and after the initial $\approx 1.5\%$ stroke risk of

3. Restorative Surgery Is Possible in Most Patients With Organic MR in Western Countries

Sundt TM 3rd. Early surgery is recommended for mitral regurgitation. Circulation 2010;121:804-11; discussion 812.

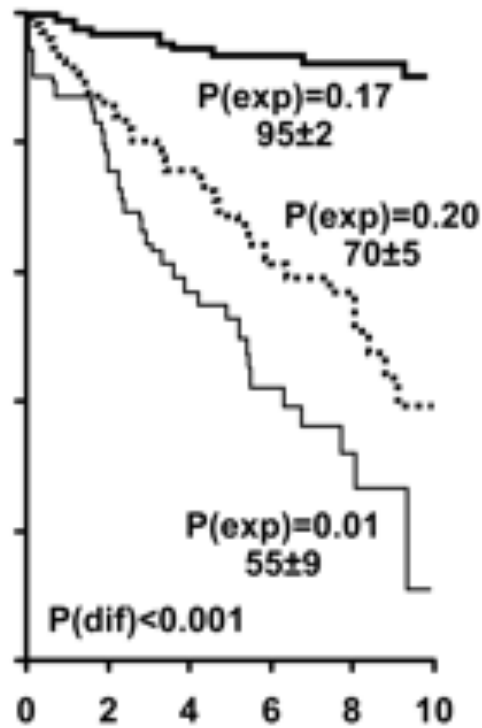


A MR Due to Flail Leaflets



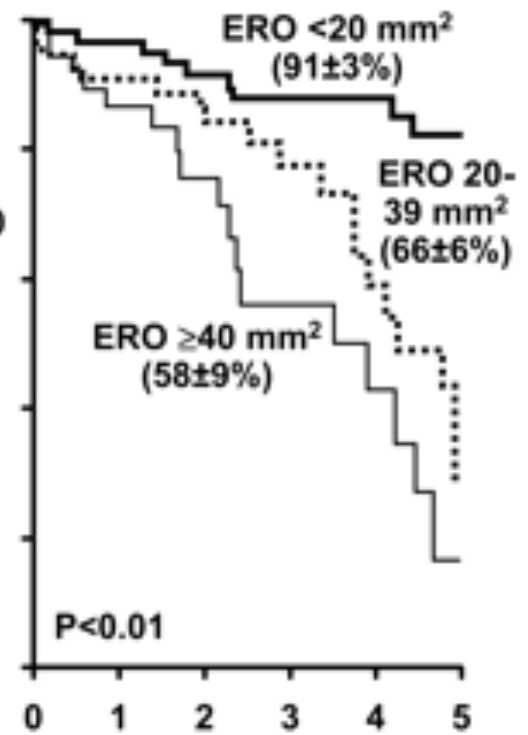
N Eng J Med 335:1417, 1996

B Asymptomatic MVP

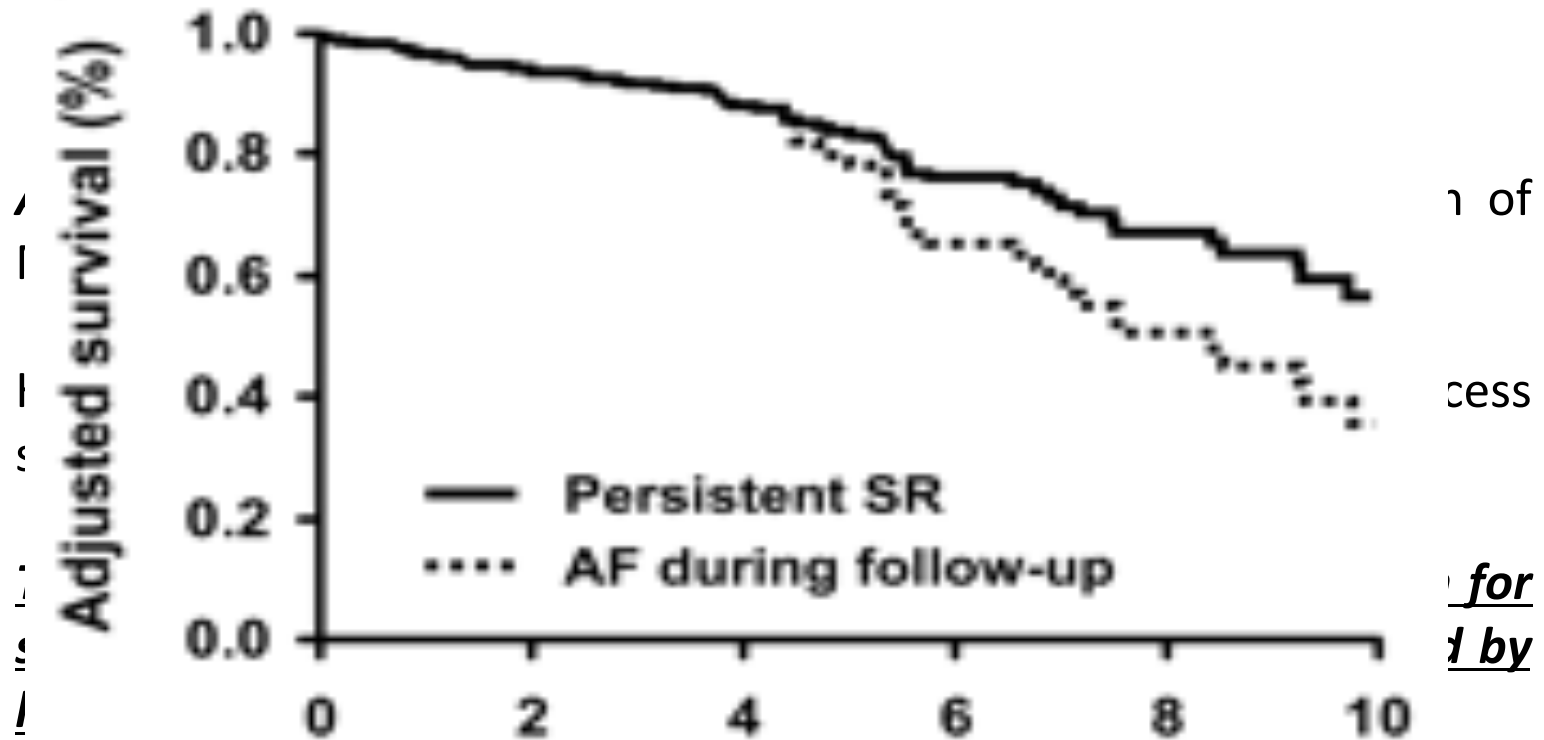


Circulation 106:1355, 2002

C Asymptomatic Quantified MR



N Eng J Med 352:875, 2005



J Am Coll Cardio 40:84, 2002

Enriquez S, Frano A, Rios J, et al. Early surgical therapy is associated with a lower risk of death and hospitalization in patients with atrial fibrillation. J Am Coll Cardiol. 2010; 55: 1218-24. doi:10.1016/j.jacc.2010.04.012

Enriquez S, Frano A, Rios J, et al. Early surgical therapy is associated with a lower risk of death and hospitalization in patients with atrial fibrillation. J Am Coll Cardiol. 2002; 40: 84-92



5. No Alternative Treatment of Organic MR Is Established

Medical treatment with **angiotensin blockade** has some promise in stabilizing organic MR, and **β -blockade** has an interesting experimental suggestion of ventricular protection, but **these currently are not alternatives to surgery.**

Enriquez-Sarano M, Sundt TM 3rd. Early surgery is recommended for mitral regurgitation. Circulation 2010;121:804-11; discussion 812.



Conclusions

Patients with organic MR with ***no symptoms and with an EF $\leq 60\%$*** should be considered for early surgery ***if the valve is reparable*** in the presence of strong predictors such as an ***$ERO \geq 40 \text{ mm}^2$*** or ***atrial fibrillation (even paroxysmal)*** resulting from MR.

advanced repair center. Such centers should provide ***operative risk of $\leq 1\%$*** , should have ***high repair rates ($\geq 85\%$ to 90%) and high durability of repair ($\leq 10\%$ reoperation rates 10 years after surgery)***, and should be guided by ***high-quality echocardiography preoperatively, intraoperatively, and postoperatively***.

Enriquez-Sarano M, Sundt TM 3rd. Early surgery is recommended for mitral regurgitation. *Circulation* 2010;121:804-11; discussion 812.



ESC Working Group on Valvular Heart Disease Position Paper—heart valve clinics: organization, structure, and experiences

Patrizio Lancellotti^{1,2*}, Raphael Rosenhek³, Philippe Pibarot⁴, Bernard Iung⁵,
Catherine M. Otto⁶, Pilar Tornos⁷, Erwan Donal⁸, Bernard Prendergast⁹,
Julien Magne^{1,2}, Giovanni La Canna¹⁰, Luc A. Piérard^{1,2}, and Gerald Maurer³

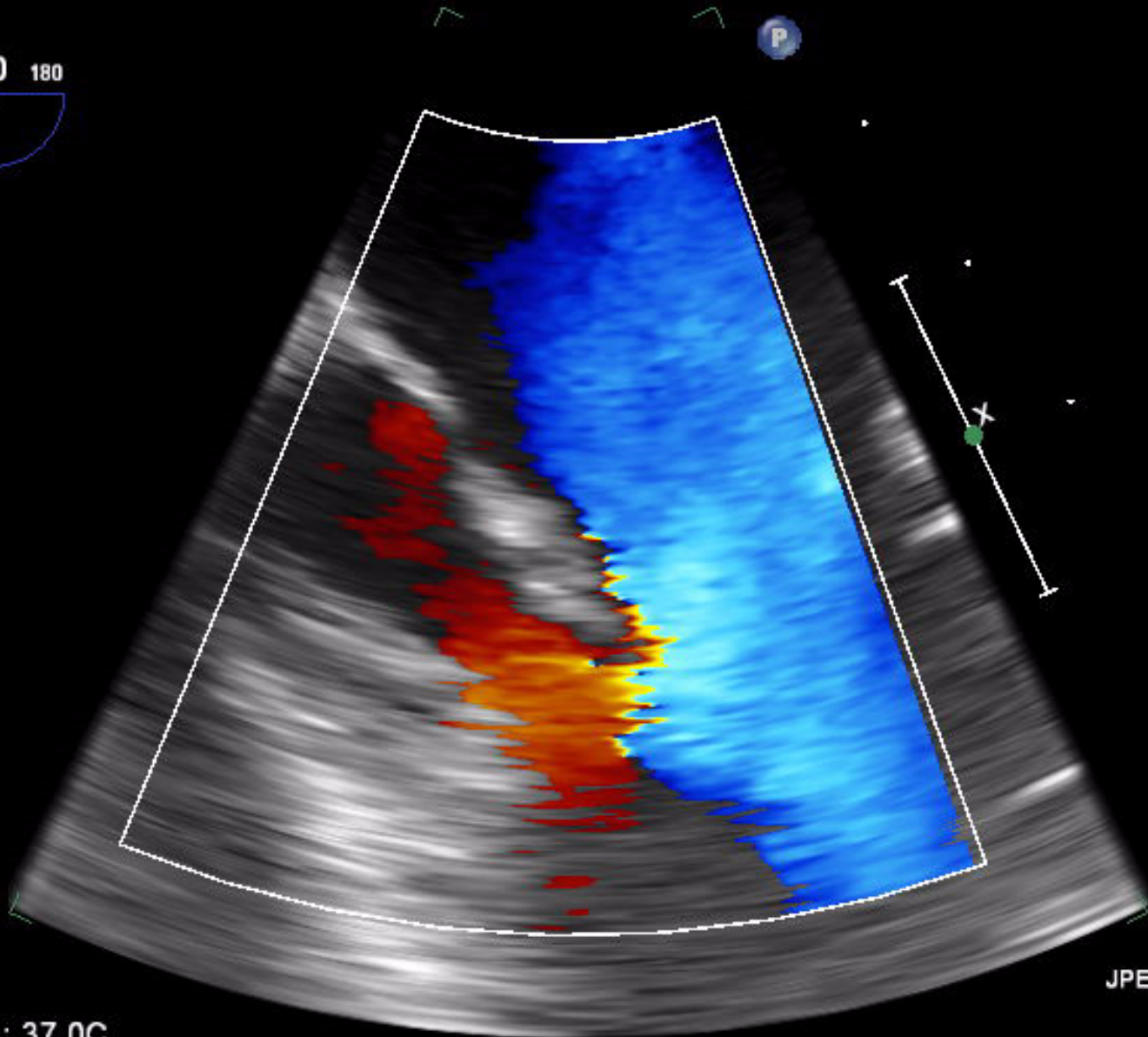
The increasing volume of patients with valvular heart disease, changing their characteristics over time and the increase of technological resources in the diagnosis and treatment of these diseases in addition to their potential poor prognosis, if not adequately treated, requires an assessment by specialists who work in clinical pathways (Heart Valve Clinic).

FR 20Hz
7.3cm

2D
80%
C 48
P Off
Gen.



CF
59%
4.4MHz
WF Alto
Med.



JPEG

Temp. PAZ.: 37.0C
Temp. TEE: 39.1C

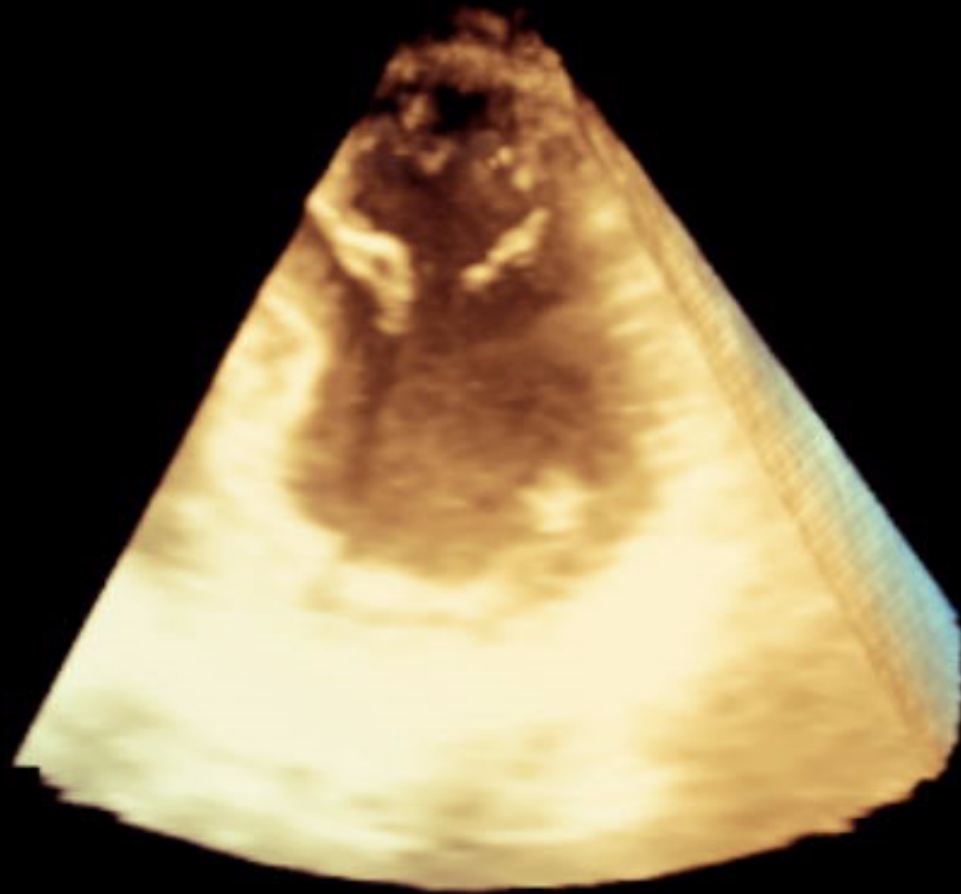
77 bpm

FR 18Hz
12cm

Battiti 3D 1

M4

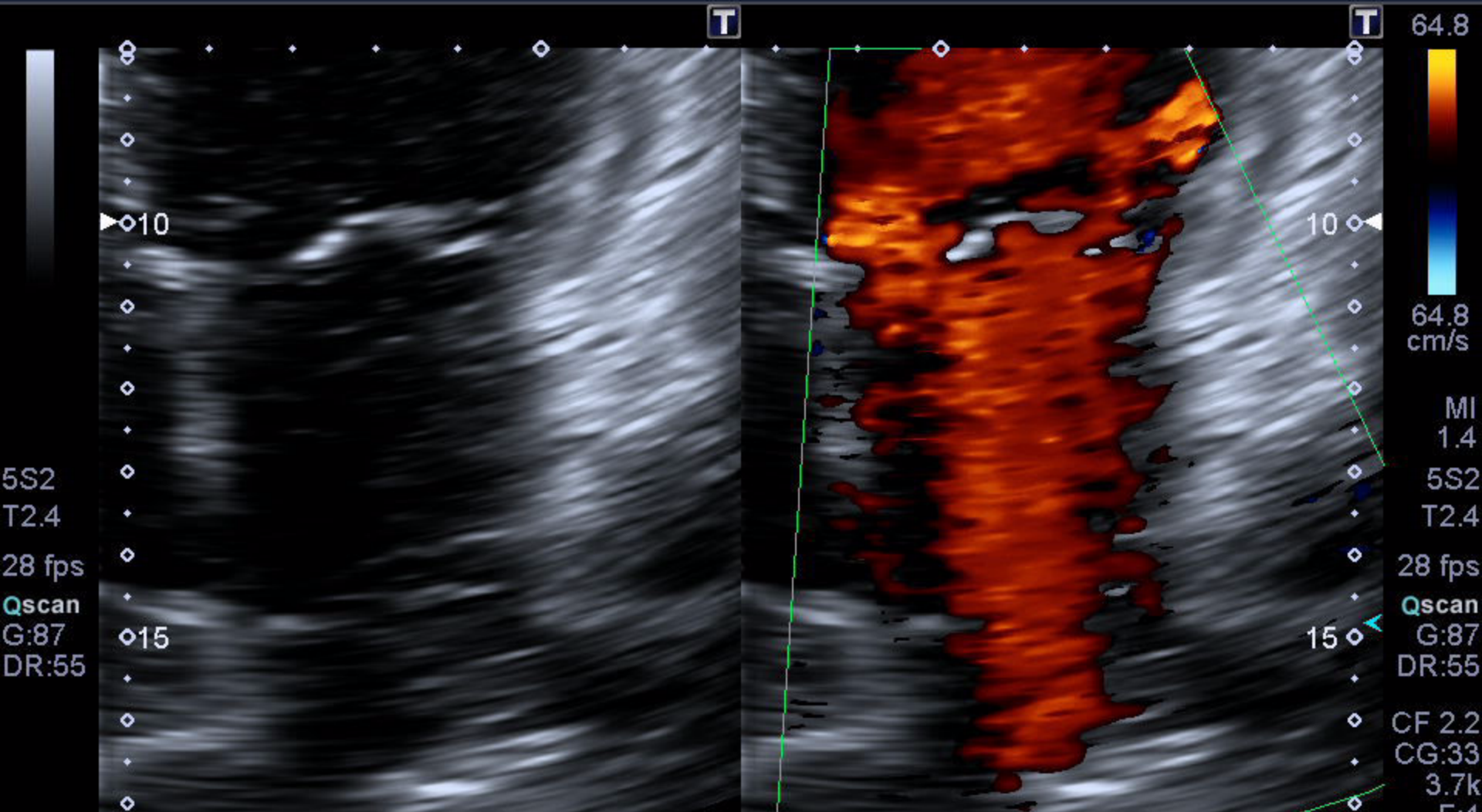
3D
3D 52%
3D 40dB



JPEG

Temp. PAZ.: 37.0C
Temp. TEE: 38.9C

77 bpm



TOSHIBA

14952535:ALLEVATO ANTONIO

14.04.2015

U.C.S.C ROMA

Heart 1

92

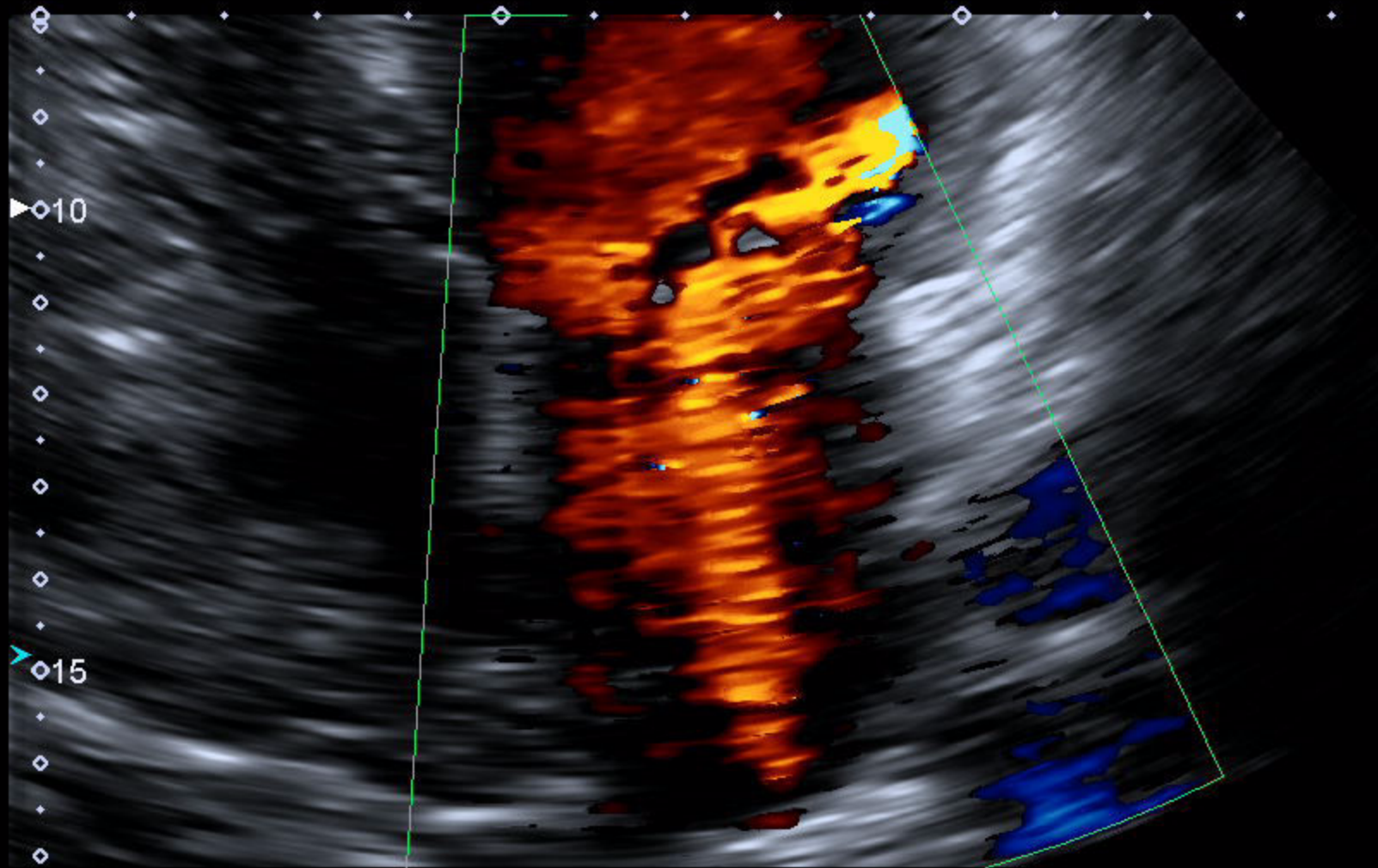
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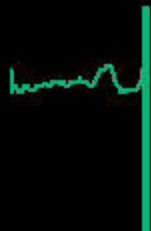
64.8



64.8
cm/s



M
1.3
5S2
T2.4
25 fps
Qscan
G:87
DR:55
CF 2.2
CG:33
3.7k
F:4



TOSHIBA

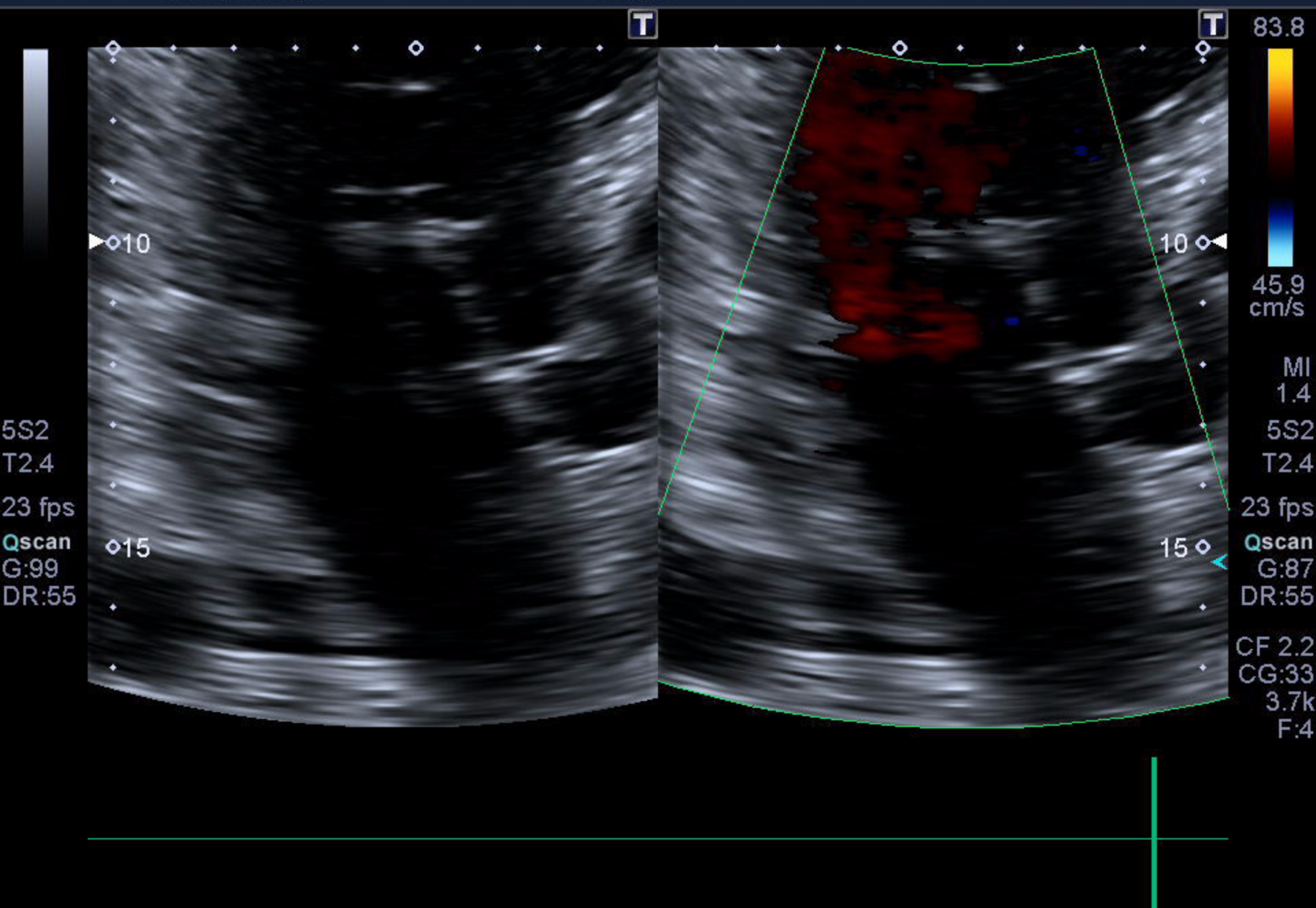
28783900: CALVANI SILVIO

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U.C.S.C ROMA

Heart 1

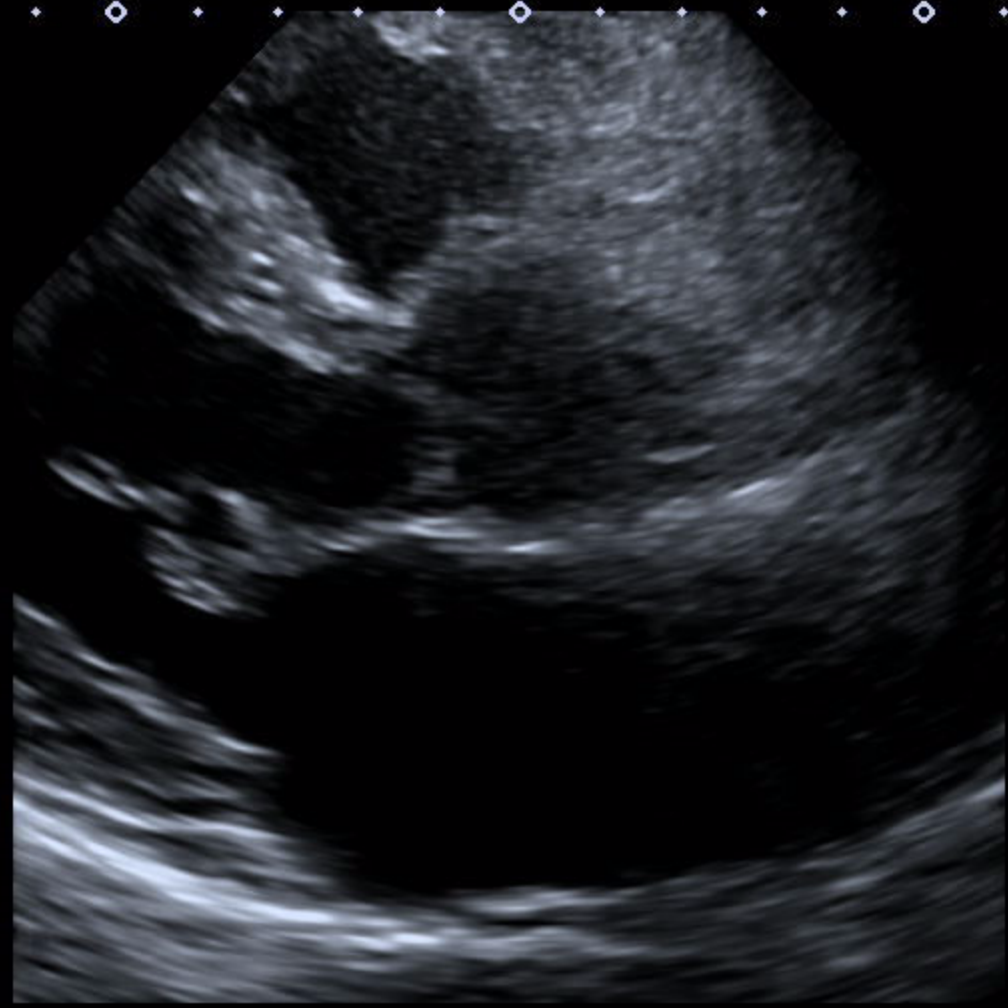
12:38:39



T

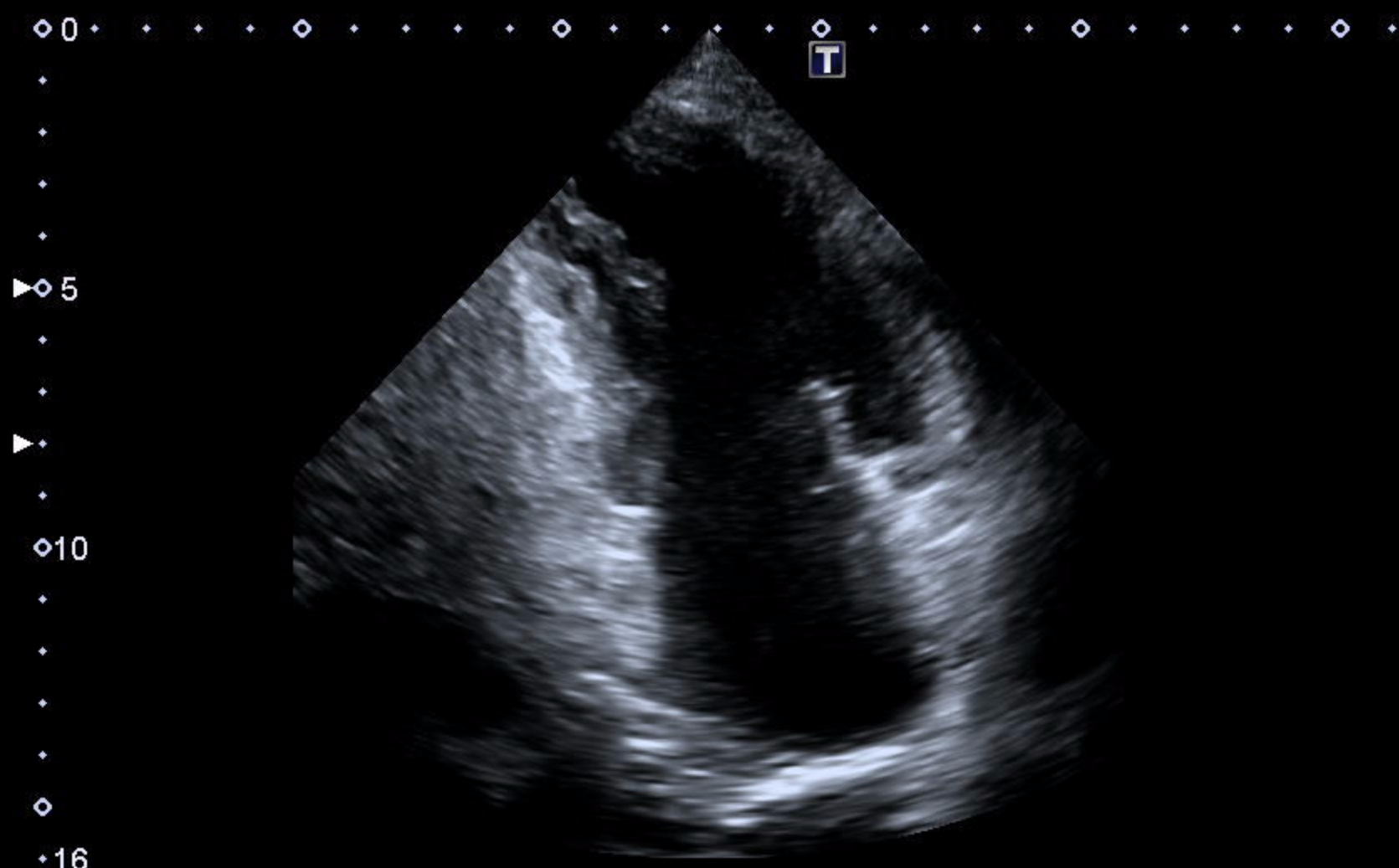


◊
◊ 5
◊
◊
◊
◊ 10
◊
◊
◊
◊ 15



M
1.3
5S2
T2.4
46 fps
Qscan
G:85
DR:55





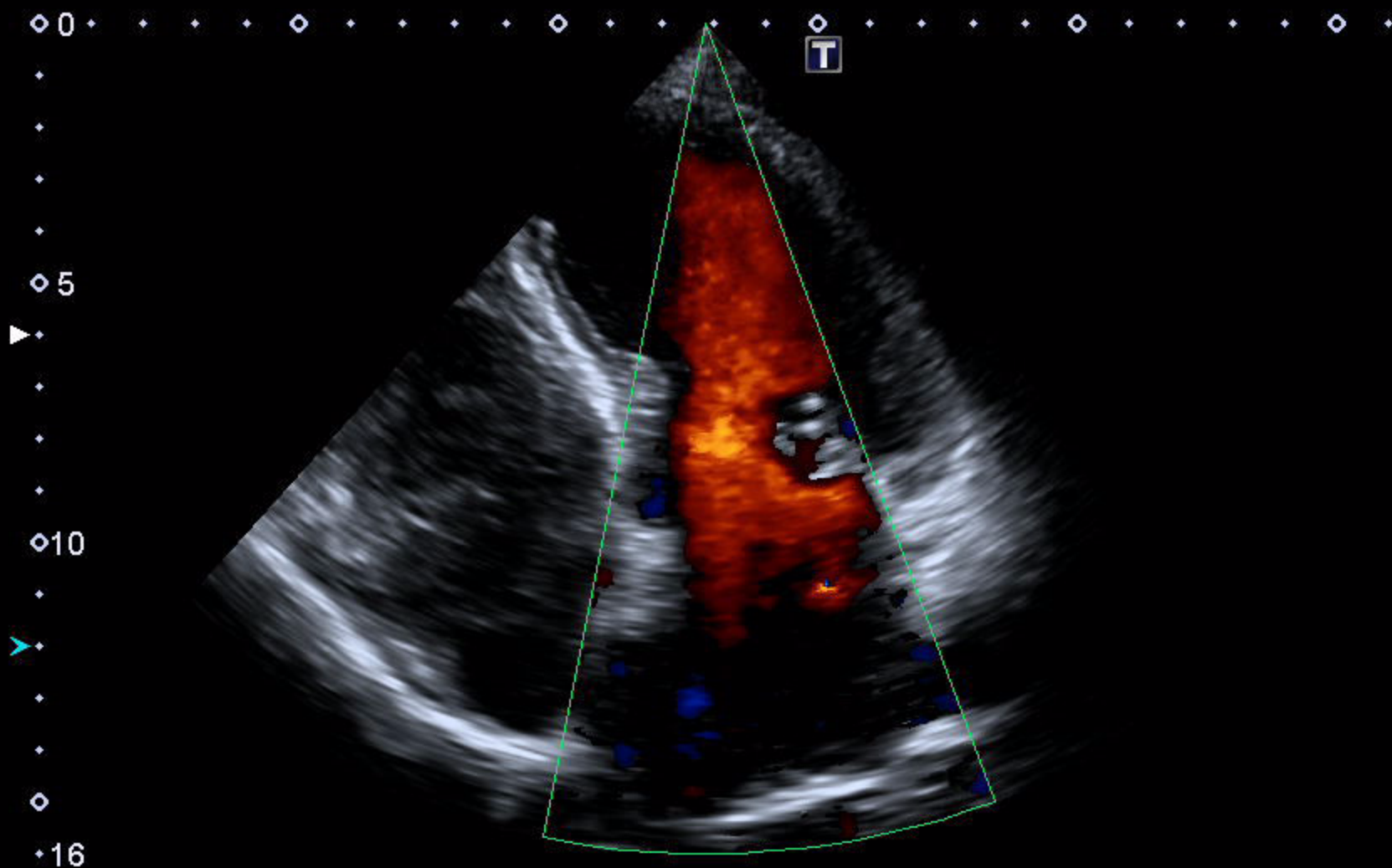
M
1.4
5S2
T2.4
46 fps
G:61
DR:55



64.8



64.8
cm/s



M
1.4
5S2
T2.4
23 fps

G:61
DR:55

CF 2.2
CG:33
3.7k
F:4

