The Forgotten Valvular Heart Disease: Rheumatic VHD

A Global Burden of Rheumatic Valve Disease

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Mitral Stenosis

- ***Mitral stenosis is a valvular heart disease characterized by the narrowing of the orifice of the mitral valve***
- **Etiology**

  - Rheumatic fever

  - Congenital

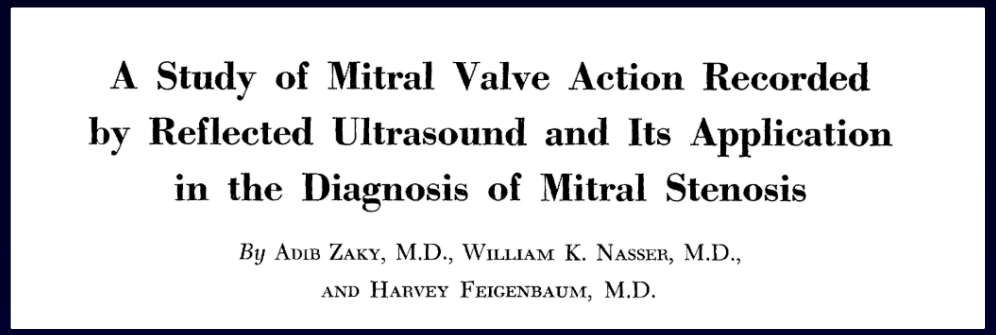
  - Infective endocarditis

  - MAC

History of Mitral Stenosis

- The First valse disease to be diagnosed with echocardiography

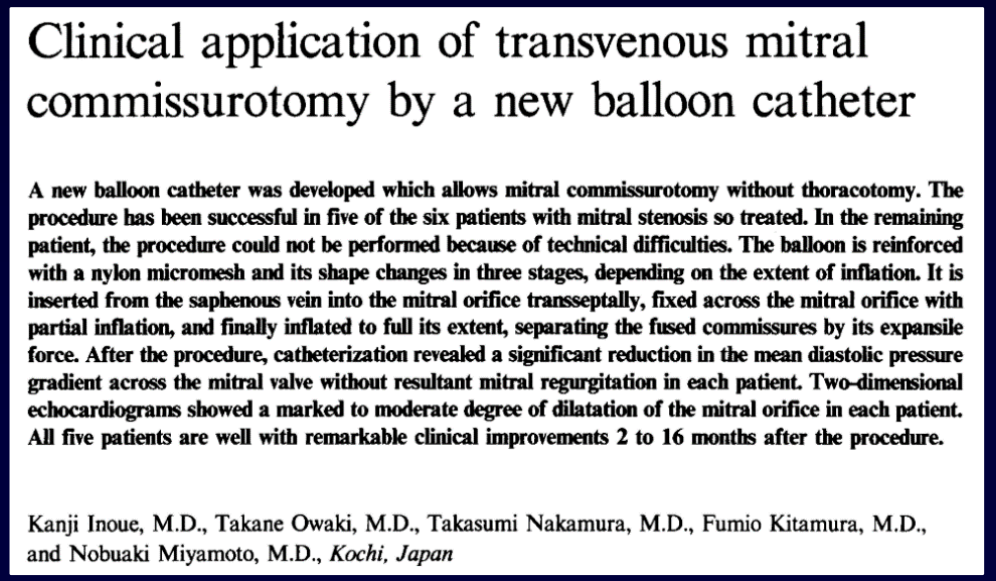
- The First valve to be successfully treated by percutaneous intervention



A Study of Mitral Valve Action Recorded by Reflected Ultrasound and Its Application in the Diagnosis of Mitral Stenosis

By Adib Zaky, M.D., William K. Nasser, M.D., and Harvey Feigenbaum, M.D.

Circulation. 1968 May;37(5):789-99.



Clinical application of transvenous mitral commissurotomy by a new balloon catheter

A new balloon catheter was developed which allows mitral commissurotomy without thoracotomy. The procedure has been successful in five of the six patients with mitral stenosis so treated. In the remaining patient, the procedure could not be performed because of technical difficulties. The balloon is reinforced with a nylon micromesh and its shape changes in three stages, depending on the extent of inflation. It is inserted from the saphenous vein into the mitral orifice transseptally, fixed across the mitral orifice with partial inflation, and finally inflated to full its extent, separating the fused commissures by its expansile force. After the procedure, catheterization revealed a significant reduction in the mean diastolic pressure gradient across the mitral valve without resultant mitral regurgitation in each patient. Two-dimensional echocardiograms showed a marked to moderate degree of dilatation of the mitral orifice in each patient. All five patients are well with remarkable clinical improvements 2 to 16 months after the procedure.

Kanji Inoue, M.D., Takane Owaki, M.D., Takasumi Nakamura, M.D., Fumio Kitamura, M.D., and Nobuaki Miyamoto, M.D., *Kochi, Japan*

J Thorac Cardiovasc Surg. 1984 Mar;87(3):394-402.

History of Mitral Stenosis

- The Korea's first open heart surgery (OMC) in Severance
- The first case of PMV was done in Severance

승모판 협착증 수술않고 치료

延大 李雄求교수팀

승모판(僧帽瓣) 협착증을 수술하지않고 치료하는 방법이 국내에서 처음으로 시도되어 성공했다。승모관은 좌심실에서 심장전혈액을 박출하는데 벨브역할을 담당하는 부위。

연세대의대 李雄求교수(심장내과)팀은 지난 4월부터 이달초까지 세브란스병원을 찾은 승모관협착증환자 5명에게 이 치료법을 실시해 모두 만족스러운 결과를 얻었다고 최근 발표했다。

이 치료방법은 미리 동맥혈관을 통해 삽입해 놓은 2개의 가는 철선을 통해 지름 1·5~2㎝의 풍선(카테터)2개를 승모관구에 정확하게 결쳐놓은 다음 풍선을 재빨리 확장시켜 협착된 판막구를 넓혀주는 것이다。

시술후 좌심방압과 좌심실압의 압력곡선을 동시에 기록하여 압력차가 개선되었는지 확인하고 좌심실조영술(造影術)을 실시해 승모관폐쇄부전증이 없어졌는지 확인한뒤 시술을 끝낸다。

그동안 시술시간이 약2시간씩 소요됐으나 앞으로는 1시간 안팎으로 단축할수있다는것。지금까지 시술결과 합병증은 전혀 발견되지 않았다。

승모관구(화살표)에 걸친 2개의 풍선을 확장시킨 모양。

09, Oct 1956 K-TV News

Natural history of MS with Medical Treatment

The clinical diagnosis of mitral stenosis was based upon the presence of a rough, rolling, or rasping diastolic or presystolic apical murmur. Patients with definite auscultatory signs of aortic valvular lesions were excluded. The material includes 261 patients with a sure clinical diagnosis and 10 patients with autopsy diagnosis.

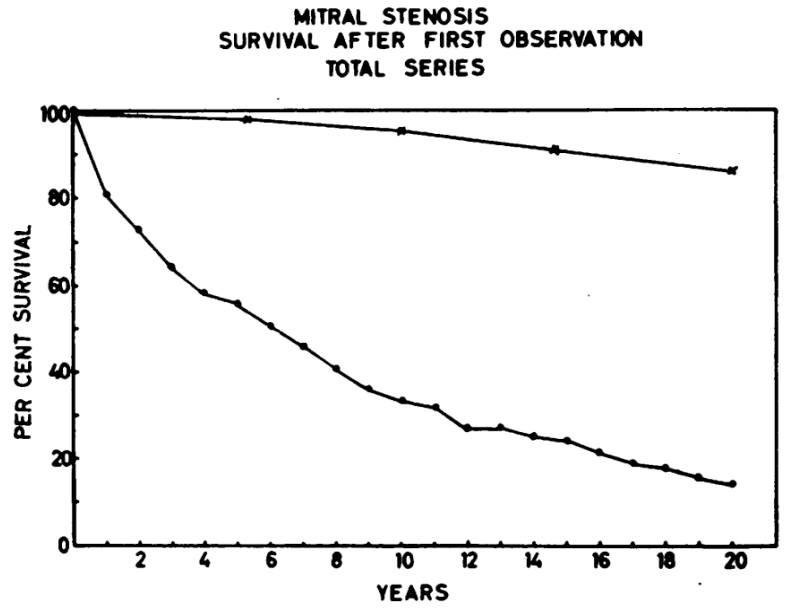


FIG. 2.—Survival of total series of mitral stenosis after first observation (lower curve) compared with the survival of the population of Denmark (upper curve).

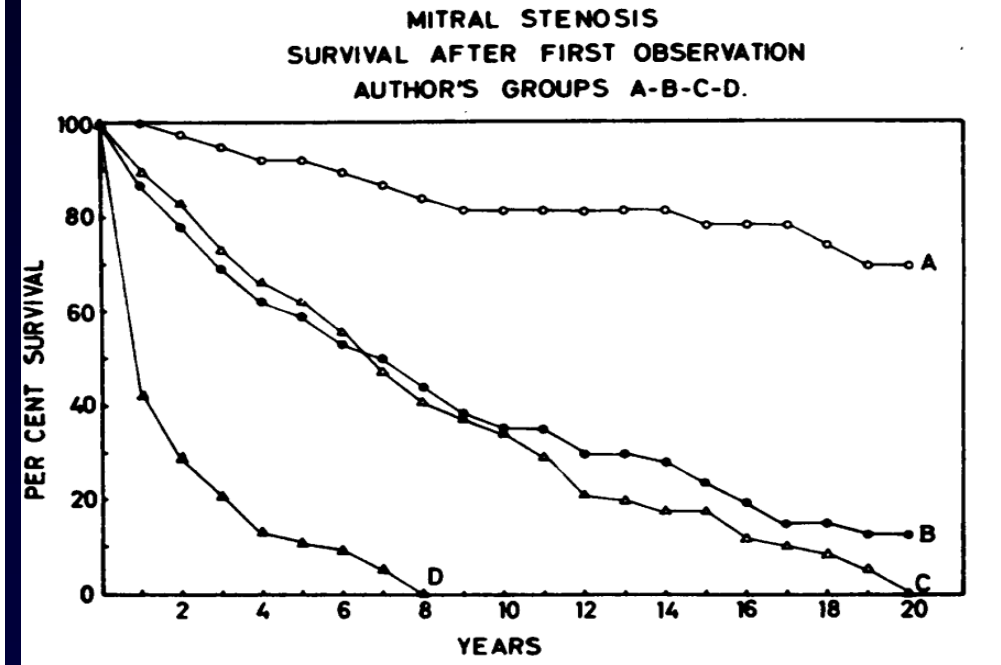
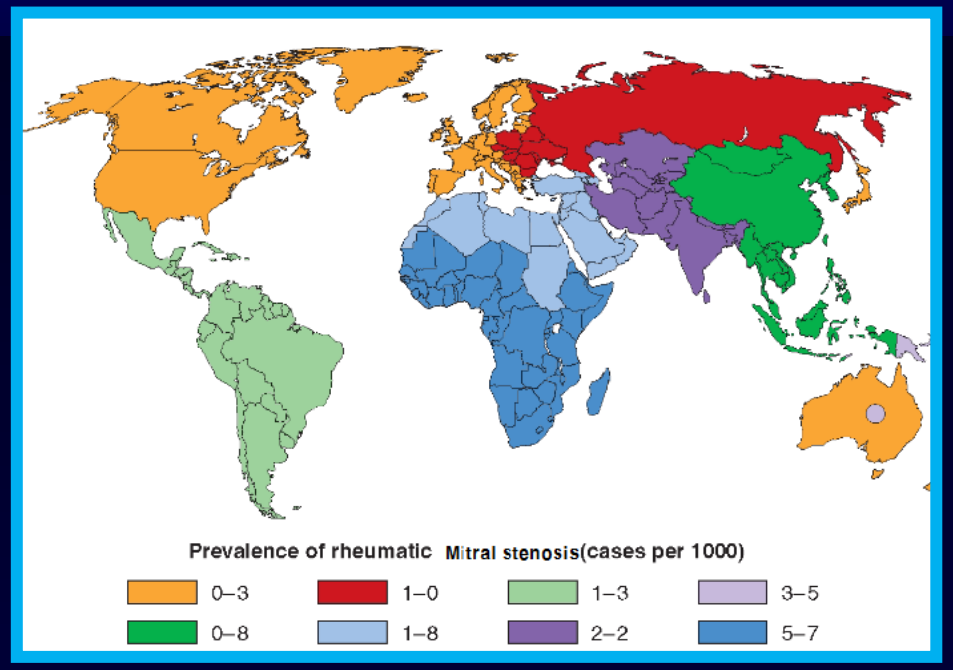


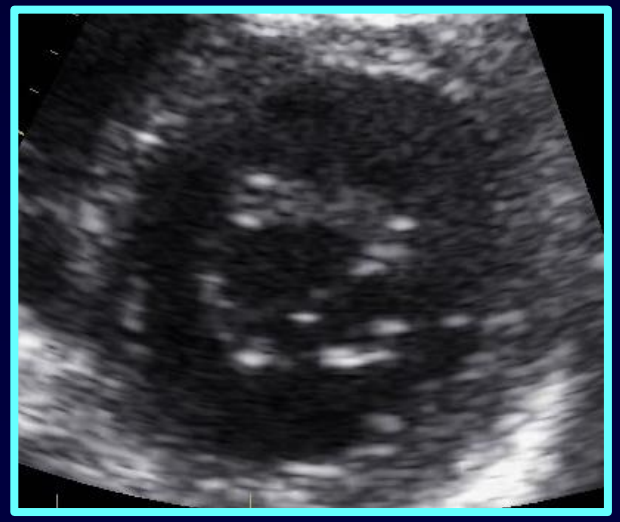
FIG. 3.—Survival after first observation according to author's classification in groups A, B, C, and D.

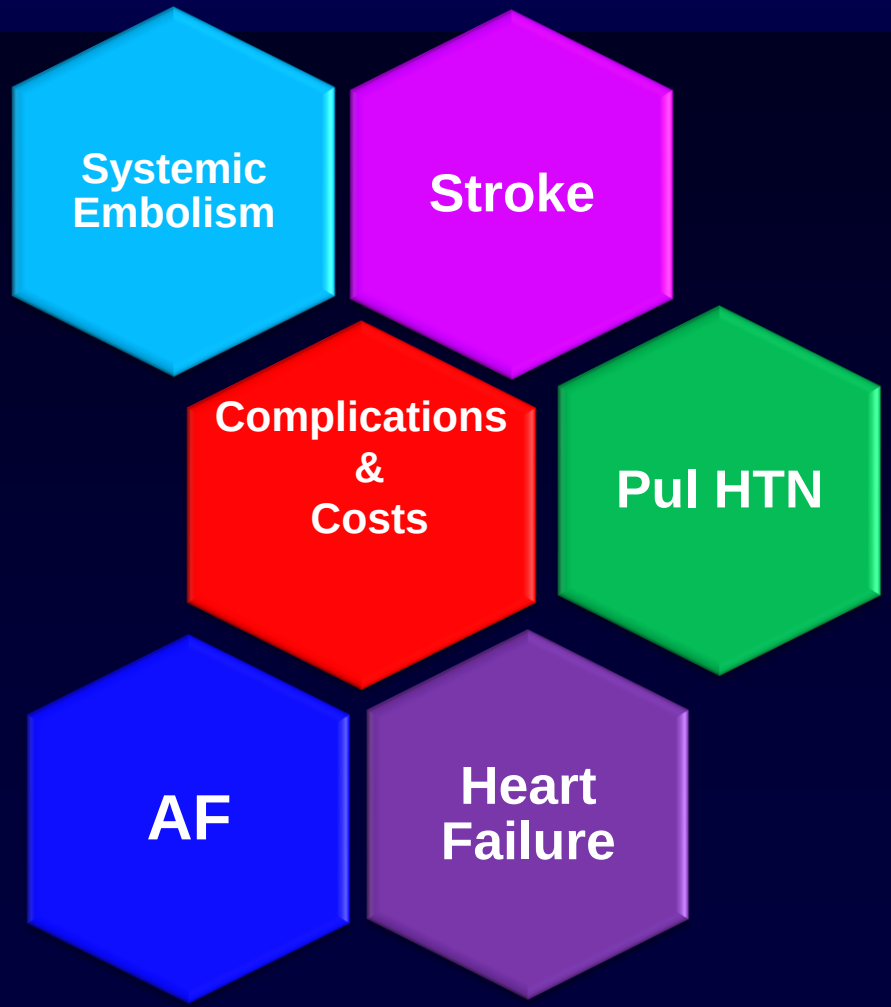
Olsen et al, Br Heart J, 1961

Group A. Patients with normal sinus rhythm belonging to Class II.
Group B. Patients with normal sinus rhythm belonging to Class III.
Group C. Patients with atrial fibrillation belonging to Class II or III.
Group D. Patients belonging to Class IV.

Prevalence of Rheumatic Mitral Stenosis







Nkomo VT et al. The Lancet. Vol. 368

Rheumatic Mitral Stenosis

WORLD HEART FEDERATION

WHO WE ARE | WHERE WE WORK | WHAT WE DO | HOW WE DO IT | SIGN THE PETITION | GET INVOLVED | NEWS & RESOURCES

Jagat Narula
President 2025-2026

AIR POLLUTION
The world's largest single environmental health risk

COVID-19
Learn about the links between COVID-19 and CVD

HEART FAILURE
64m people are affected by heart failure globally

PREVENTION
An estimated 80% of CVD is preventable

DIABETES
Diabetes affects 537 million people worldwide

HYPERTENSION
Hypertension is the number one risk factor for death globally

RHEUMATIC HEART DISEASE
RHD claims over 300,000 lives each year

HEALTHY DIET
Poor diet is a leading risk factor for CVD, diabetes and obesity

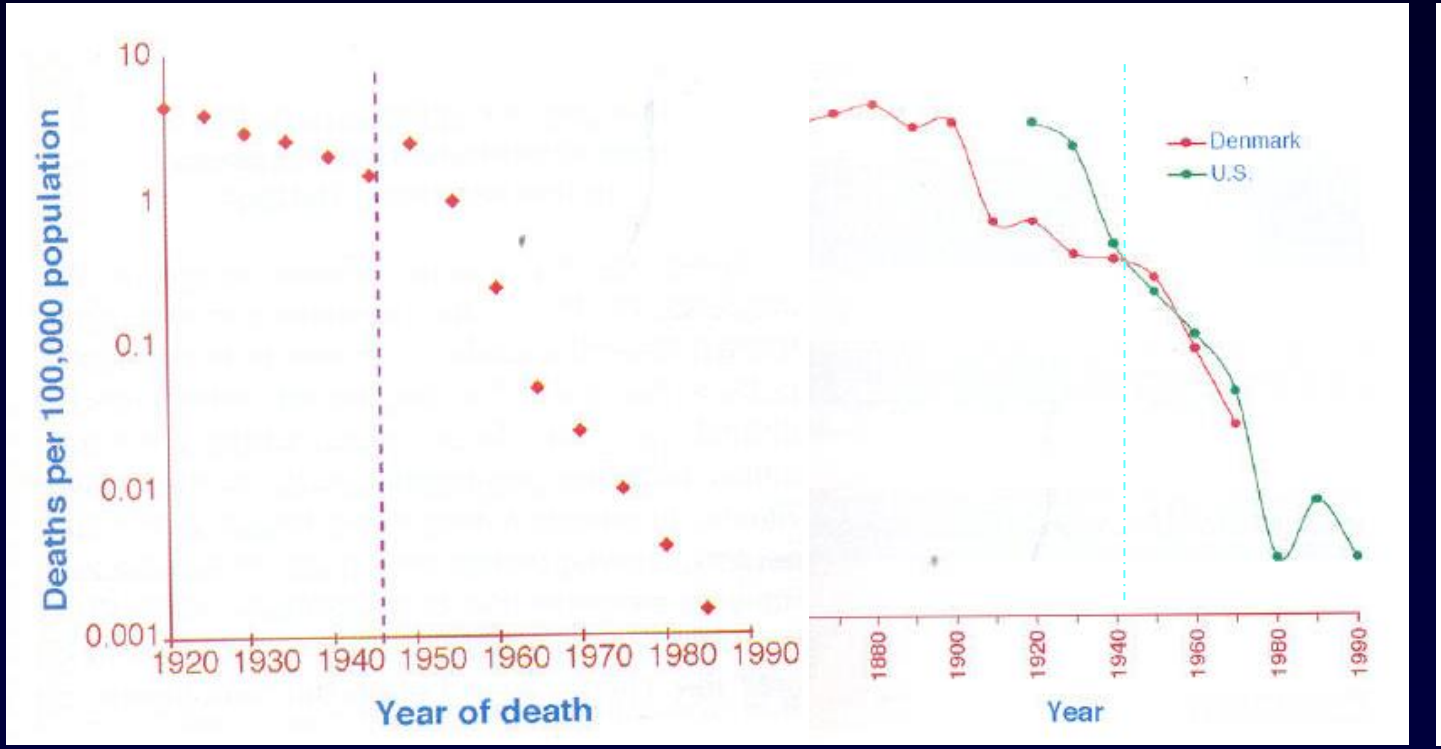
INFLUENZA
Learn about the links between influenza and CVD

TOBACCO
There are immediate health benefits to quitting tobacco

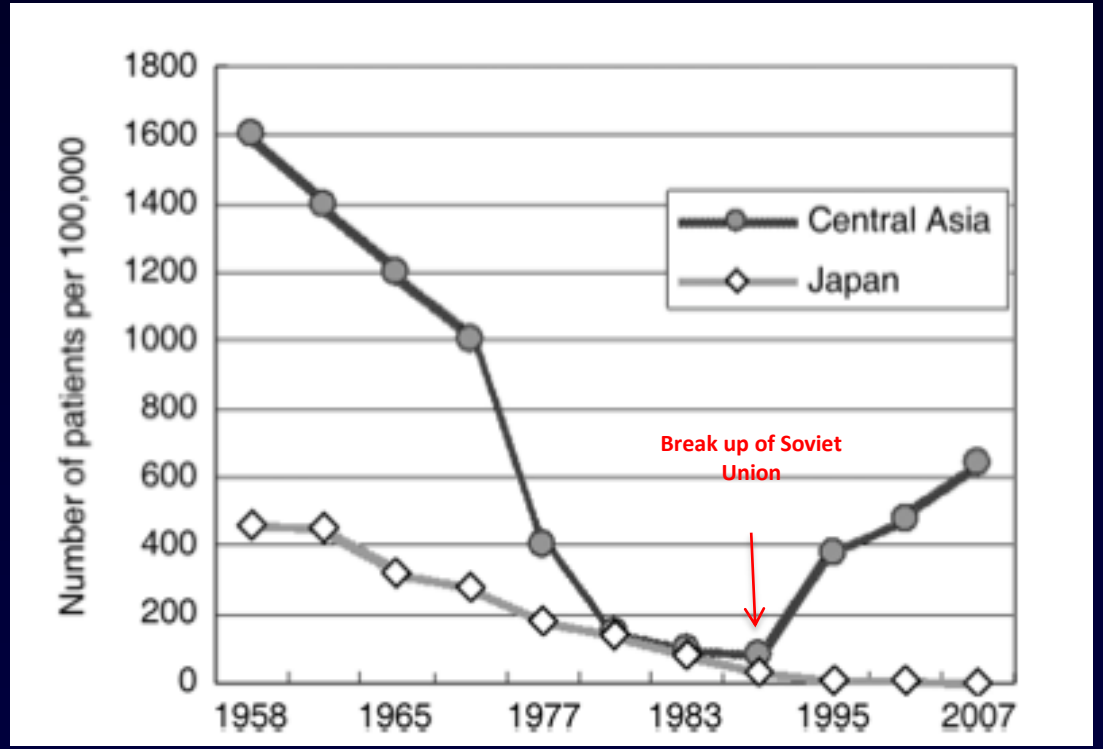
OBESITY
One of the most important public health problems facing the world today

WOMEN & CVD
Women with CVD continue to be under-diagnosed

Trends in High Income Nations



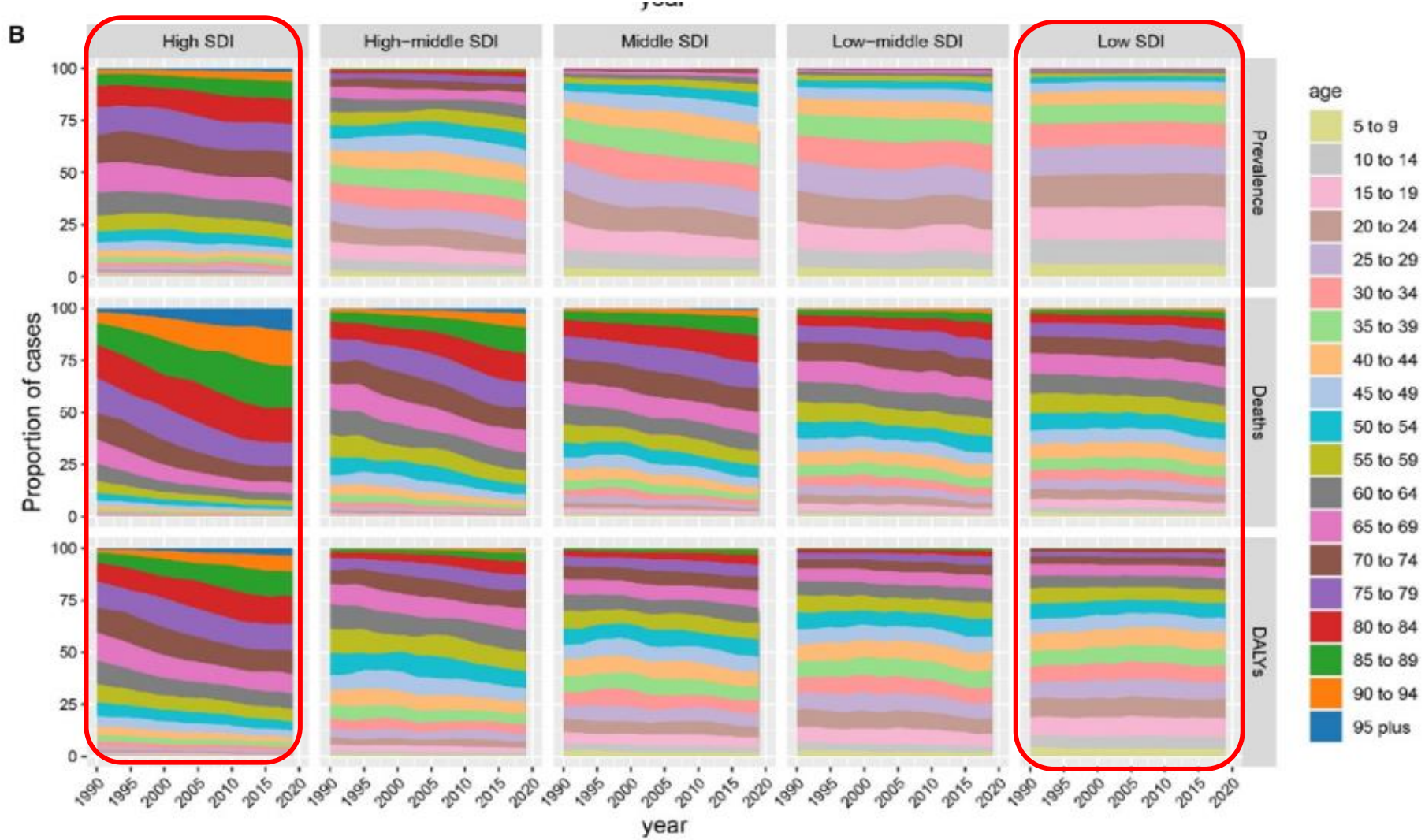
Massell, Narula. Braunwald's Atlas #2, 1995



Omurzakova et. al. Int J Rheum Dis 2009;12: 79

Temporal trend of RHD

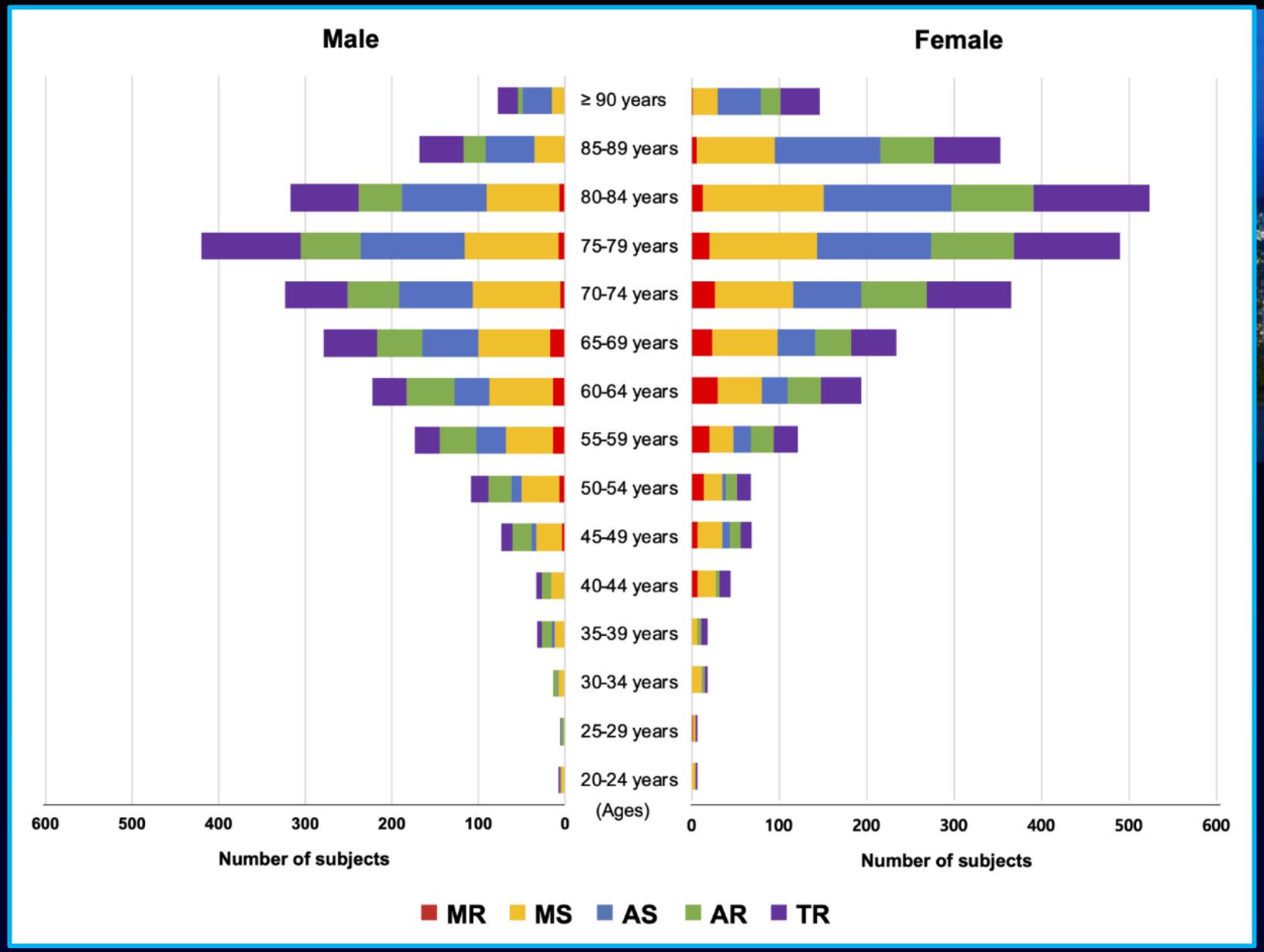
Global trend (1990 ~ 2019)

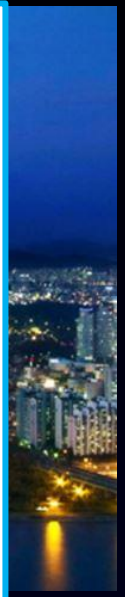


Old age ↑

RUAN, Renjie, et al. JAHA 2023

Korea





“Korean Valve Survey”

44 Medical Centers

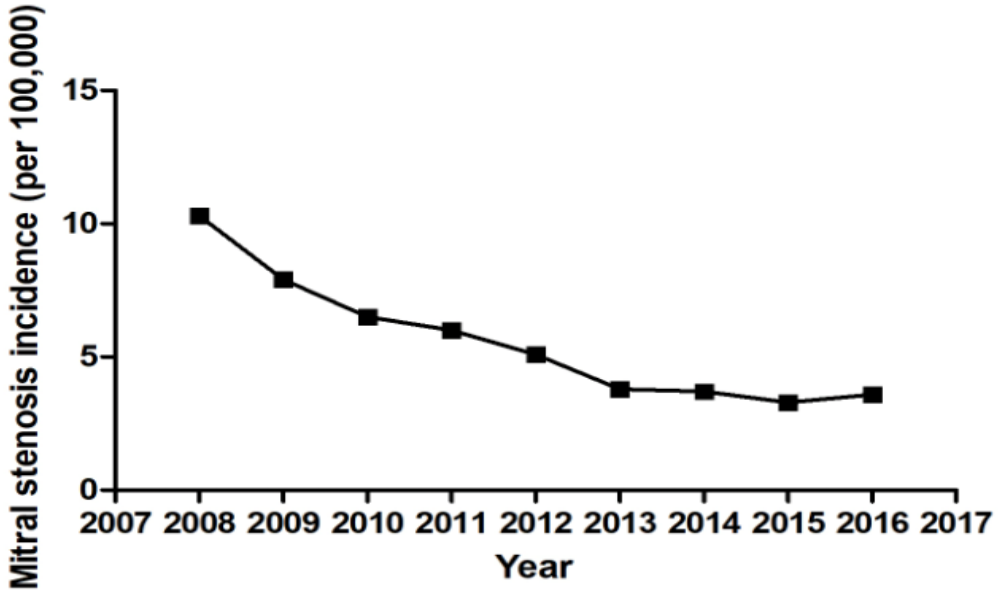
4,089 Patients with VHD in 2019

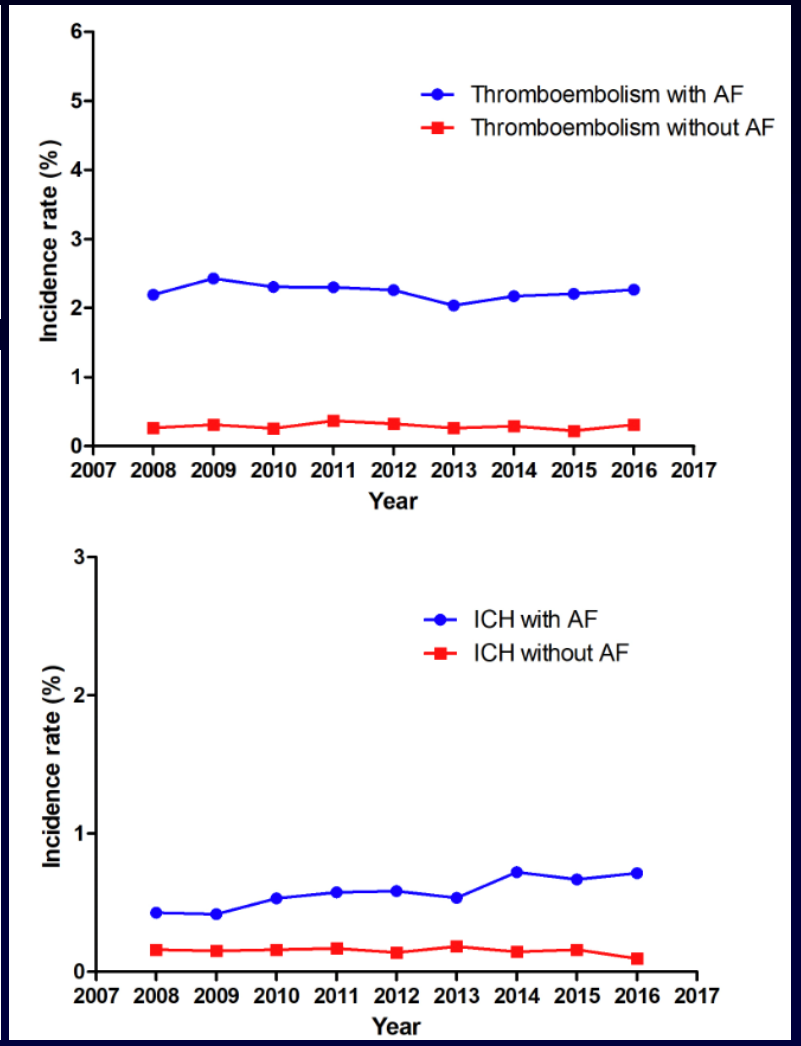
Prevalence of Mitral Stenosis – Korea

ORIGINAL RESEARCH

Ten-year trends in the incidence, treatment and outcomes of patients with mitral stenosis in Korea

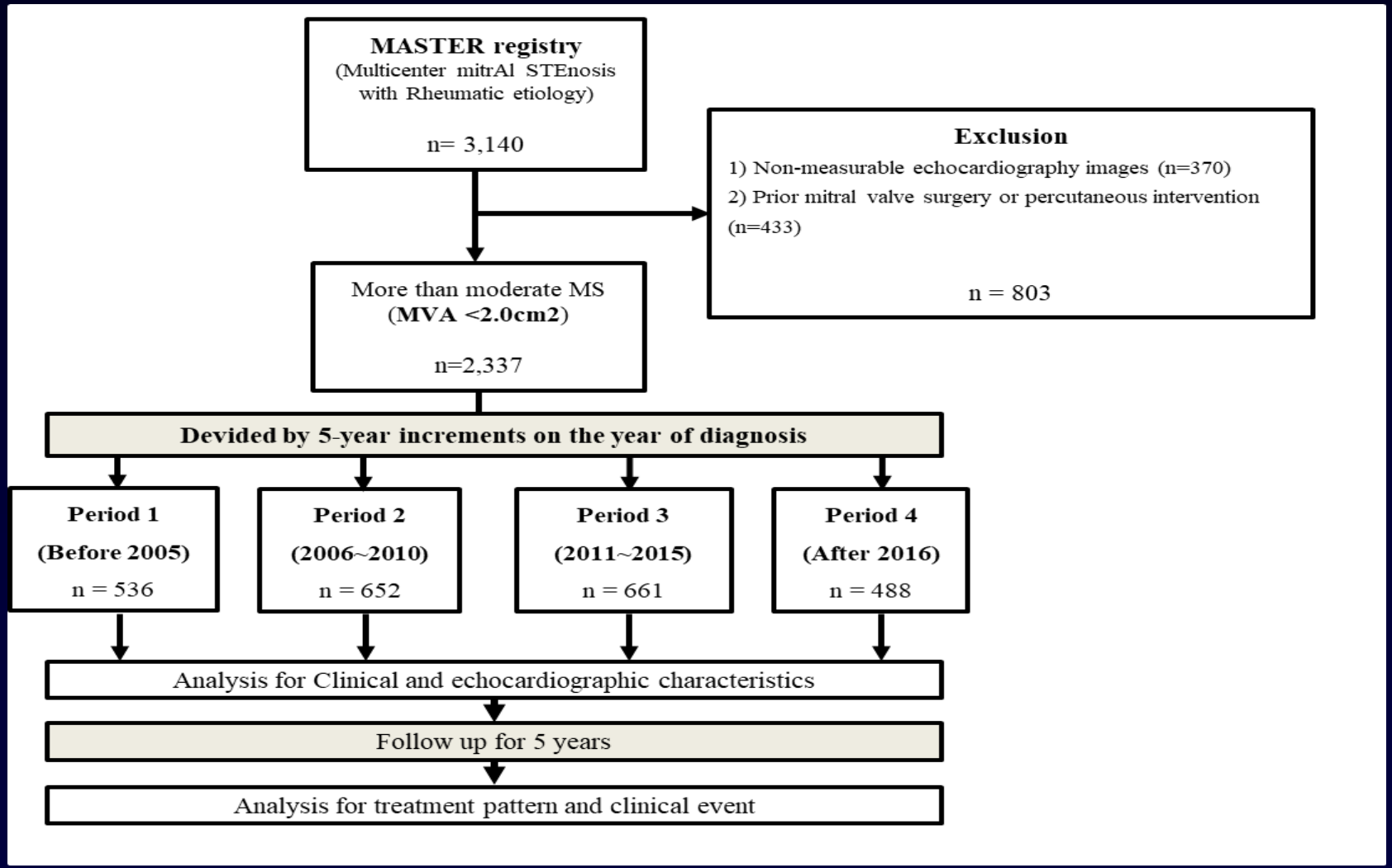
Ju Youn Kim,[1] Sung-Hwan Kim,[2] Jun Pyo Myong,[3] Young Choi,[2] You Mi Hwang,[4] Tae-Seok Kim,[5] Ji-Hoon Kim,[4] Sung-Won Jang,[6] Yong-Seog Oh ,[2] Man-Young Lee[7]





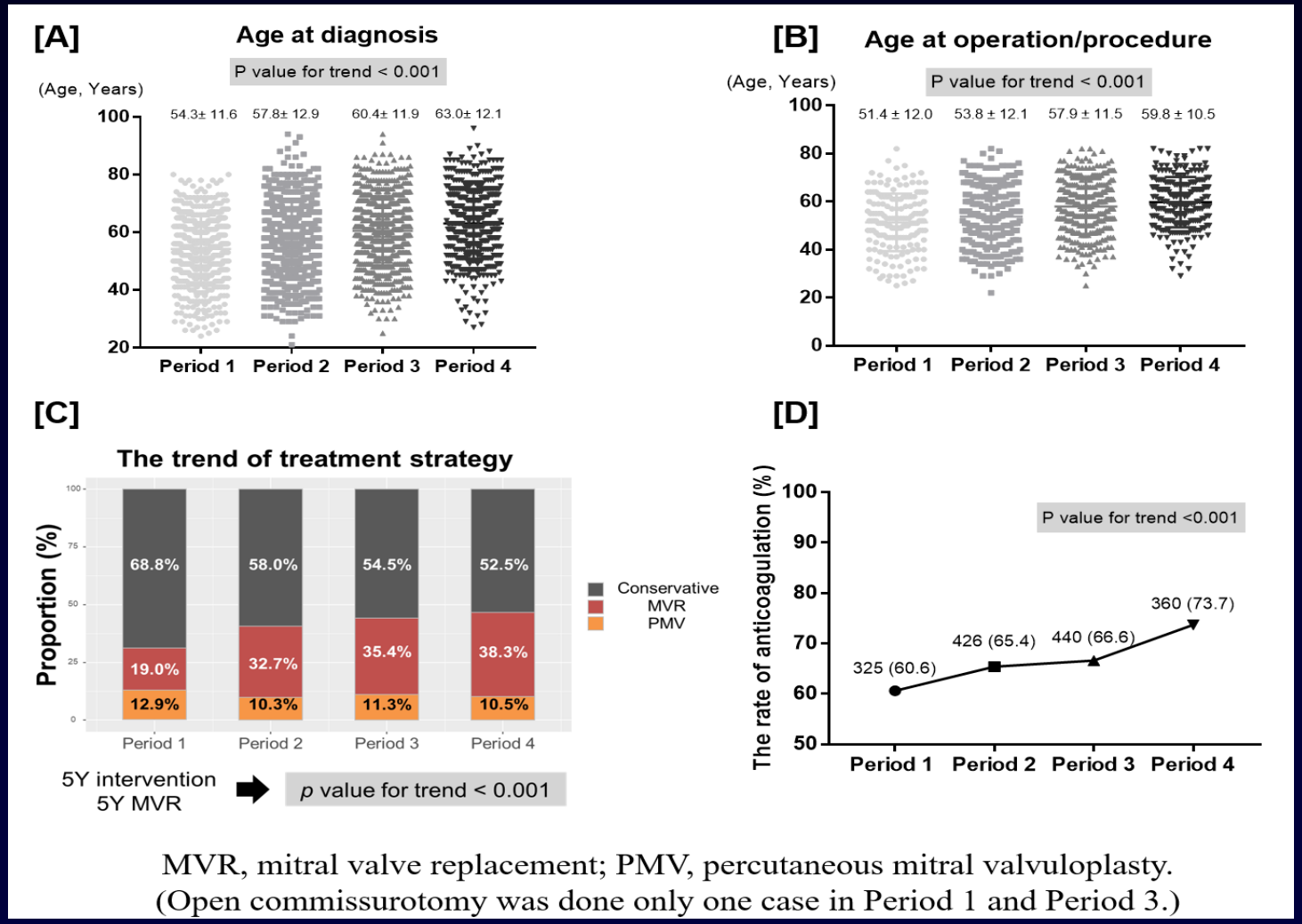
Kim JY et al. Heart. 2020 May 1;106(10):746-50.

Multicenter Mitral Stenosis with Rheumatic Etiology: MASTER Registry



I Cho, HJ Lee, GR Hong, et al. JKMS 2024

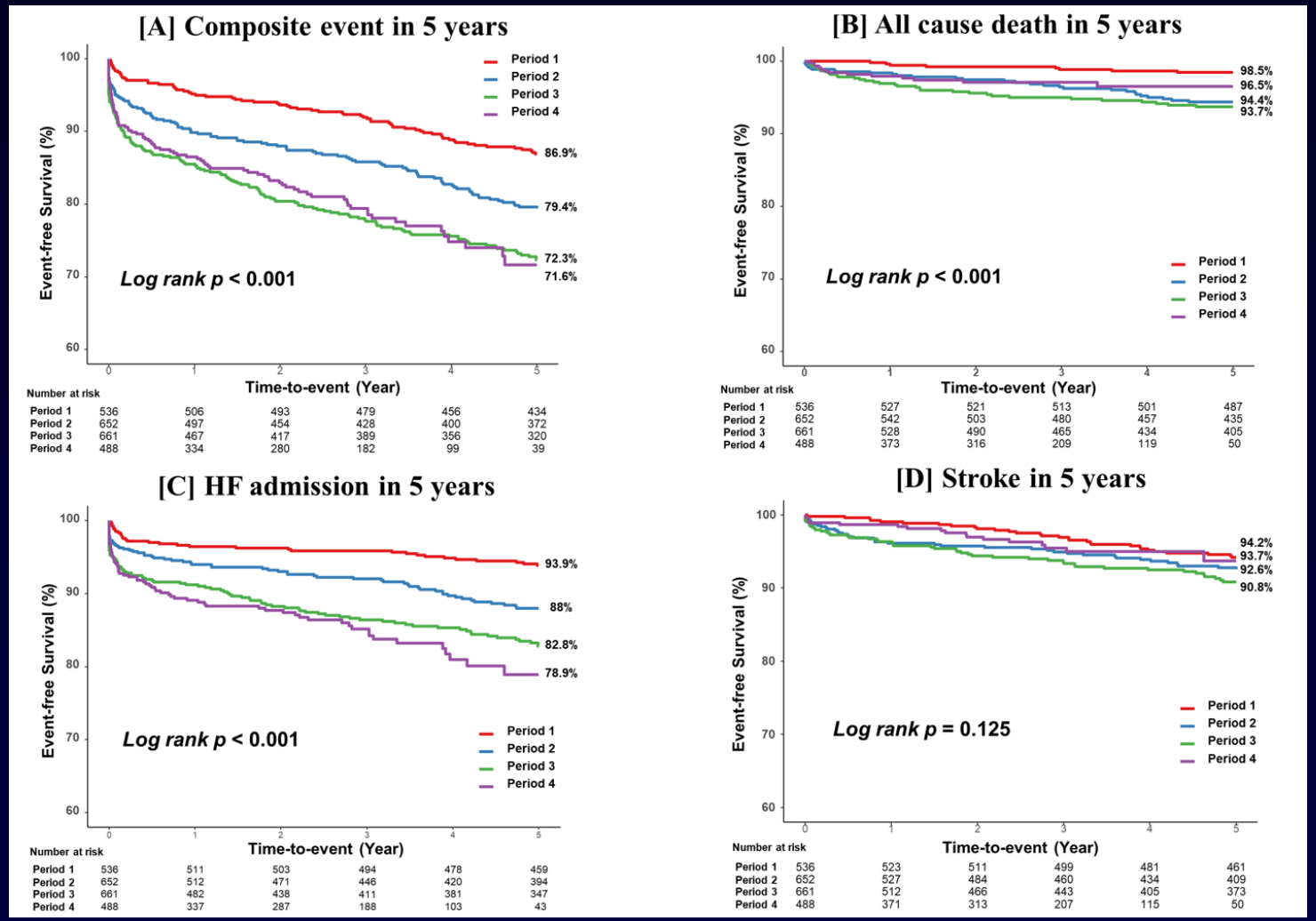
Temporal trends of ages, treatment strategy & use of anticoagulation rate/outcomes



MVR, mitral valve replacement; PMV, percutaneous mitral valvuloplasty.
(Open commissurotomy was done only one case in Period 1 and Period 3.)

I Cho, HJ Lee, GR Hong, et al. JKMS 2024

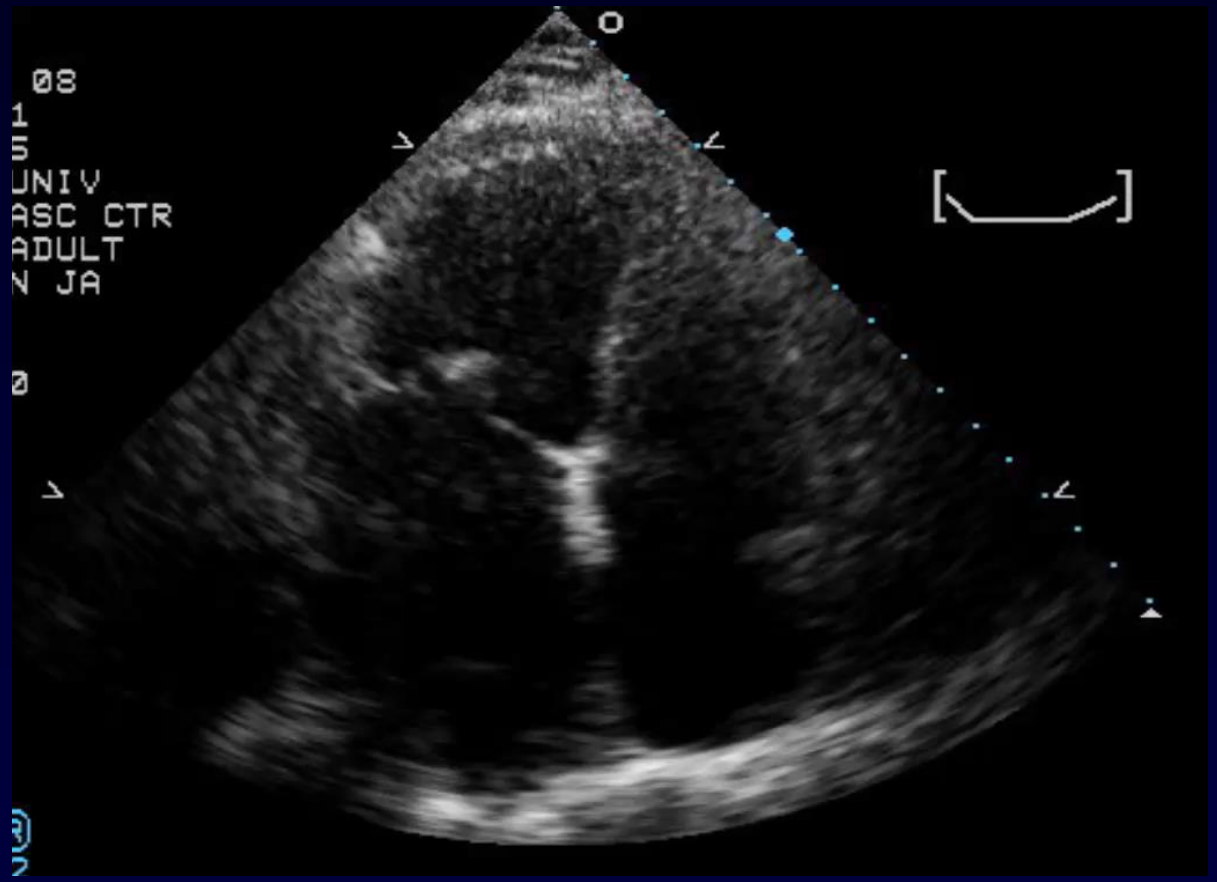
Temporal trends of ages, treatment strategy & use of anticoagulation rate/outcomes



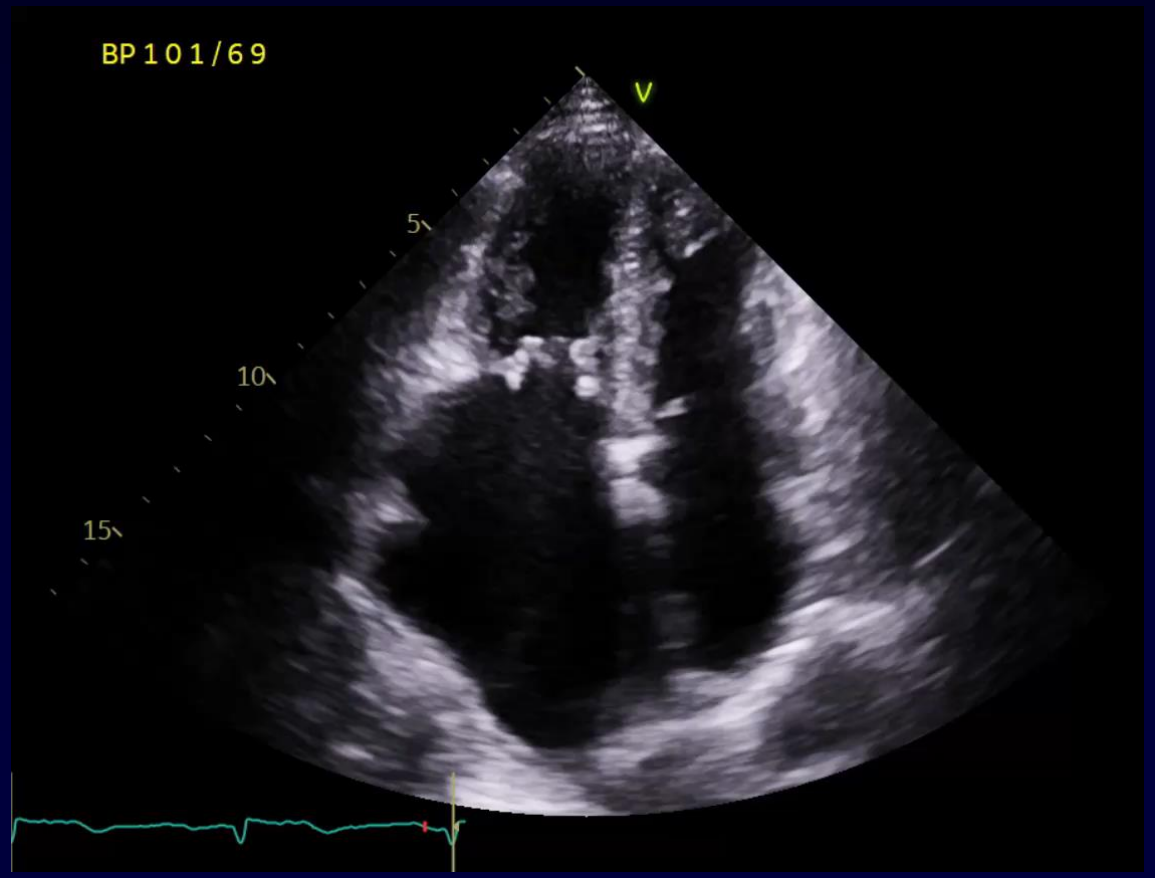
I Cho, HJ Lee, GR Hong, et al. JKMS 2024

RHD – A Old Disease Still Affecting Today's World

2000



2025



Clinical Dilemmas in Treating Rheumatic MS

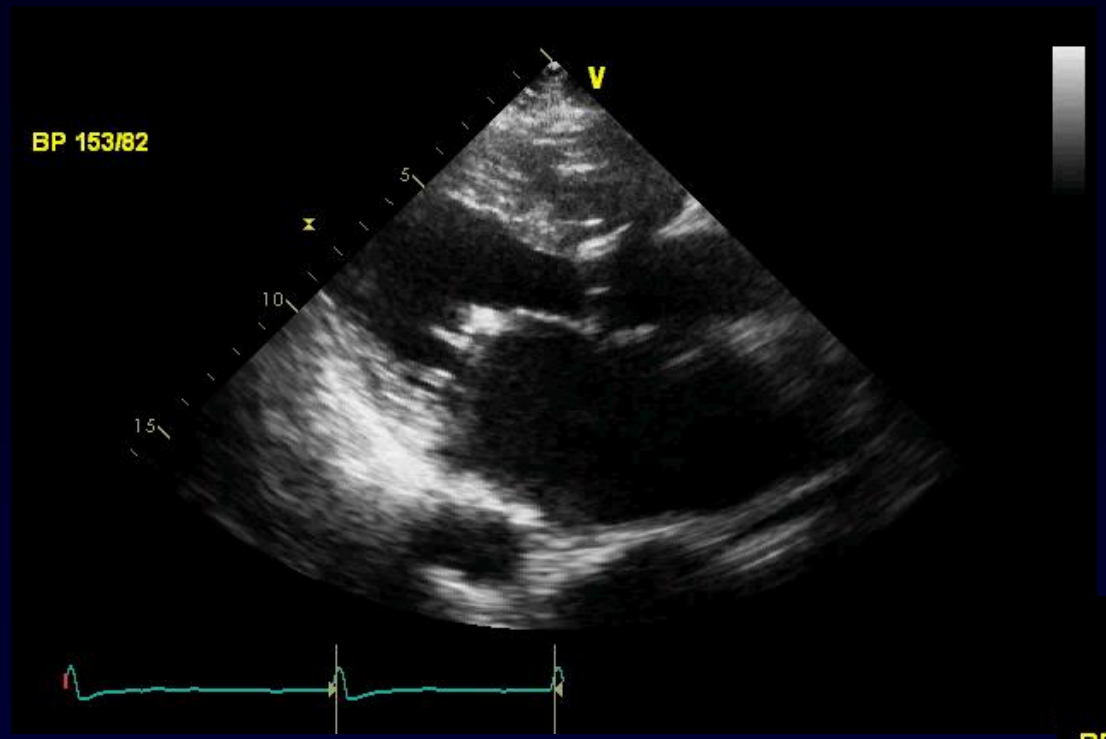
- **Assessment of severity and morphology of MS**
  - Discrepancy in gradient and area: low gradient severe MS
- **Treatment strategy**
  - Treatment Strategy in MS with MVA 1.0-1.5cm2
- **New imaging parameters for management**
  - Echo score for PMV
  - Anticoagulation Strategies in Severe MS with Sinus Rhythm

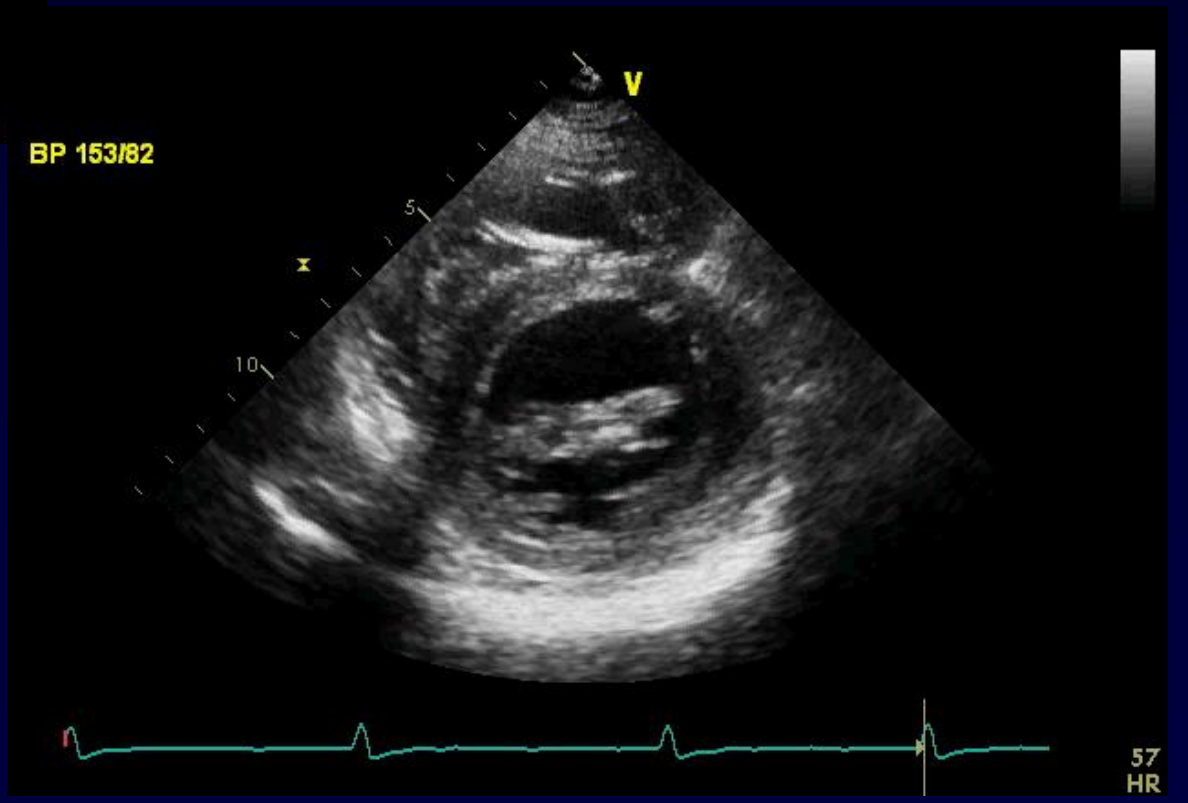
Case 72 Year-Old Female

- **Chief complaint**

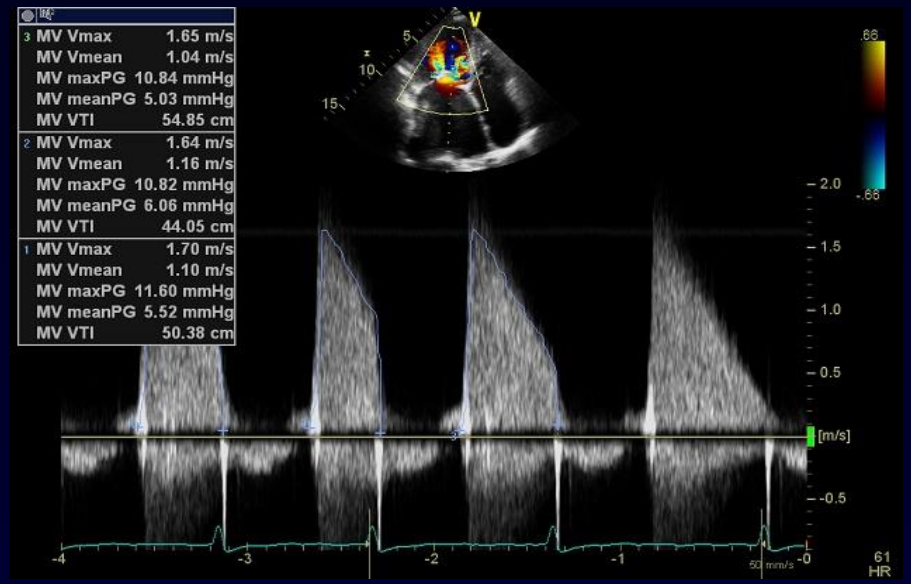
  Non-specific

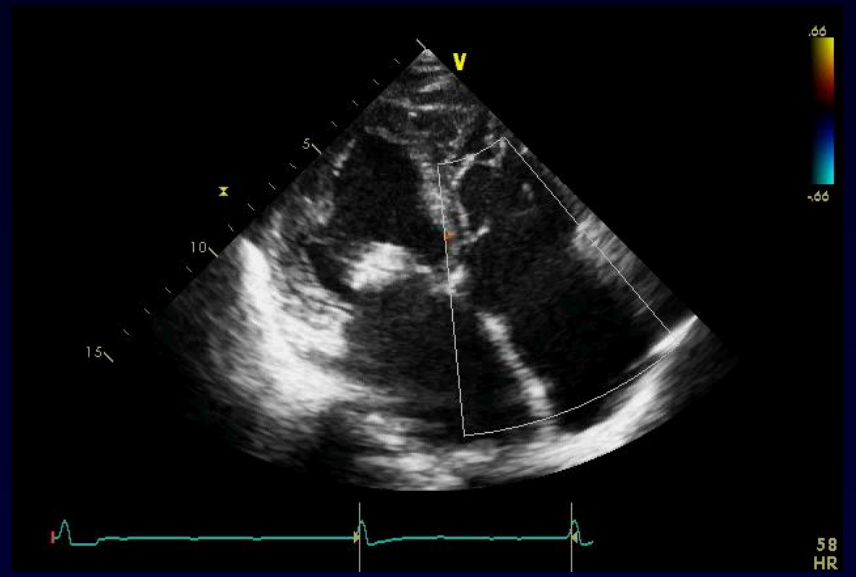
- **Co-morbidity** – AF, Old stroke





MVA by 2D-planimetry: 0.7cm2

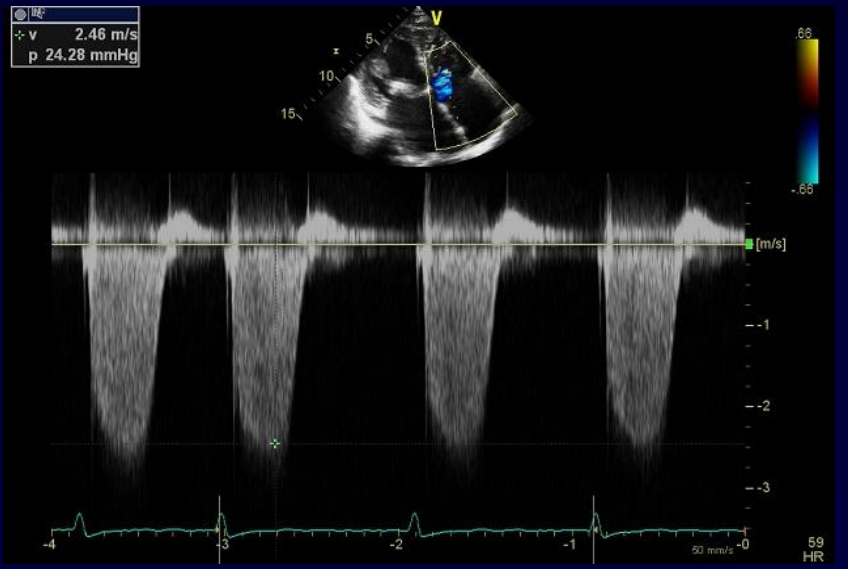


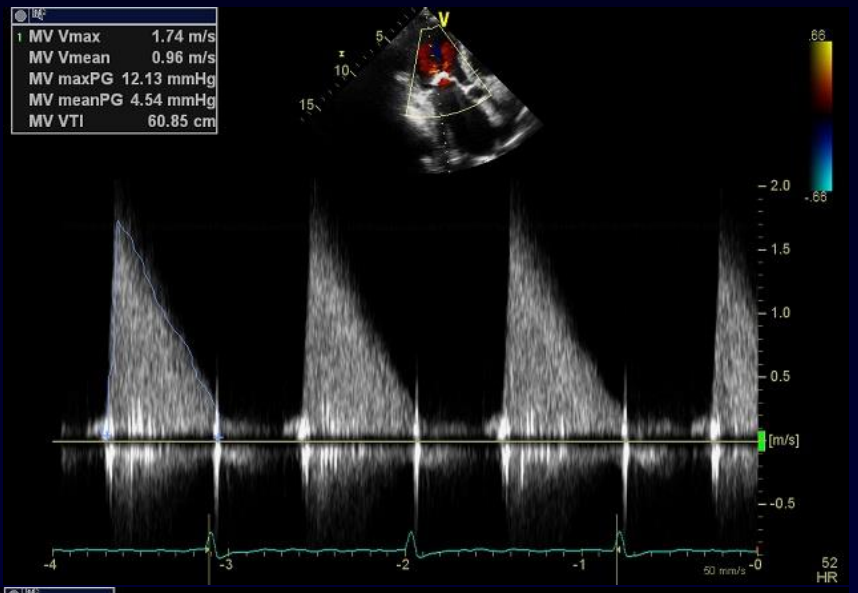


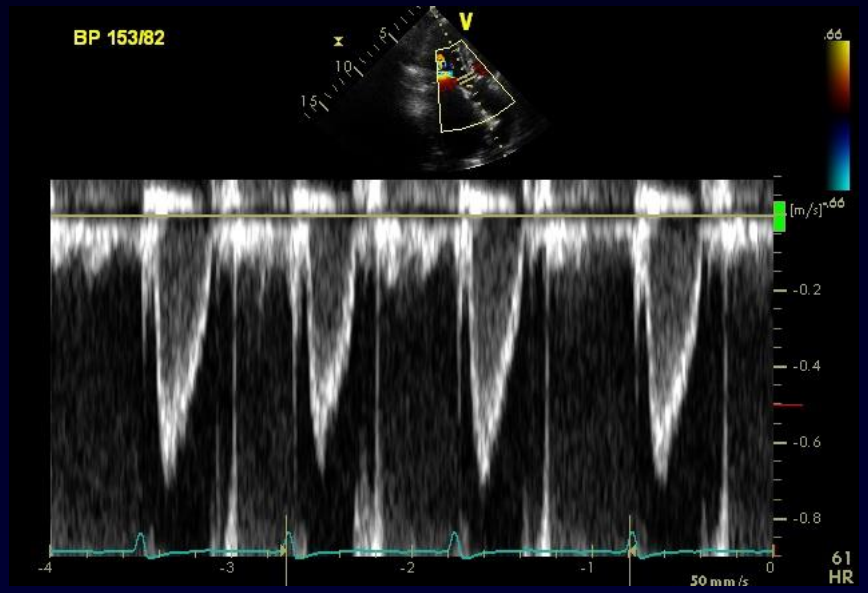
PHT = 194 ms

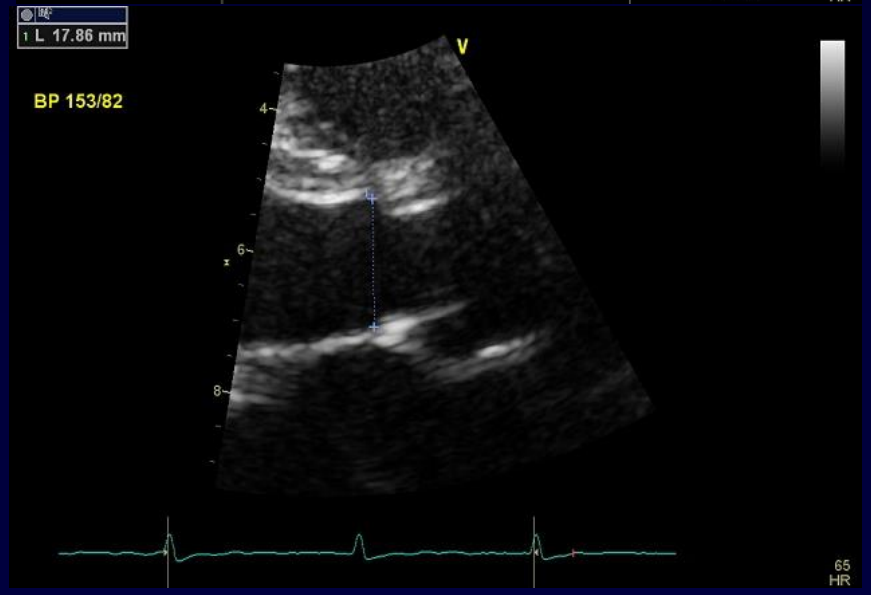
MVA(P1/2)=1.13cm2

MDPG=4.96 mmHg









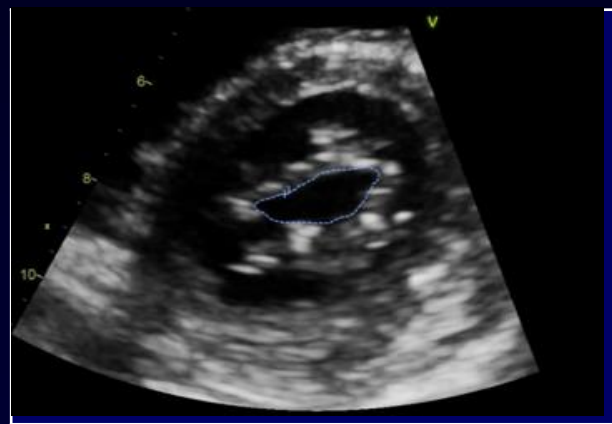
$$\text{MVA} = \frac{(\text{LVOTVTI} \times \text{d2} \times 0.785)}{\text{MV VTI}}$$

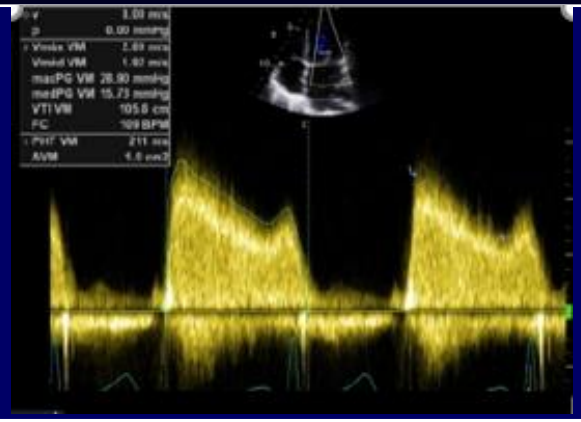
$= 0.6\text{cm}^2$

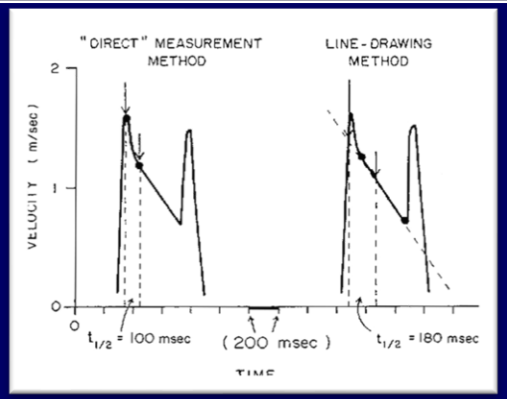
What is severity of MS?

1. Very severe MS
2. Severe MS
3. Moderate MS
4. Moderate to severe MS

Severity of MS







2D Planimetry • Reference measurement for determining the severity of MS • MVA<1.0 cm^2 (very severe), ≤1.5 cm^2	**Transmitral MDPG** • Hemodynamic significance in patients with MS • Severe: >10mmHg (<1.0cm^2); >5mmHg? (<1.5cm^2)	**Pressure Half Time** • Time: peak gradient to ½ • Empirical formula: MVA=220/PHT
• Alignment and position is crucial	• Loading condition, HR dependent • HR should be reported at the image acquisition • AF: average 5 cycles	• Bimodal slope: 2nd half in mid-diastole • LV relaxation abnormality: PHT ↑➔ underestimation of MVA • LV compliance ↓, AR ➔ PHT ↓ ➔ Overestimation of MVA

Baumgartner et al, JASE 2009

Noninvasive Assessment of Atrioventricular Pressure Half-time by Doppler Ultrasound

LIV HATLE, M.D., BJØRN ANGELSEN, DR. TECHN., AND ARVE TROMSDAL, M.D.

SUMMARY The mean pressure drop across the mitral valve and atrioventricular pressure half-time were measured noninvasively by Doppler ultrasound in 40 normal subjects, in 17 patients with mitral regurgitation, 32 patients with mitral stenosis and 12 with combined stenosis and regurgitation. In normal subjects pressure half-times were 20–60 msec, in patients with isolated mitral regurgitation 35–80 msec and in patients with mitral stenosis 90–383 msec. There was no significant change in pressure half-time with exercise or on repeat examinations, indicating relative independence of mitral flow. In 25 patients with mitral stenosis and seven with combined stenosis and regurgitation, pressure half-time was related to mitral valve area calculated from catheterization data. Increasing pressure half-times occurred with decreasing mitral valve area, and this relationship was not influenced by additional mitral regurgitation. Noninvasive measurement of pressure half-time together with mean pressure drop was useful for evaluating patients with mitral valve disease.

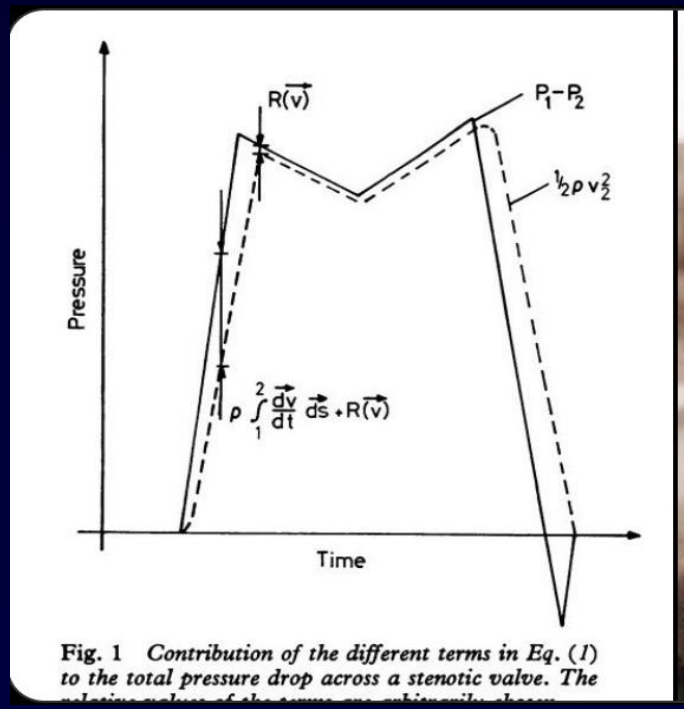


Fig. 1 *Contribution of the different terms in Eq. (1) to the total pressure drop across a stenotic valve. The*

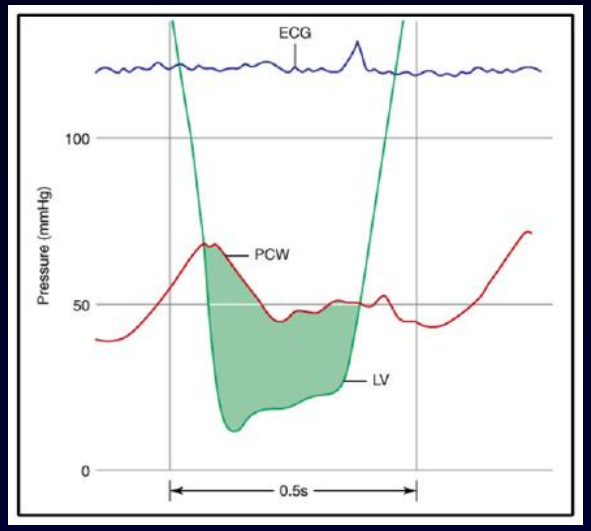
MS: Severity – PHT

- Hatle et al (Br Heart J 1978;40:131) related the PHT to mitral area using an empiric equation:

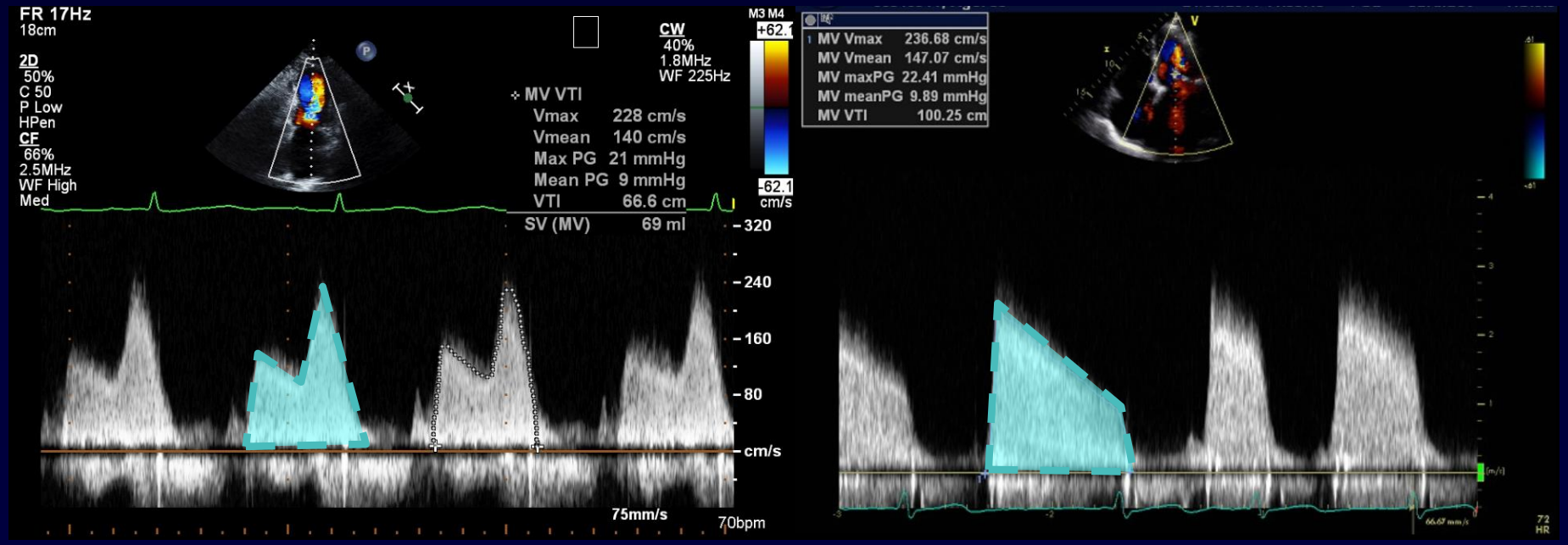
Mitral Valve Area = 220/PHT = 750/DT

Note: constant of 220 msec is proportional to net compliance (of LV and LA) and the square root of maximum transmitral gradient and does NOT take into account active relaxation of the LV

MS: Severity – Pressure gradient



- Peak and mean gradients correlate well with cath
- Pressure gradients dependent on absolute pressures in each chamber
- Pressure gradient depends on heart rate and cardiac output



Changes of MS severity in ACC/AHA Guideline

2006

	Mitral Stenosis		
	Mild	Moderate	Severe
Mean gradient (mm Hg)*	Less than 5	5–10	Greater than 10
Pulmonary artery systolic pressure (mm Hg)	Less than 30	30–50	Greater than 50
Valve area (cm^2)	Greater than 1.5	1.0–1.5	Less than 1.0

2014

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of MS	• Mild valve doming during diastole	• Normal transmitral flow velocity	• None	• None
B	Progressive MS	• Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets • Planimetered MVA >1.5 cm^2	• Increased transmitral flow velocities • MVA >1.5 cm^2 • Diastolic pressure half-time <150 ms	• Mild-to-moderate LA enlargement • Normal pulmonary pressure at rest	• None
C	Asymptomatic severe MS	• Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets • Planimetered MVA ≤1.5 cm^2 • (MVA ≤1.0 cm^2 with very severe MS)	• MVA ≤1.5 cm^2 • (MVA ≤1.0 cm^2 with very severe MS) • Diastolic pressure half-time ≥150 ms • (Diastolic pressure half-time ≥220 ms with very severe MS)	• Severe LA enlargement • Elevated PASP >30 mm Hg	• None
D	Symptomatic severe MS	• Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets • Planimetered MVA <1.5 cm^2	• MVA ≤1.5 cm^2 • (MVA ≤1.0 cm^2 with very severe MS) • Diastolic pressure half-time ≥150 ms • (Diastolic pressure half-time ≥220 ms with very severe MS)	• Severe LA enlargement • Elevated PASP >30 mm Hg	• Decreased exercise tolerance • Exertional dyspnea

The American Journal of Cardiology

VOLUME X DECEMBER 1962 NUMBER 6

Clinical Studies

The Spectrum of Pure Mitral Stenosis

Hemodynamic Studies in Relation to Clinical Disability*

PAUL G. HUGENHOLTZ, M.D., THOMAS J. RYAN, M.D., SAMUEL W. STEIN, M.D. and WALTER H. ABELMANN, M.D.

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Volume 331 OCTOBER 13, 1994 Number 15

PERCUTANEOUS BALLOON VALVULOPLASTY COMPARED WITH OPEN SURGICAL COMMISSUROTOMY FOR MITRAL STENOSIS

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2020

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of MS	Mild valve doming during diastole	Normal transmitral flow velocity	None	None
B	Progressive MS	Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets Planimetered mitral valve area >1.5 cm^2	Increased transmitral flow velocities Mitral valve area >1.5 cm^2 Diastolic pressure half-time <150 ms	Mild to moderate LA enlargement Normal pulmonary pressure at rest	None
C	Asymptomatic severe MS	Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets Planimetered mitral valve area ≤1.5 cm^2	Mitral valve area ≤1.5 cm^2 Diastolic pressure half-time ≥150 ms	Severe LA enlargement Elevated PASP >50 mm Hg	None
D	Symptomatic severe MS	Rheumatic valve changes with commissural fusion and diastolic doming of the mitral valve leaflets Planimetered mitral valve area ≤1.5 cm^2	Mitral valve area ≤1.5 cm^2 Diastolic pressure half-time ≥150 ms	Severe LA enlargement Elevated PASP >50 mm Hg	Decreased exercise tolerance Exertional dyspnea

No evidence!!

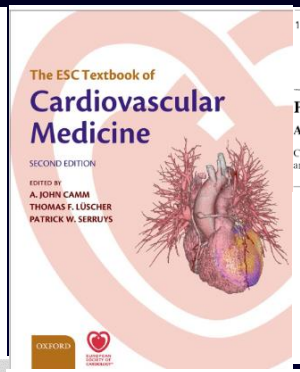
Changes of MS severity in ESC Guideline

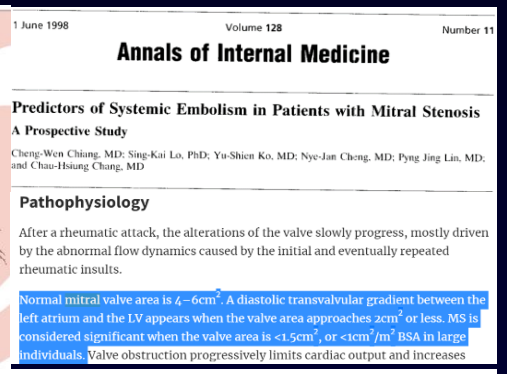
2006

ing valve area. Planimetry, when it is feasible, is the method of choice, in particular, immediately after PMC. Measurements of mean transvalvular gradient calculated using Doppler velocities are highly rate- and flow-dependent; however, they are useful to check consistency of the assessment of severity, in particular, in patients in sinus rhythm.[136] MS usually does not have clinical consequences at rest when valve area is >1.5 cm^2, except in patients with particulary large body size.

2012

	Mild	Moderate	Severe
Specific findings			
Valve area (cm^2)	>1.5	1.0–1.5	<1.0
Supportive findings			
Mean gradient (mmHg)[a]	<5	5–10	>10
Pulmonary artery pressure (mmHg)	<30	30–50	>50




1 June 1998 Volume 128 Number 11

Annals of Internal Medicine

Predictors of Systemic Embolism in Patients with Mitral Stenosis

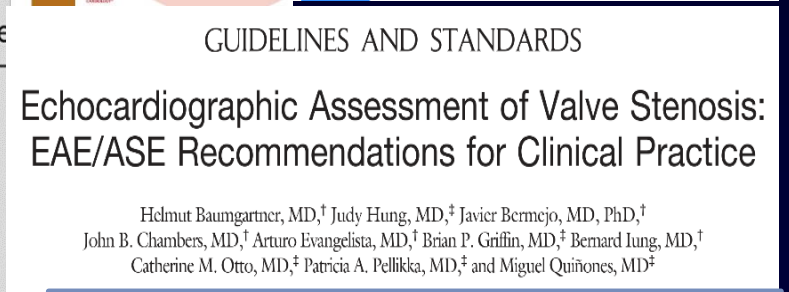
A Prospective Study

Cheng-Wen Chiang, MD; Sing-Kai Lo, PhD; Yu-Shien Ko, MD; Nye-Jan Cheng, MD; Pyng Jing Lin, MD; and Chau-Hsiung Chang, MD

Pathophysiology

After a rheumatic attack, the alterations of the valve slowly progress, mostly driven by the abnormal flow dynamics caused by the initial and eventually repeated rheumatic insults.

Normal mitral valve area is 4–6cm^2. A diastolic transvalvular gradient between the left atrium and the LV appears when the valve area approaches 2cm^2 or less. MS is considered significant when the valve area is <1.5cm^2, or <1cm^2/m^2 BSA in large individuals. Valve obstruction progressively limits cardiac output and increases


GUIDELINES AND STANDARDS

Echocardiographic Assessment of Valve Stenosis: EAE/ASE Recommendations for Clinical Practice

Helmut Baumgartner, MD,† Judy Hung, MD,‡ Javier Bermejo, MD, PhD,† John B. Chambers, MD,† Arturo Evangelista, MD,† Brian P. Griffin, MD,‡ Bernard Iung, MD,† Catherine M. Otto, MD,‡ Patricia A. Pellikka, MD,‡ and Miguel Quiñones, MD‡

2021

7.1 Rheumatic mitral stenosis

7.1.1 Evaluation

Clinically significant mitral stenosis is defined by a mitral valve area (MVA) ≤1.5 cm^2. Commissural fusion with thickening of the posterior leaflet is the most important mechanism of stenosis.

No Clinical evidence for MV area cutoff

2024 ASE Guideline for RHD

GUIDELINES AND STANDARDS

Recommendations for the Use of Echocardiography in the Evaluation of Rheumatic Heart Disease: A Report from the American Society of Echocardiography

Natesa G. Pandian, MD (Chair), Jin Kyung Kim, MD, PhD, FASE (Co-Chair), Jose Antonio Arias-Godinez, MD, Gerald R. Marx, MD, FASE, Hector I. Michelena, MD, FASE, Jagdish Chander Mohan, MBBS, MD, DM, FASE, Kofoworola O. Ogunyankin, MD, FASE, Ricardo E. Ronderos, MD, PhD, FASE, Leyla Elif Sade, MD, Anita Sadeghpour, MD, FASE, Shantanu P. Sengupta, MD, DNB, FASE, Robert J. Siegel, MD, FASE, Xianhong Shu, MD, PhD, Amiliana M. Soesanto, MD, PhD, Lissa Sugeng, MD, FASE, Ashwin Venkateshvaran, PhD, RCS, RDCS, FASE, Marcelo Luiz Campos Vieira, MD, PhD, and Stephen H. Little, MD, FASE, *Newport Beach, California; Irvine, California; Mexico City, Mexico; Boston, Massachusetts; Rochester, Minnesota; New Delhi, India; Lagos, Nigeria; Buenos Aires, Argentina; Ankara, Turkey and Pittsburgh, PA; Washington, District of Columbia; Nagpur, India; Los Angeles, California; Shanghai, China; Jakarta, Indonesia; Manhasset, New York; Stockholm, Sweden; Sao Paulo, Brazil; Houston, Texas*

Table 1 Classification of Mitral Stenosis Severity

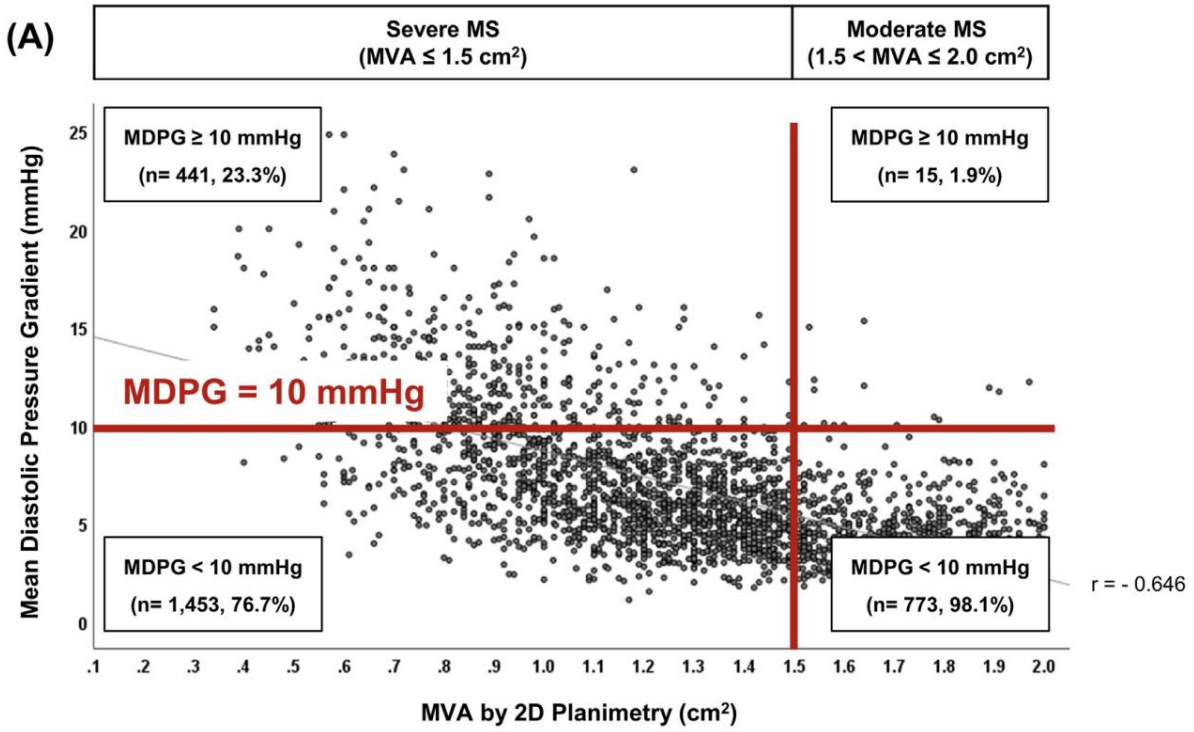
	Progressive		
	(Mild)	(Moderate)	Severe
Valve area (cm^2)	>2.5	2.5-1.6	≤1.5
Pressure half-time (milliseconds)	<100	100-149	≥150
Mean gradient (mmHg)*	<5	5-9	≥10
Systolic pulmonary artery pressure (mmHg)	<30	30-49	≥50

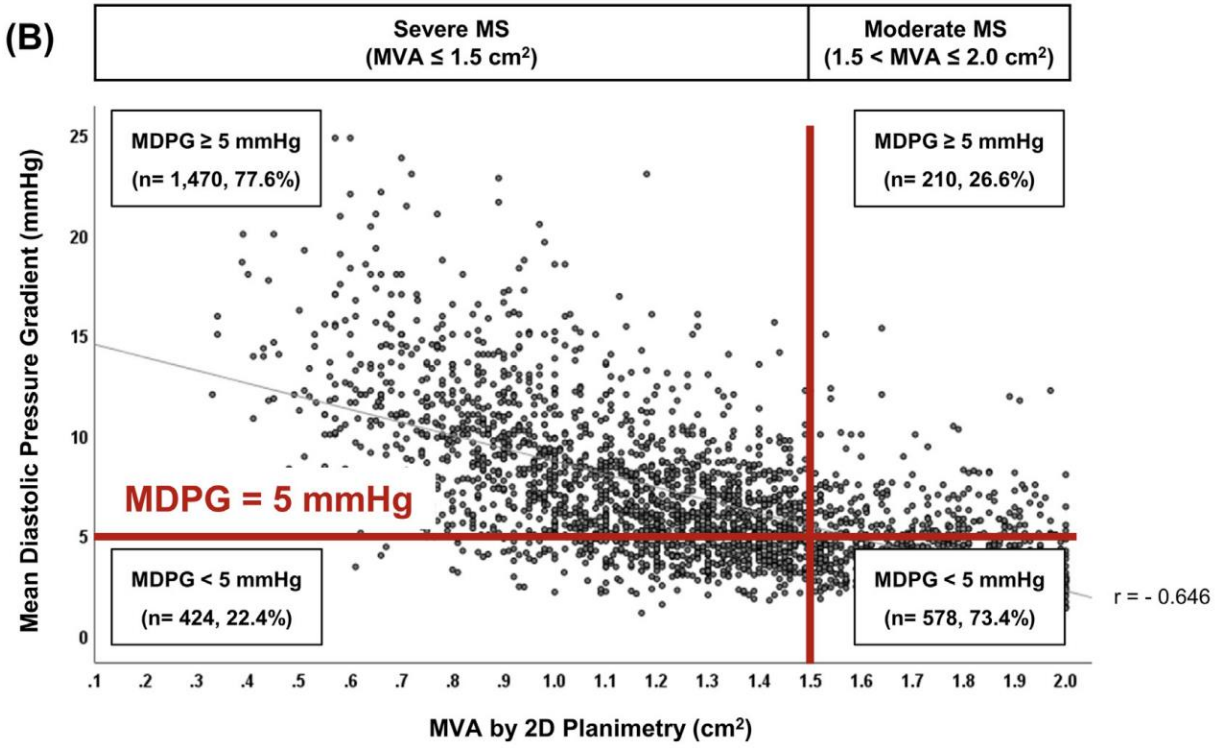
*At a heart rate of 60-80 beats per minute

J Am Soc Echocardiogr 2023;36:3-28.

Discrepancy between MDPG and MVA in Severe MS

- From the Multicenter Mitral Stenosis With Rheumatic Etiology (MASTER) registry of 3,140 patients
- Inclusion: moderate and severe MS patients with a normal range of heart rate (50 -100 bpm) after excluding previous cardiac surgery or intervention and conditions that could affect the hemodynamic status such as anemia, thyroid disease, or infection.
- Age: 59.9 ± 12.8





Cho I, Hong GR et al. JASE, 2024

Differences in Characteristics, Left Atrial Reverse Remodeling, and Functional Outcomes after Mitral Valve Replacement in Patients with Low-Gradient Very Severe Mitral Stenosis

In-Jeong Cho, MD, Geu-Ru Hong, MD, PhD, Seung Hyun Lee, MD, Sak Lee, MD, PhD, Byung-Chul Chang, MD, PhD, Chi Young Shim, MD, PhD, Hyuk-Jae Chang, MD, PhD, Jong-Won Ha, MD, PhD, Gil Ja Shin, MD, PhD, and Namsik Chung, MD, PhD, *Seoul, Korea*

Variable	Overall patients (*n* = 140)		
	LG (*n* = 82)	HG (*n* = 58)	*P*
Age (y)	61 ± 9	51 ± 11	<.001
Female gender	64 (78.0)	36 (62.1)	.039
Hypertension	11 (13.4)	3 (5.2)	.109
Diabetes mellitus	12 (14.6)	1 (1.7)	.010
AF	60 (73.2)	28 (48.3)	.003

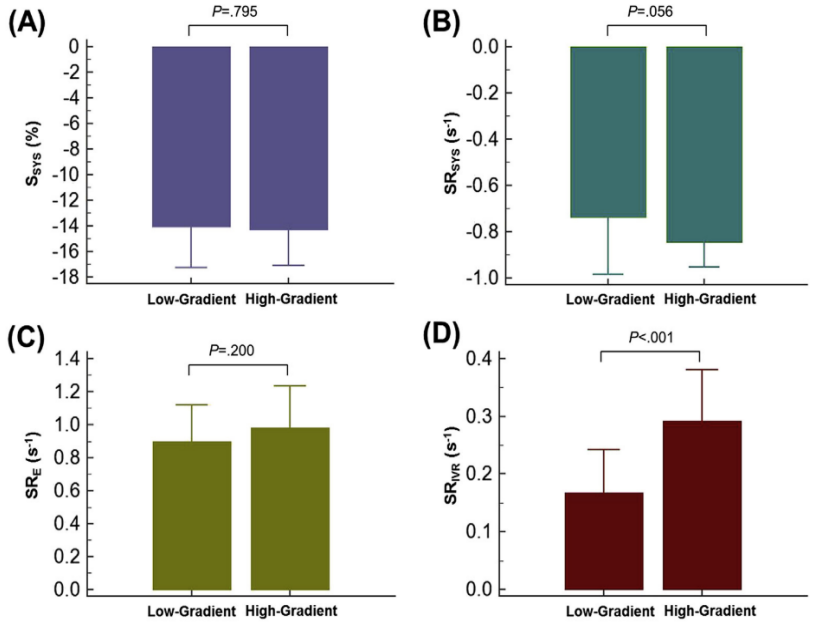


Figure 1 Comparison of speckle-tracking echocardiography–derived characteristics between LG and HG VSMS: **(A)** systolic strain (S_{SYS}), **(B)** systolic strain rate (SR_{SYS}), **(C)** strain rate during early diastole (SR_E), and **(D)** SR_{IVR}.

IJ Cho, GR Hong et al. JASE 2016;29:759-67

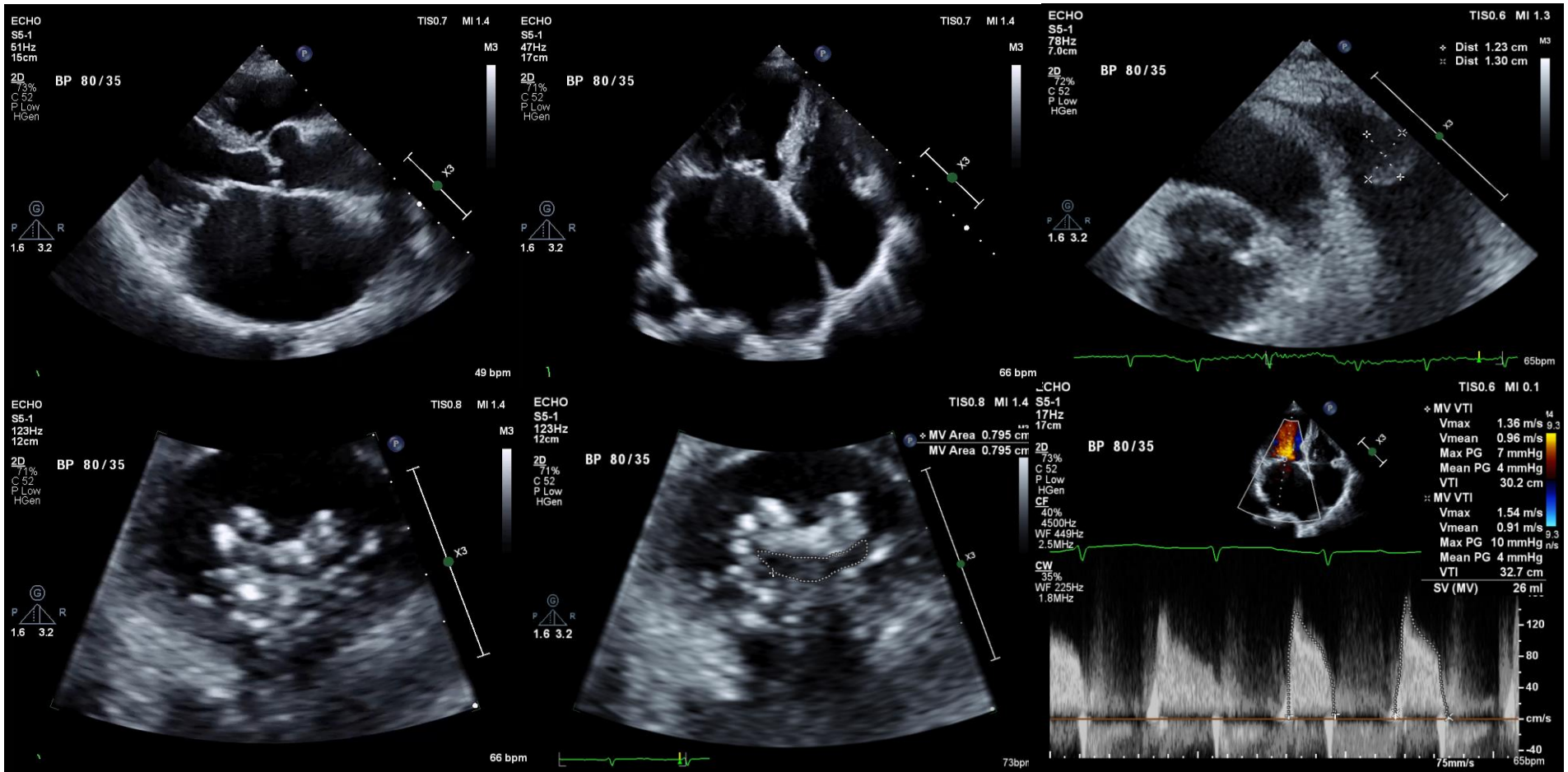
Low Gradient MS

- Measurement error or inherited limitation of pressure gradient (HR dependent)
- Less severe MS group
- Low flow MS d/t LV systolic and diastolic dysfunction
- Multivalvular disease (e.g., severe TR)

Discrepancy in MVA and MDPG

- Discordance between the MVA and MDPG
  → Low MDPG may mislead and underestimate the severity of MS

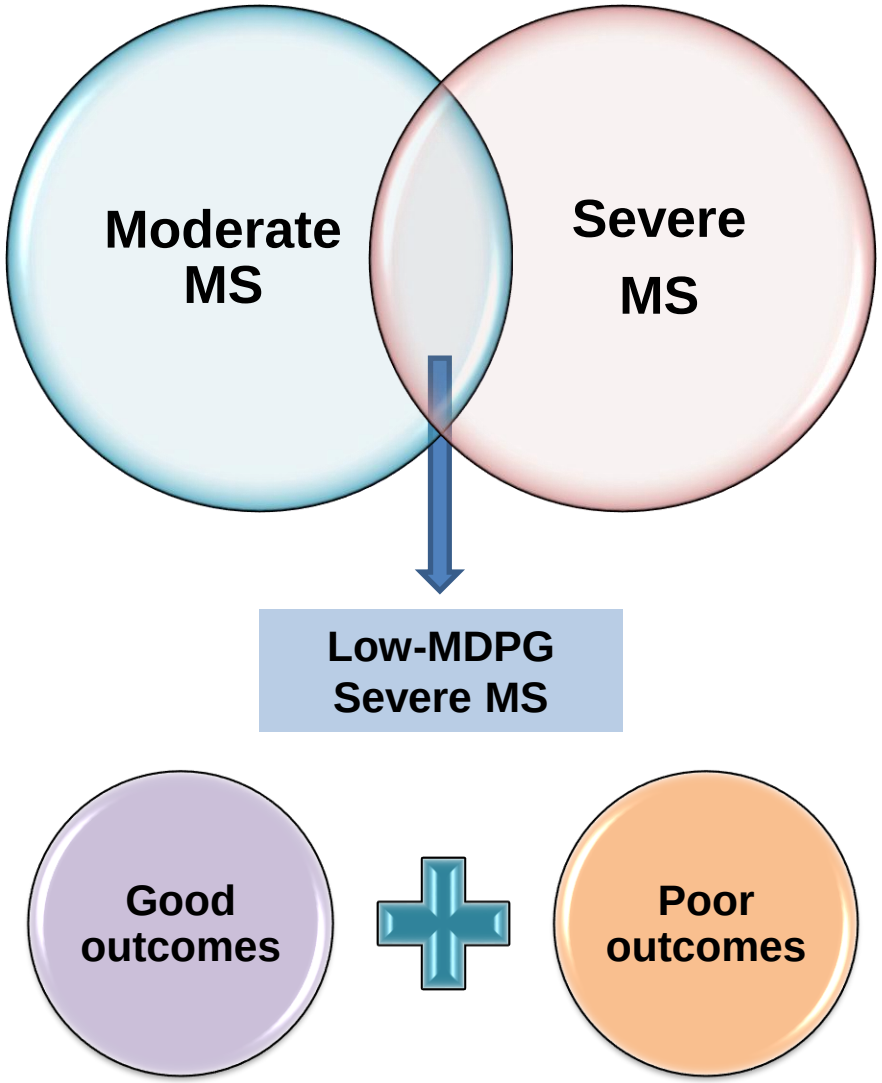
Case : F/81 with AF

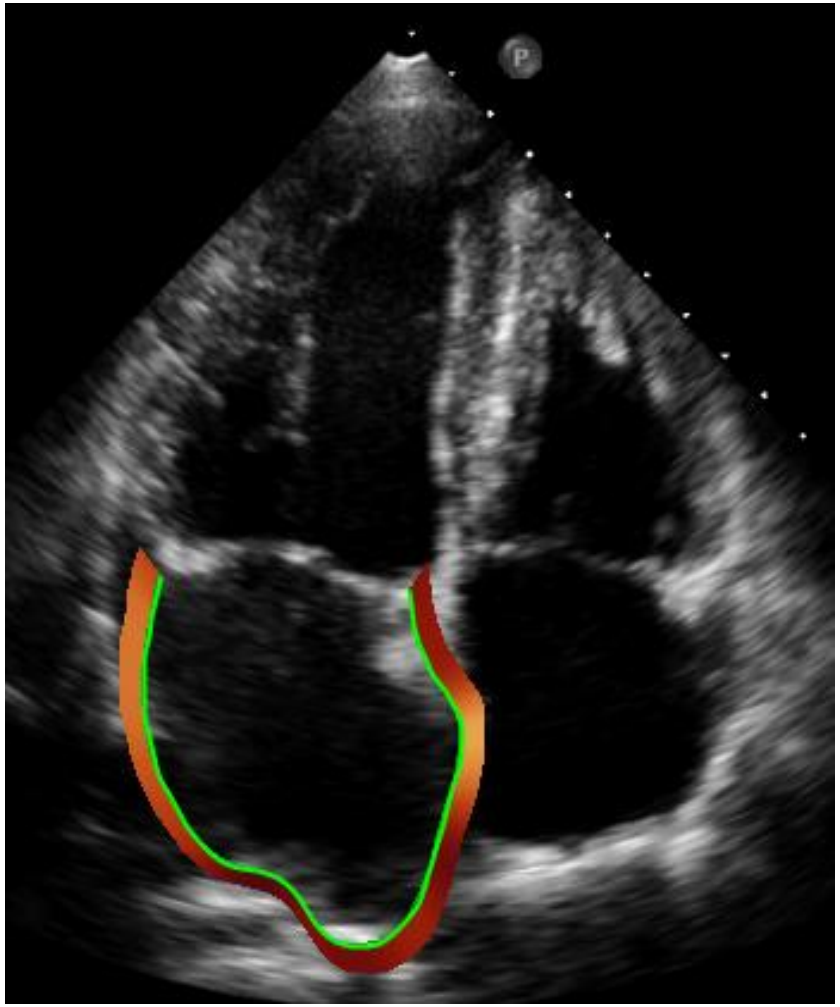


MVA: 0.79cm²
MDPG: 4mmHg
Severe swirling
LAA thrombus

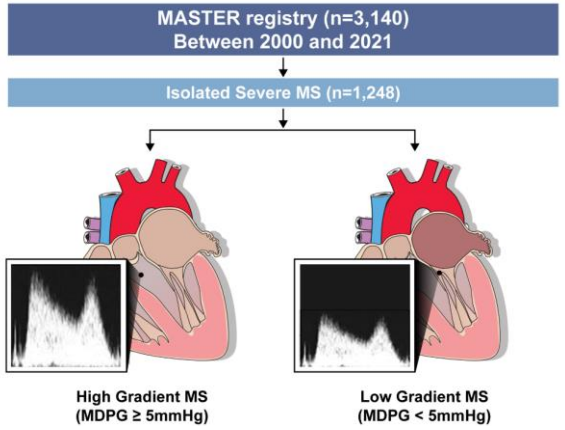
Less severe MS?

Discrimination of high-risk group within low-MDPG

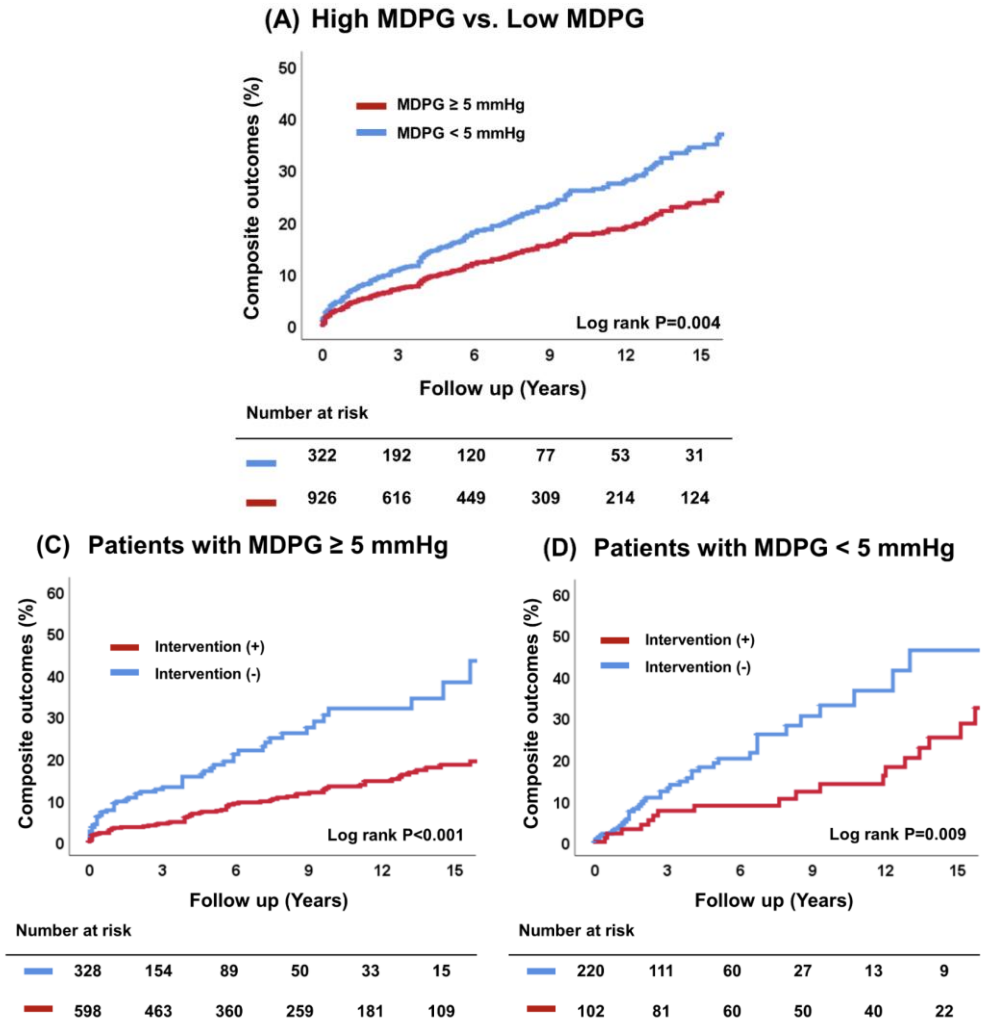




Low Gradient Severe MS: Worse Outcome than High Gradient



	Overall (n=1248)	MDPG (<5 or ≥5mmHg) Low (n=322)	MDPG (<5 or ≥5mmHg) High (n=926)	p-value
Age, years	**59 ± 13**	**65 ± 11**	**57 ± 13**	**<0.001**
BMI, kg/m^2	22.9 ± 3.1	23.2 ± 3.4	22.8 ± 3.0	0.092
Sex (male)	308 (24.7%)	73 (22.7%)	235 (25.4%)	0.332
Hypertension	542 (43.4%)	148 (46.0%)	394 (42.5%)	0.287
Diabetes Mellitus	305 (24.4%)	78 (24.2%)	227 (24.5%)	0.917
Chronic Kidney Disease	73 (5.8%)	25 (7.8%)	48 (5.2%)	0.089
Atrial fibrillation	**917 (73.5%)**	**246 (76.4%)**	**671 (72.5%)**	**0.017**
NYHA over 3	**298 (23.9%)**	**60 (18.6%)**	**238 (25.7%)**	**0.010**



Cho I, Hong GR et al, Circ Cardiovasc Imaging. 2025

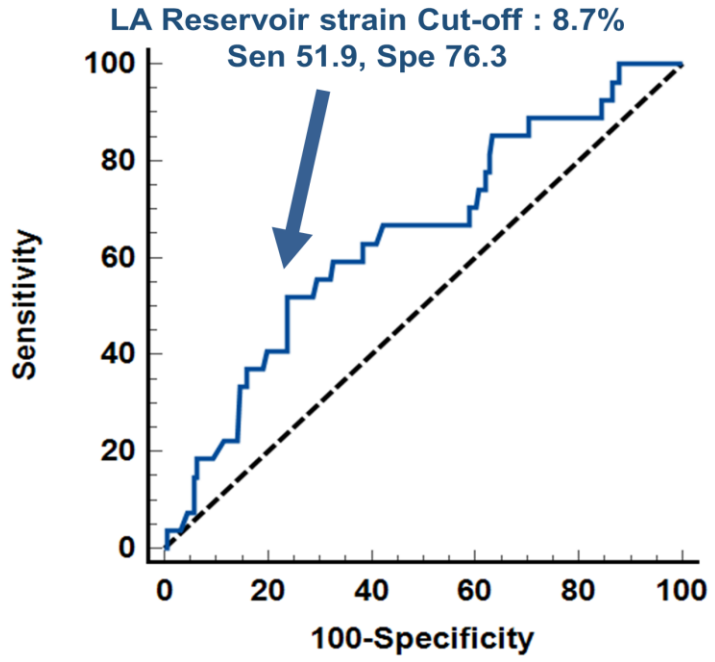
	Overall (n=681)	High (n=548)	Low (n=133)	P-value
Mitral valve intervention	497 (73.0%)	441 (80.5%)	56 (42.1%)	<0.001
PMV	119 (17.5%)	112 (20.4%)	7 (5.3%)	
MVR	350 (51.4%)	303 (55.3%)	47 (13.4%)	
PMV and MVR	28 (4.1%)	26 (4.7%)	2 (7.1%)	

	Overall (n=681)	High (n=548)	Low (n=133)	P-value
Time to Intervention* (years)	1.8 ± 3.4	1.5 ± 3.1	3.9 ± 4.7	<0.001

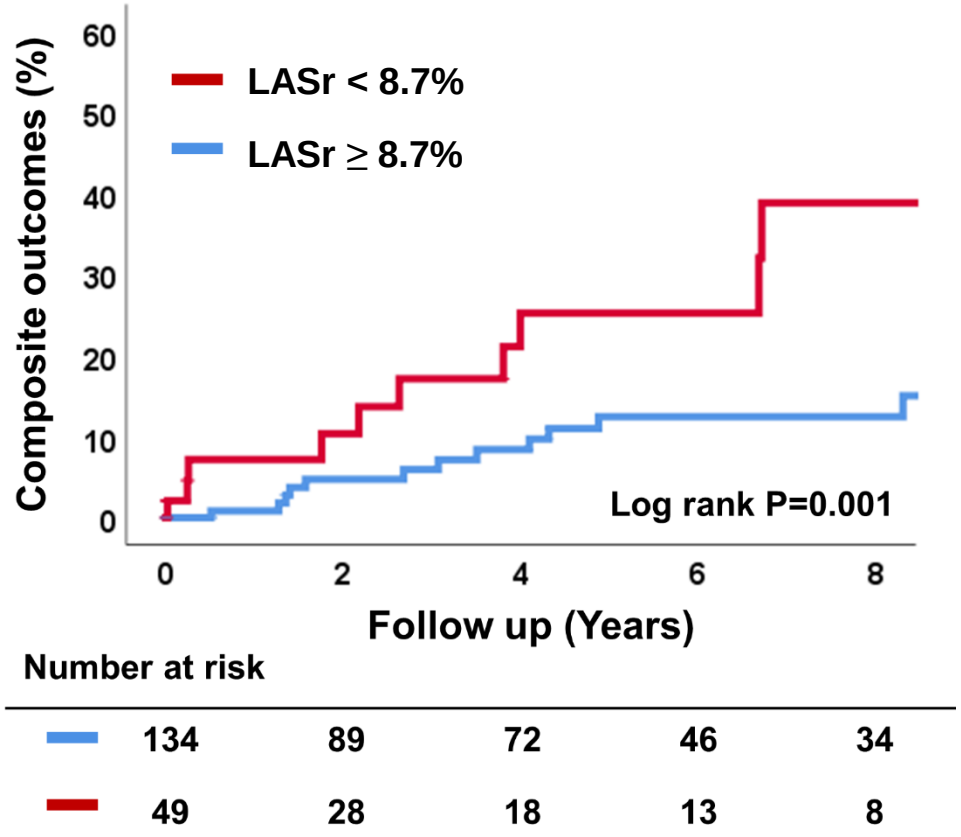
Cho I, Hong GR et al, Circ Cardiovasc Imaging. 2025

Discrimination of high-risk group within low-MDPG

- **Decreased LASr showed significant predictive value for the outcomes** (AUC 0.644, p=0.013)
- **The cut-off value for LASr** : **8.7%** (51.9% sensitivity, 76.3% specificity)



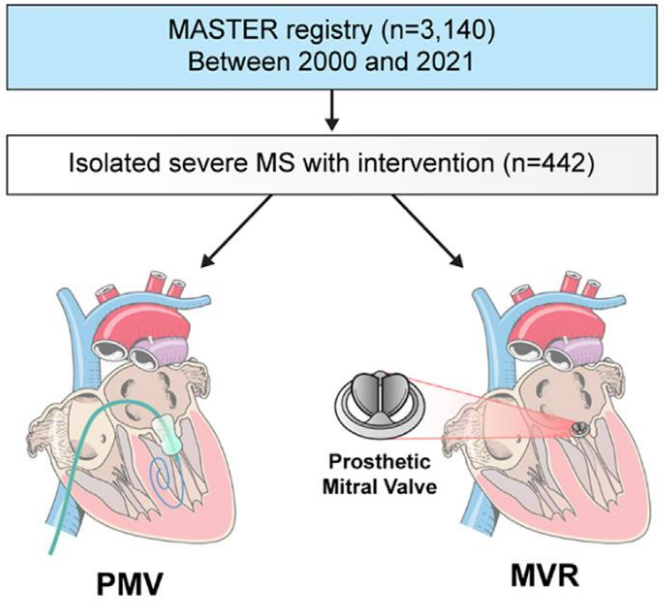
	AUC	P value
LA Reservoir strain	0.644	0.013



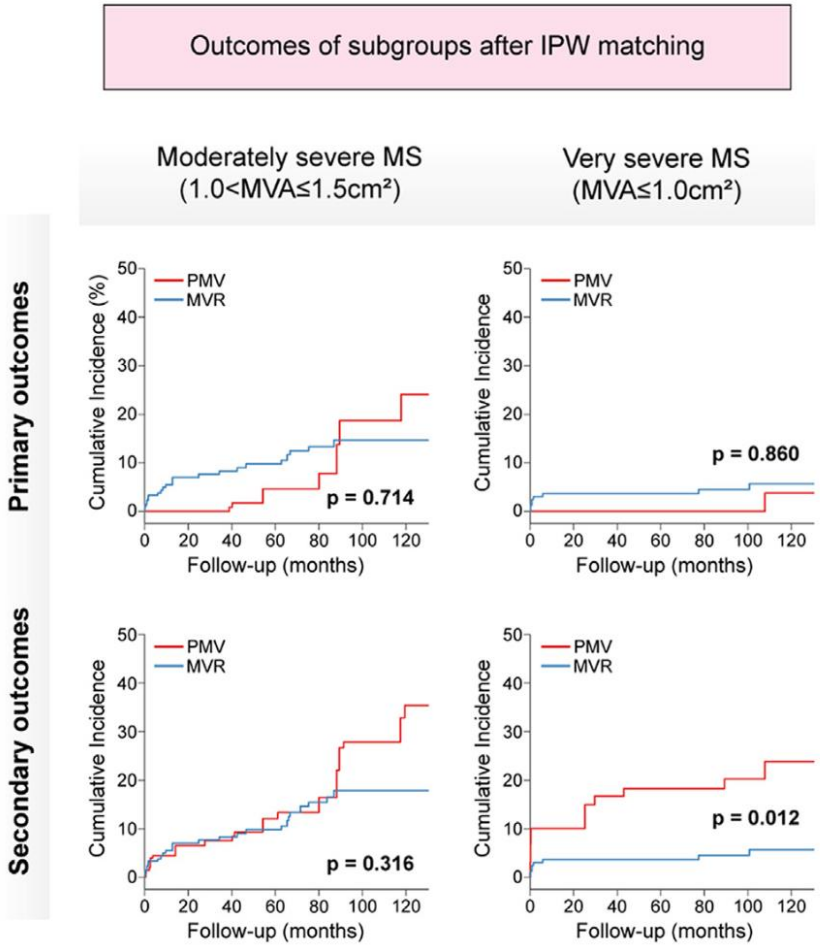
Cho I, Hong GR et al, Circ Cardiovasc Imaging. 2025

Revised Severe MS Criteria: Outcome of Intervention in MVA 1.0-1.5 cm^2

PMV vs MVR



	PMV (n=182)	MVR (n=260)
Moderately severe MS (1.0<MVA≤1.5cm²)	118	138
Very severe MS (MVA≤1.0cm²)	64	122



- **Primary outcomes** : CV death, HF hospitalization
- **Secondary outcomes** : CV death, HF hospitatlization, Redo intervention (PMV or MVR)

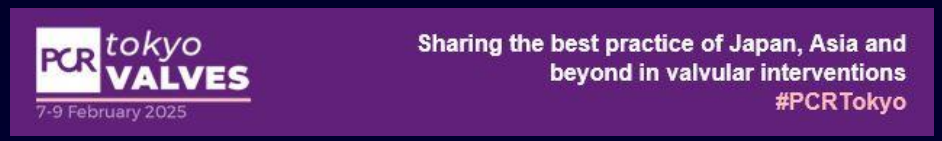
DY Kim, GR Hong et al, Canadian Journal of Cardiology 40 (2024)

Take Home Messages

Rheumatic VHD

- Is not forgotten valvular heart disease
- Decreasing prevalence in high income developed countries, still prevalent VHD in low-income countries
- *Global burden of MS has changed significantly compared to the past, and there are significant differences across countries*
- The changing trends in MS, but no significant improvement of management
- More clinical data and detailed classification are needed for further treatment of MS

Structural Heart World



ECHO360 2025

Structural Heart Imaging with Asia Valve

Oct. 31(Fri) ~ Nov. 01(Sat), 2025

The Westin Seoul Parnas

Program Directors

Official website:
Echo360.co.kr


Severance
With the Love of God, Free Humankind from Disease and Suffering
SEVERANCE HOSPITAL

Stroke Prevention

2021 ESC/EACTS Guidelines for the management of valvular heart disease

7.1.3 Medical therapy

isolation are indicated before intervention in patients with significant mitral stenosis, as they do not durably restore sinus rhythm. If AF is of recent onset and the LA is only moderately enlarged, cardioversion should be performed soon after successful intervention, it should also be considered in patients with less than severe mitral stenosis. Amiodarone is most effective in maintaining the sinus rhythm after cardioversion. In patients in sinus rhythm, OAC is recommended when there has been a history of systemic embolism or a thrombus is present in the LA and should also be considered when TOE shows dense spontaneous echocardiographic contrast or an enlarged LA (M-mode diameter >50 mm or LA volume >60 mL/m^2).

OAC is recommended

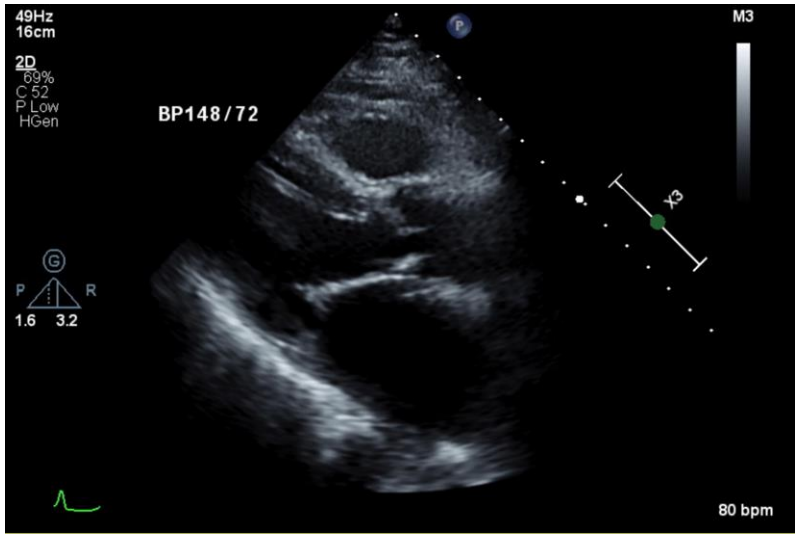
- ✓ History of systemic embolism
- ✓ Thrombus in LA

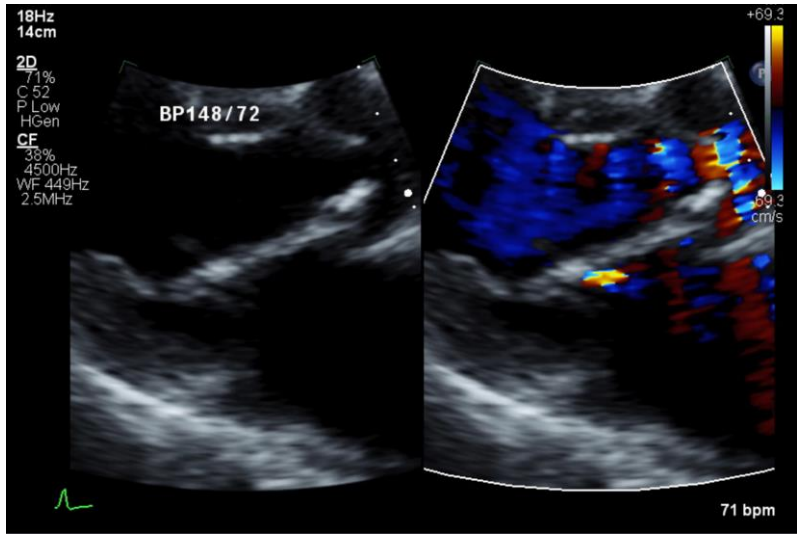
OAC should be considered

- ✓ Spontaneous echocardiographic contrast in TEE
- ✓ Enlarged LA
  (M mode diameter >50mm or LA volume >60mL/m^2)

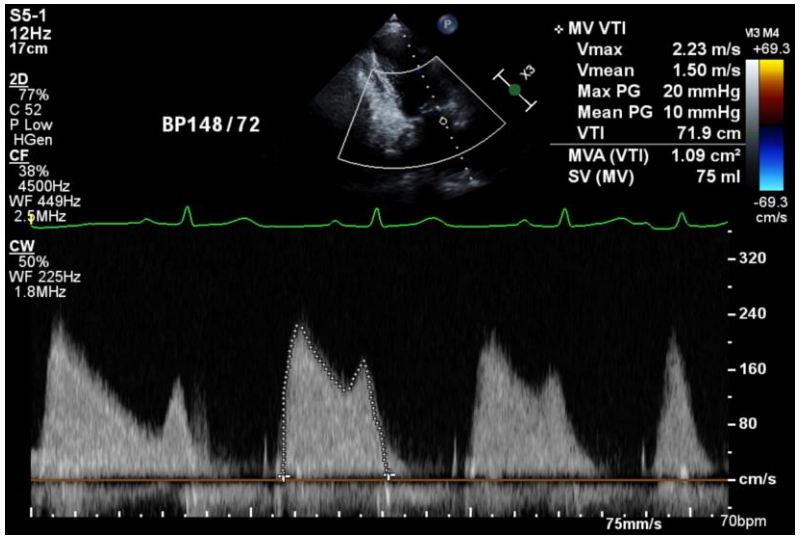
Vahanian A et al. 2021 ESC/EACTS Guidelines for the management of valvular heart disease

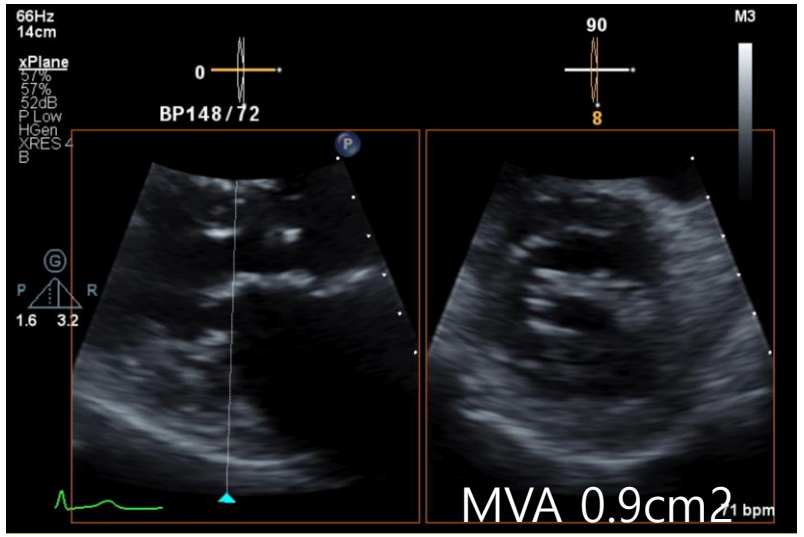
63/F, c/c: cardiac murmur, asymptomatic
Severe MS without AF (resting ECG, Holter)



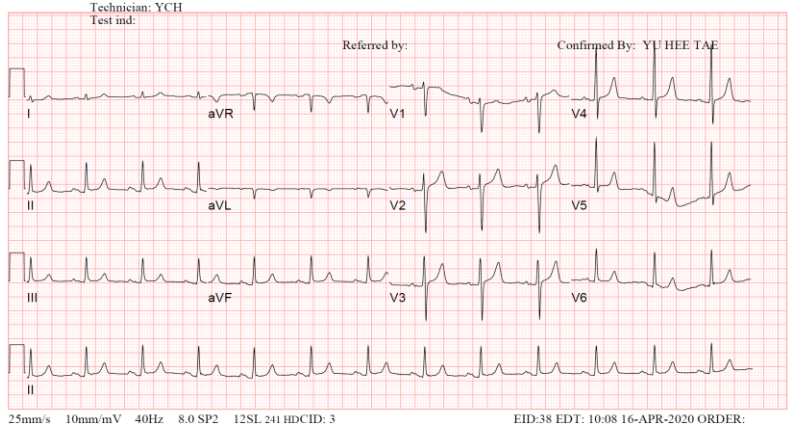


LA (AP / ML / SI) :	41//	mm
LA Vol		
by prolate ellipse :		ml
by mod simpson :	80.7	ml
LA Vol index (18-28)		
by prolate ellipse :		ml/m2
by mod simpson :	45.3	ml/m2
MV Annulus (4C/2C) :	/	mm

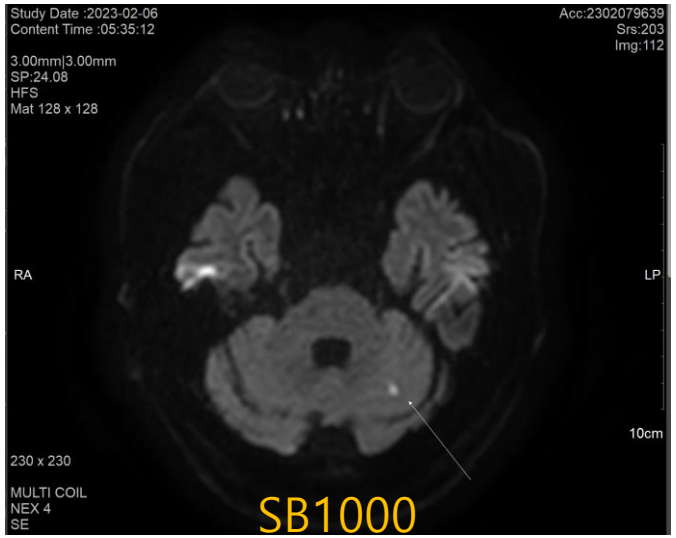


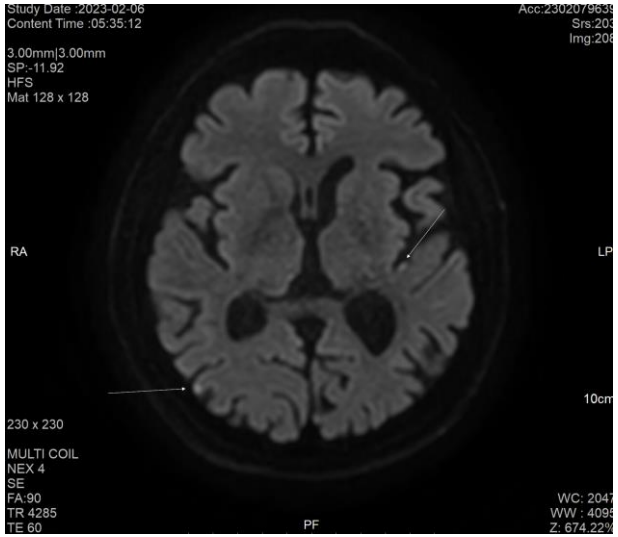


SR, Holter: No AF



1 Yr F/U → Admitted to ED d/t dysarthria





Multiple cerebellar and cerebral infarction

SUMMARY

110132 QRS complexes
0 Ventricular ectopics which represent <1 % of total QRS complexes
28137 Supraventricular ectopics which represent 25 % of total QRS complexes
0 Paced QRS complexes which represent <1 % of total QRS complexes

VENTRICULAR ECTOPY	SUPRAVENTRICULAR ECTOPY
0 Isolated	24153 Isolated
0 Bigeminal Cycles	867 Couplets
0 Couplets	707 Runs
0 Runs	2247 Beats in Runs
0 Beats in Runs	7 Beats LONGEST at 118 BPM at 10:13:57 07-FEB-2023
Beats LONGEST at BPM at	3 Beats FASTEST at 185 BPM at 10:04:30 07-FEB-2023
Beats FASTEST at BPM at	

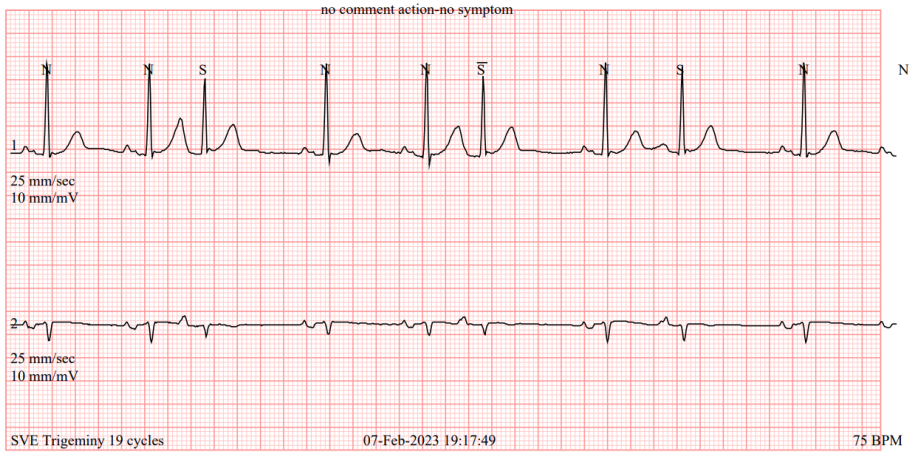
S-T LEVELS Channel 1 S-T LEVELS Channel 2 S-T LEVELS Channel 3

HEART RATES
61 MIN at 05:12:39 08-FEB-2023
80 AVG
127 MAX at 10:07:55 07-FEB-2023 LONGEST RR 1.488 sec at 02:08:49 08-FEB-2023

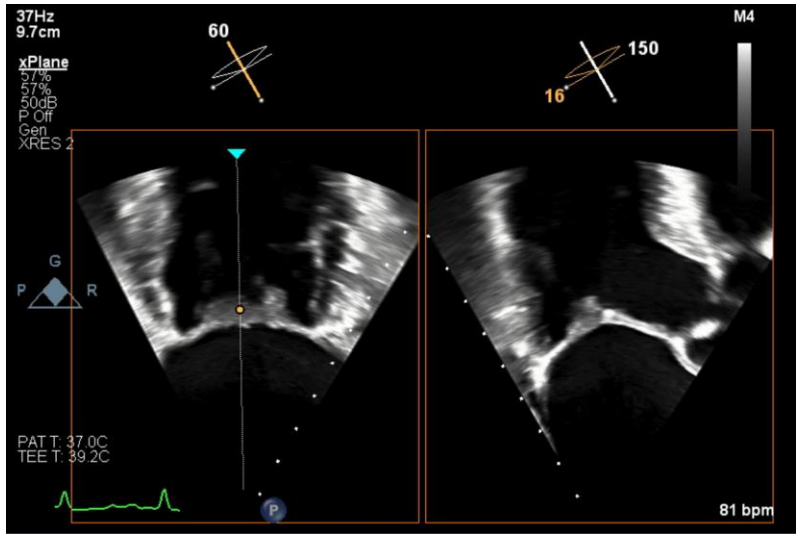
INTERPRETATION

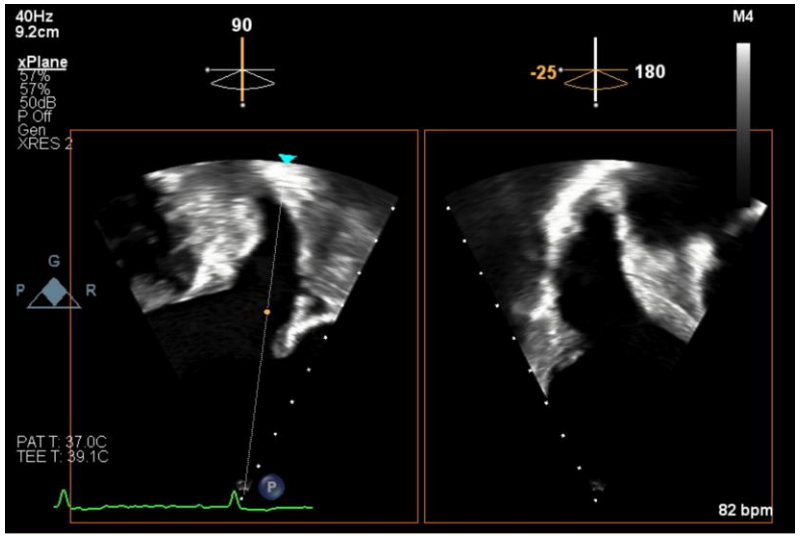
Basically normal sinus rhythm
Asymptomatic nonsustained atrial tachycardia
Premature atrial complexes , Premature aberrant complexes

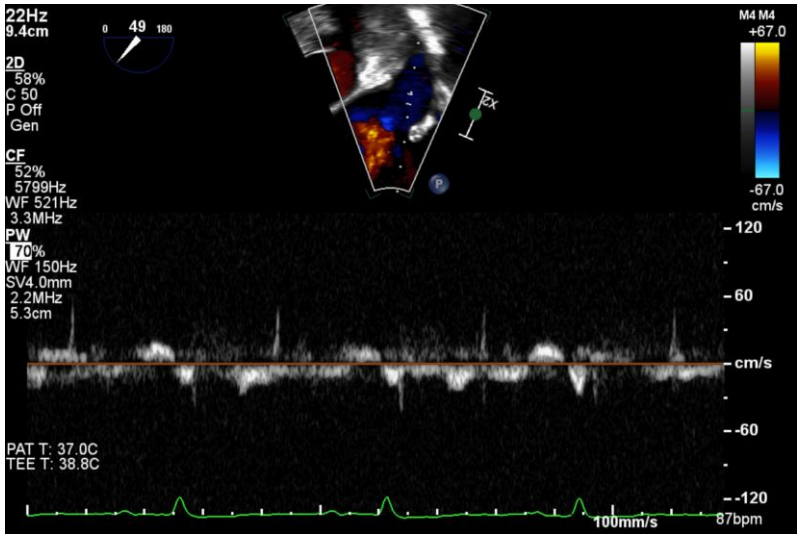
No definite AF

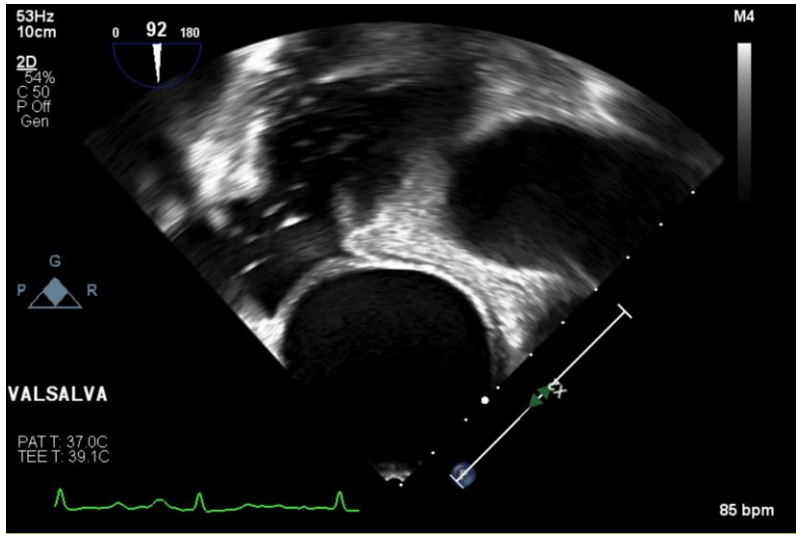


TEE



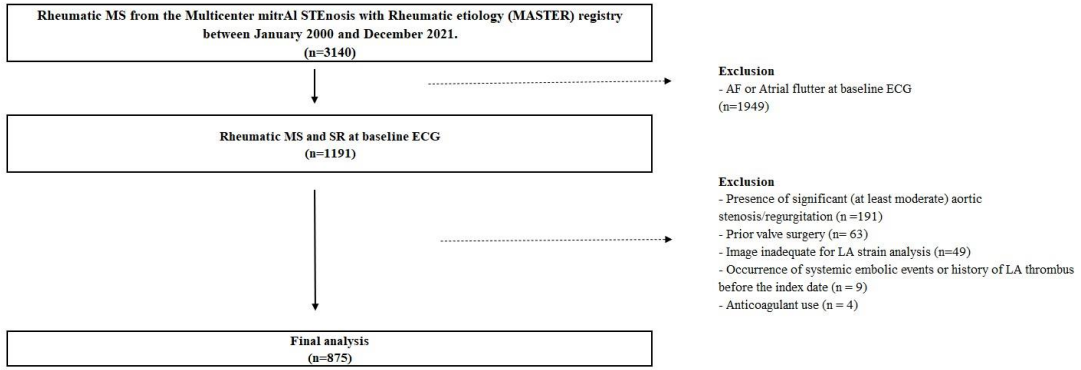






Mild swirling in LA and LAA
Decreased LAA emptying velocity
No intracardiac shunt

LA Strain to Predict Stroke: MASTER Registry



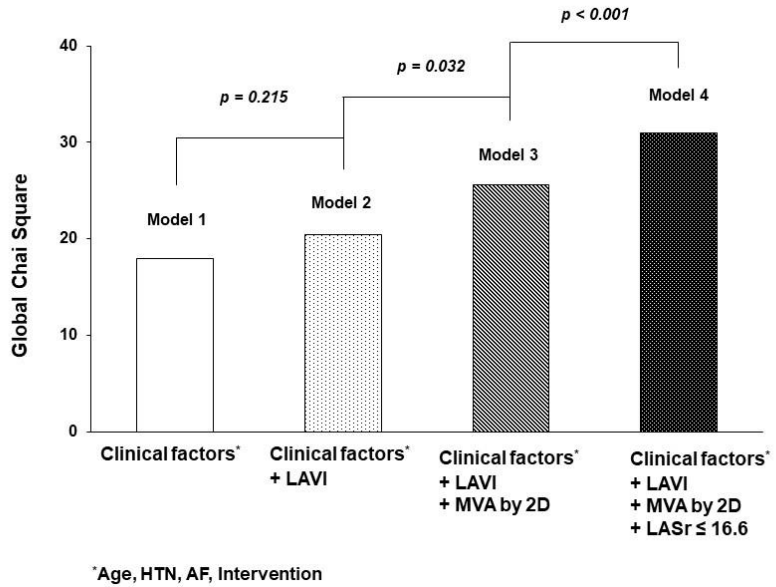
- Mean follow-up period of 92.3 ± 59.9 months (IQR 42 to 119 months; median 96.3 months).
- Systemic embolic events developed in 124 (14.1%) patients at a rate of **4.0 per 100 patient-years** (95% CI: 2.5 to 5.5).

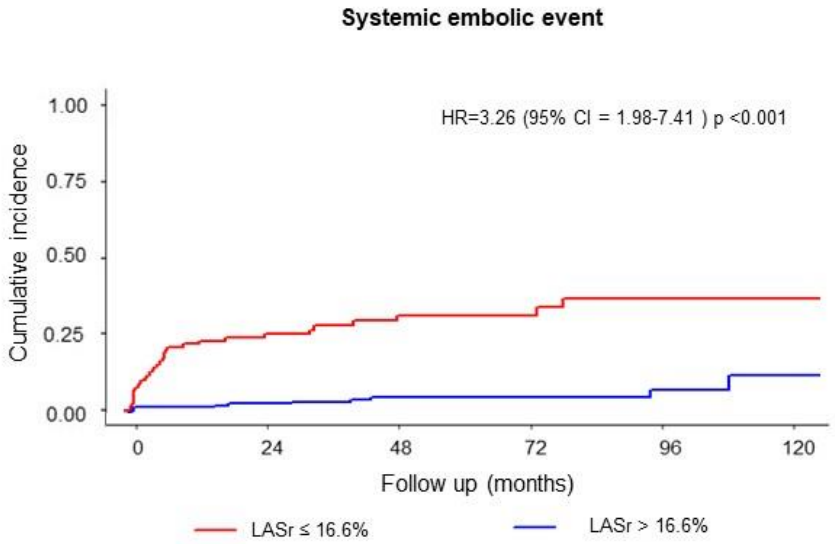
Variables*	HR (95% CI)	p value	HR (95% CI)	p value
	Censored for AF		Adjusted time dependent AF	
LAVI	1.006 (0.992-1.020)	0.500	1.005 (0.995-1.016)	0.336
LA AP dimension	1.014 (0.986-0.968)	0.561	1.020 (0.990-1.051)	0.288
LASr	0.857 (0.802-0.903)	<0.001	0.837 (0.797-0.880)	<0.001
LAScd	0.803 (0.730-0.884)	<0.001	0.802 (0.762-0.885)	<0.001
LASct	0.877 (0.801-0.959)	0.004	0.824 (0.750-0.904)	<0.001
LASr >16.6%	Reference		Reference	
LASr ≤16.6%	2.98 (1.08-4.85)	<0.001	3.13 (1.11-5.97)	<0.001

*Adjusted for age, HTN, more than moderate MR, intervention

Under Revision

LASr

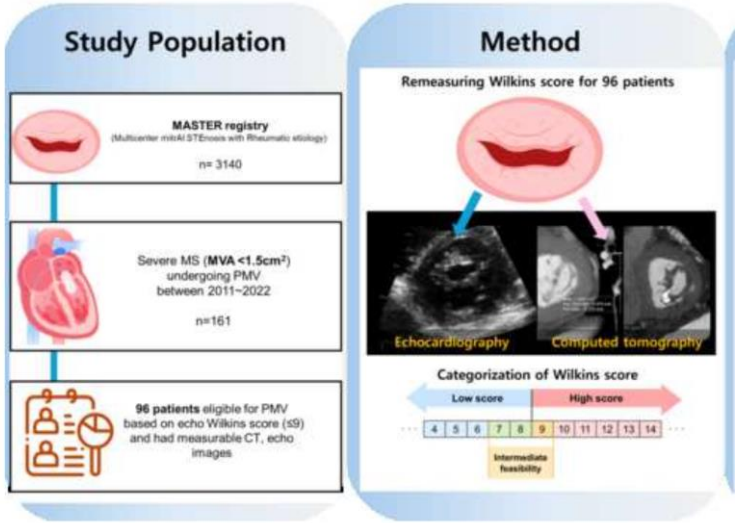


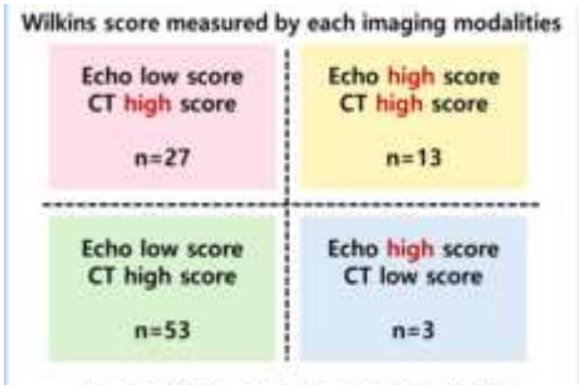


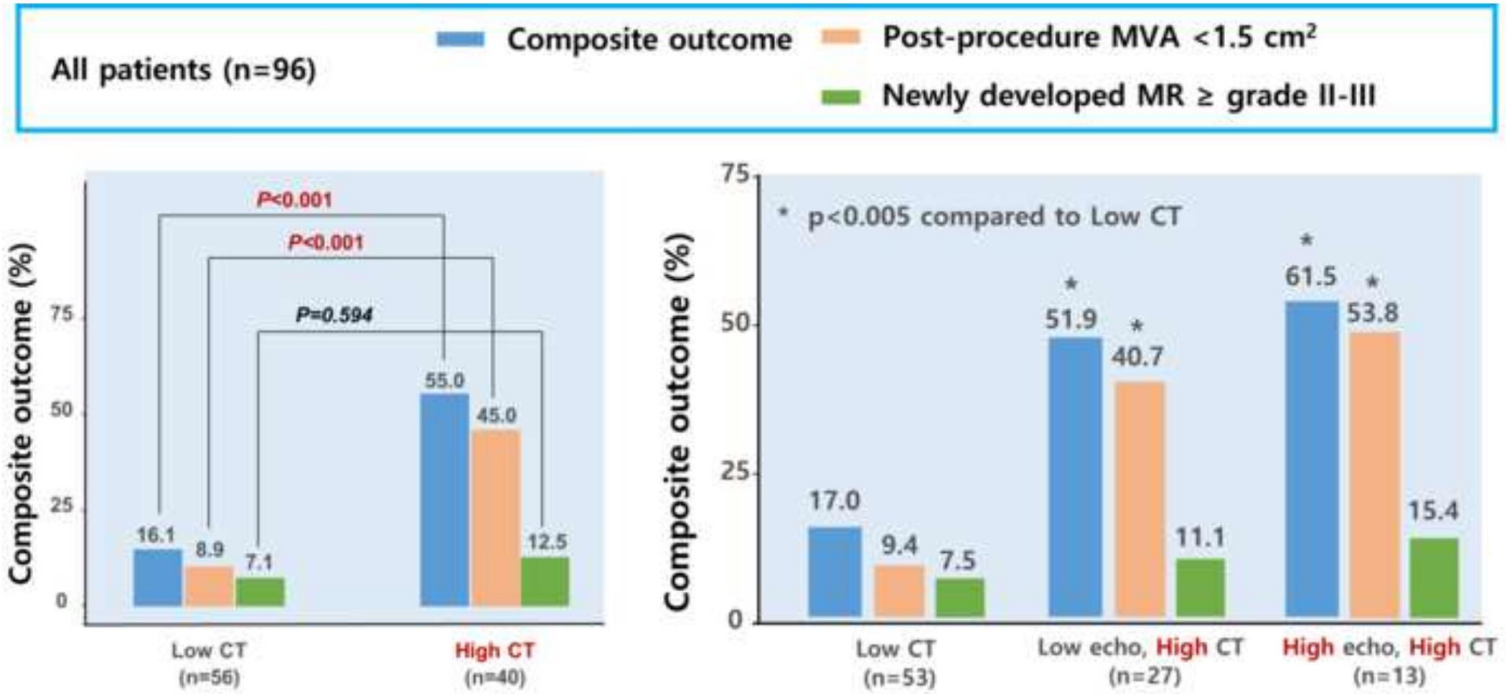
	C-index (95% CI)	p value	Net reclassification index (95% CI)	p value	Integrated discrimination improvement (95% CI)	p value
Model 1 as a reference	0.651 (0.561-0.723)	Ref.	Ref.	Ref.	Ref.	Ref.
Model 1 + MVA	0.672 (0.558-0.732)	0.734	0.324 (0.112-0.536)	0.654	0.025 (0.001-0.046)	0.732
Model 1 + LAVI	0.671 (0.573-0.731)	0.796	0.224 (0.089-0.475)	0.402	0.031 (0.007-0.054)	0.395
Model 1 + LASr	0.743 (0.702-0.837)	<0.001	0.745 (0.248-0.913)	0.005	0.089 (0.045-0.113)	0.008

Pre-PMV Evaluation: Role of CT in Severe MS with intermediate feasibility echo score for PMV

- Unsuccessful procedural outcome: suboptimal post-procedrual MVA (<1.5 cm^2) or newly developed MR grade ≥II.







- For PMV candidate patients with Wilkins score by echo ≥7, CT-based reclassification potentially improve patient selection and procedural outcomes.

HJ Lee, I Cho, JY Suh, GR Hong, Eur Heart J Cardiovasc Imaging. 2024 Dec 31:

MS: Pitfalls of PHT

- PHT reflects the rate at which left atrial and ventricular pressures move toward equilibrium in diastole.
- **PHT will be shortened if**:

- LV diastolic pressure rises faster than expected

Aortic regurgitation, Noncompliant ventricle

- LA pressures fall faster than expected

ASD, Noncompliant left atrium (chronic AF)

- **PHT will be lengthened if:**

- LV diastolic pressure rises slower that expected

Abnormal LV relaxation (note: peak velocities usually low)

Pressure gradient; Pitfalls

High gradient with large MVA

- High forward output
  - Hyperdynamic LV with high output: anemia, exercise
  - Significant mitral regurgitation
- Tachycardia: shortens diastolic filling period
- Subvalvular obstruction (chordal calcification)

Low gradient with small MVA

- Low forward output (Low stroke volume index < 35 cc/m2)
  - Reduced LV function with low cardiac output
  - Increased LV diastolic pressures (diastolic dysfunction , AR)
- Low LA pressure (ie: with bradycardia)