ACC Latin America Conference 2017

MEXICO CITY

JUNE 22 – 24, 2017

GLOBAL EXPERTS, LOCAL LEARNING

SOLUTIONS FOR EVERY DAY PROBLEMS

Imaging Insights for the Mitral Valve

ACC Latin America Conference 2017

Mitral Regurgitation

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No disclosure

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A 62-year-old woman, Mexican-Hispanic.

No history of Rheumatic Fever.

In 1986, at 31y, she was diagnosed with ***atrial septal defect and mitral valve prolapse*** with mild mitral regurgitation. She was operated of surgical closure of the interatrial defect.

In 2009, at 54y, Systemic Arterial Hypertension was detected and she actually is taking enalapril 10 mg. twice /day.

In 2010, at 55y, Type 2-Diabetes Mellitus was detected and she has been treated with glimepiride and metformin.

What about association between ASD and MVP?

1. The involvement of the mitral valve is frequent in patients with ASD
2. Lutembacher Syndrome is the association of ASD with MVP.
3. It is probable that the mitral lesion results in progressive mitral regurgitation.

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The prevalence of Primary MVP is 2.5%. Tricuspid valve prolapse has been observed in up to 40-50% of patients with primary or nonsyndromic MVP. Also occurs in the presence of connective tissue disorders like Marfan syndrome, Loeys-Dietz and Ehlers-Danlos syndrome.

The association of prolapse of the mitral valve with secundum atrial septal defect is common and may be present in the absence of any clinical evidence of a mitral valve lesion.

The prevalence of clinically silent prolapse in association with secundum atrial septal defect is from 17 % to 50% in some studies, but incidence increase with age.

The characteristic feature of the mitral lesion accompanying secundum atrial septal defect is a dislocation of the mitral leaflet toward the left atrial side in the area of coaptation.

It is probable that the mitral lesion results in progressive mitral regurgitation.

Br Heart J 1983: 49: 51-38
J Heart Valve Dis. 2014 May;23(3):310-5.

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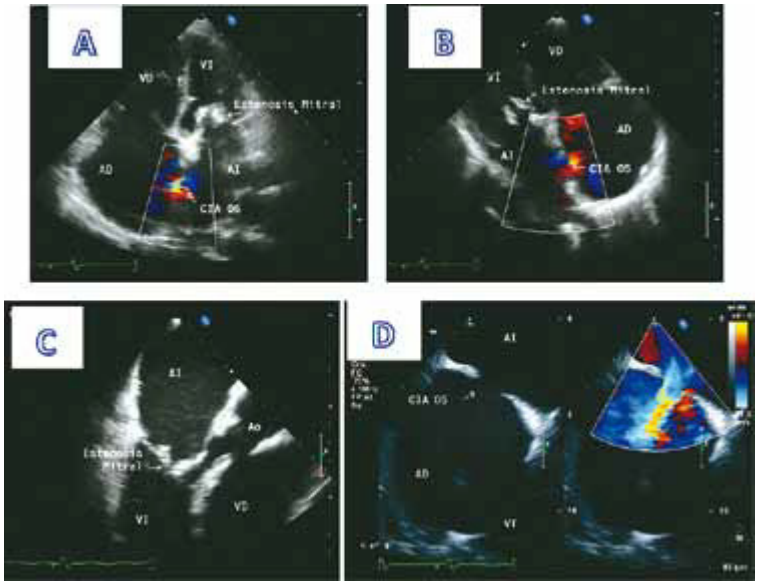
This association is not a Lutembacher Syndrome Typically Lutembacher Synd was described in patients with ASD and rheumatic mitral stenosis.



Rev Chil Cardiol 2010; 29: 263

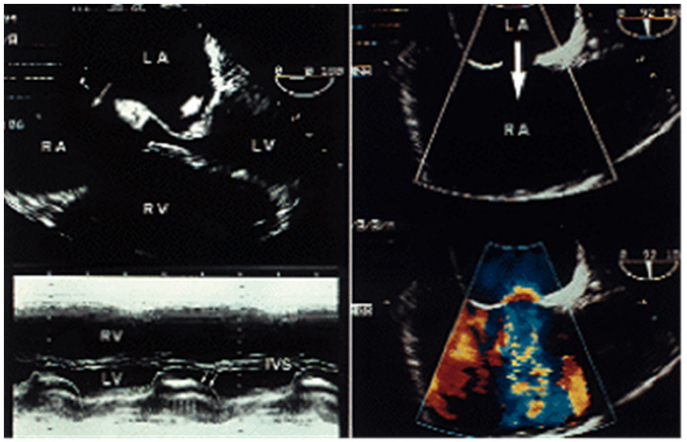


Figura. Superior izquierda: *ecocardiograma transesofágico, proyección de 4 cámaras. Estenosis de la válvula mitral con doming marcado de la valva anterior. No se aprecia una clara calcificación de la válvula (flecha gruesa). El área valvular mitral calculada mediante la ecuación de continuidad fue de 1 cm².* La comunicación interauricular tipo ostium secundum se aprecia claramente (flecha fina). Inferior izquierda: *ecocardiograma transtorácico en modo M, proyección paraesternal de eje largo. Disminución de la pendiente E-F de la valva anterior mitral (flechas blancas) y movimiento anterior de la valva posterior (flechas negras). Dilatación del ventrículo derecho.* Superior derecha: *visualización de la comunicación interauricular tipo ostium secundum mediante ecocardiografía transesofágica. La flecha pasa a través del defecto desde la aurícula izquierda hasta la aurícula derecha.* Inferior derecha: *la misma imagen con Doppler-color. En la aurícula derecha se aprecia el cortocircuito izquierda a derecha como un flujo multicolor de alta velocidad con fenómeno de aliasing. En el lado izquierdo del defecto se aprecia la aceleración proximal del flujo con las superficies de isovelocidad en forma de arco iris. El cociente de flujo pulmonar/sistémico fue 2.1;* LA: aurícula izquierda; RA: aurícula derecha; LV: ventrículo izquierdo; RV: ventrículo derecho; IVS: septo interventricular.

Rev Esp Cardiol. 1998;51:762

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Symptoms:

Progressive *Dyspnea* that has been presented to moderate efforts
Palpitations, rhythmic that dissapeared spontaneously in a few seconds

Physical Examination

BMI 24.3 Kg/m^2, BP 110/70 mmHg., 36^{o}C, 48x´.
Jugular venous distention at 4 cm from sternum. No hepatoyugular reflux. Carotid pulse was normal. No hyperdynamic cardiac impulse and prominent LV filling wave was noted.
S1 diminished, with holosystolic murmur over the apex; that radiates to the left axilla. S_2 splitting is not fixed. No S3 and P2 was not accentuated. Tricuspid regurgitant murmur, no pansystolic, w/o Rivero-Carvallo´s sign.
No enlargement of liver and spleen. No edema. Arterial pulses examination was normal.

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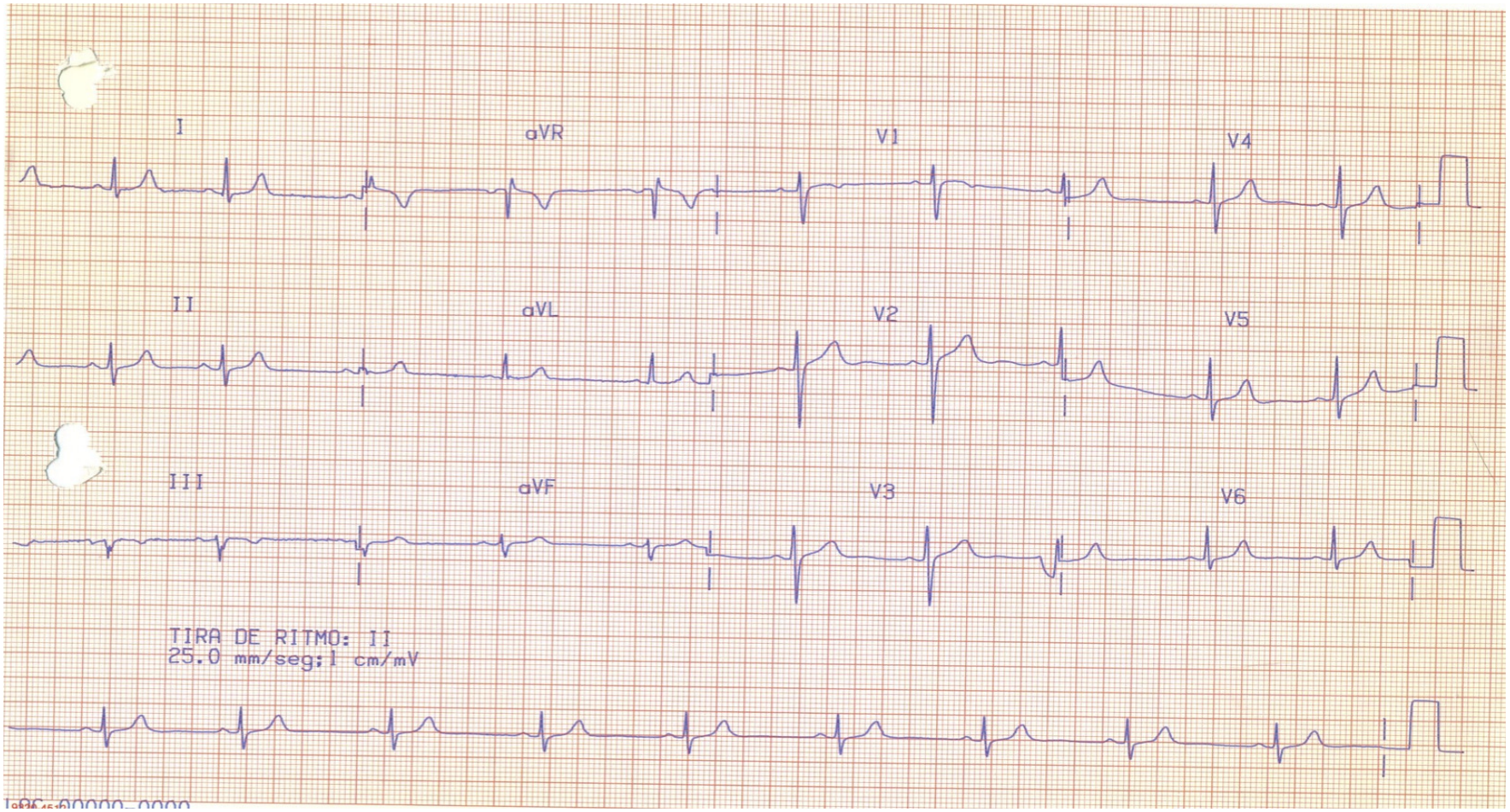

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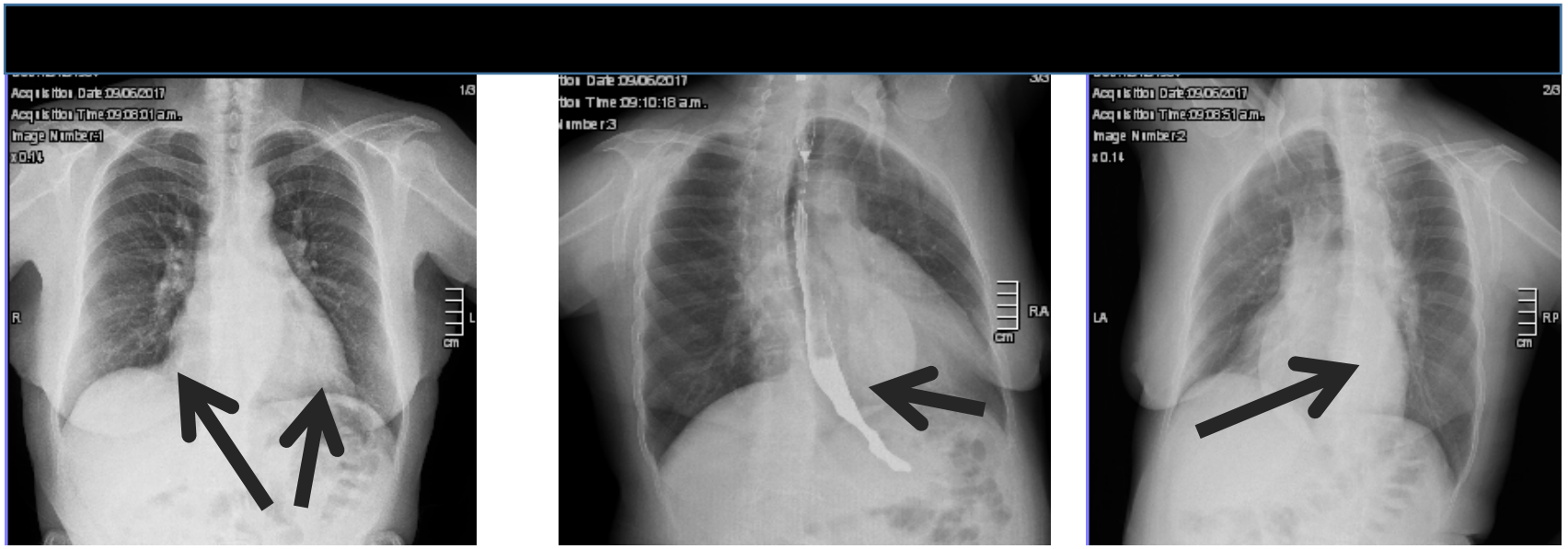

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Regarding the severity of Mitral valve injury ¿What is your opinion?

1. The holosystolic murmur that diminishes S1 indicates that mitral regurgitation is severe.
2. There is dissagreement between clinical examination, electrocardiogram and X-ray
3. Tricuspid regurgitation is severe

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There is a disagreement between the clinical examination, the chest X-rays and the electrocardiogram

Decreased S1 and mitral holosystolic murmur with irradiation to the axilla are clinical signs of severity, but the electrocardiographic and X-ray signs are discordant.

Jugular venous distention with a non prominent V wave, No Rivero-Carvallo´s sign, w/o ascites and peripheral edema.

Echocardiography is the diagnostic imaging modality of choice

Rivero-Carvallo JM. Signo para el diagnóstico de las insuficiencias tricuspideas. *Archivos del Instituto de cardiologia de Mexico*, 1946, 16: 531.

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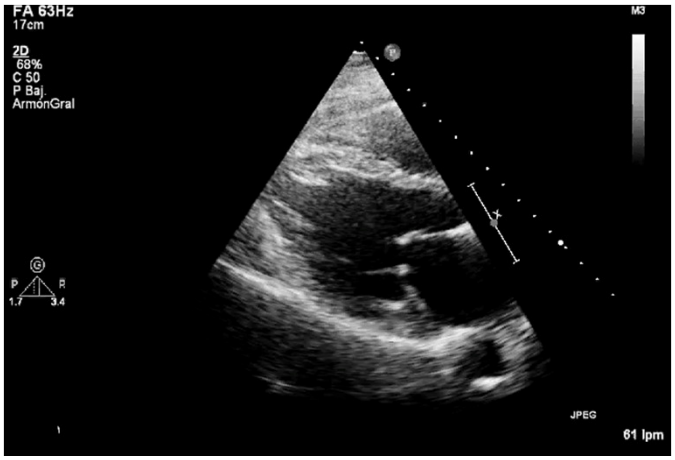

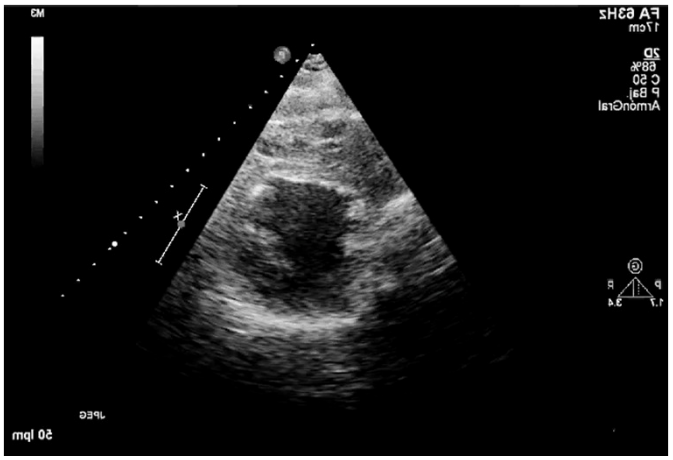

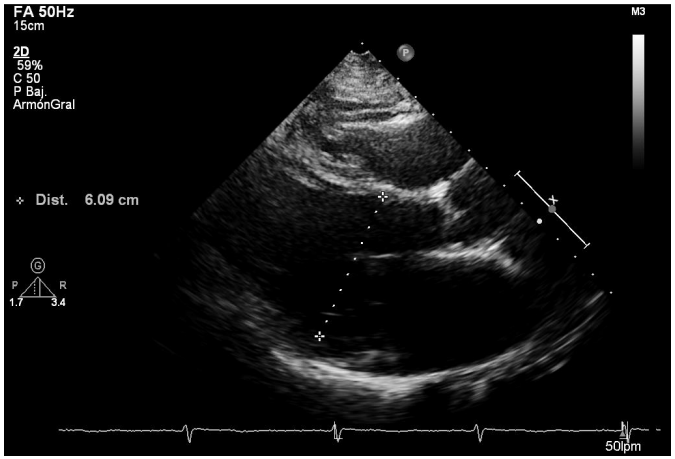

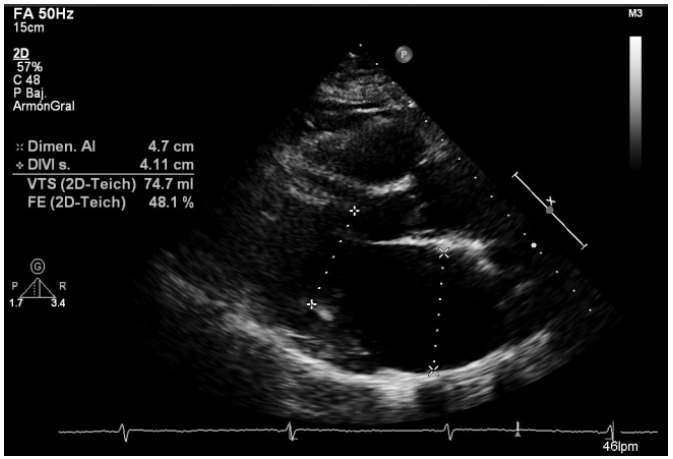

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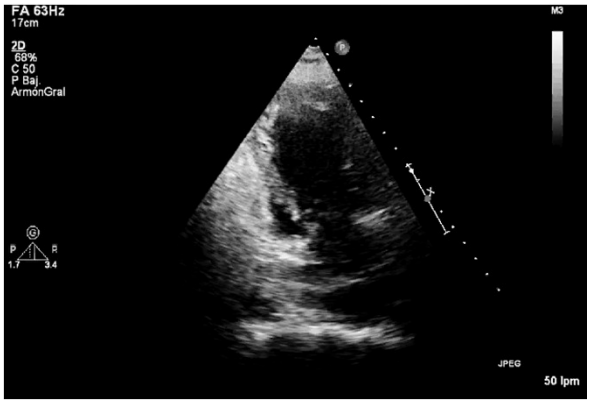

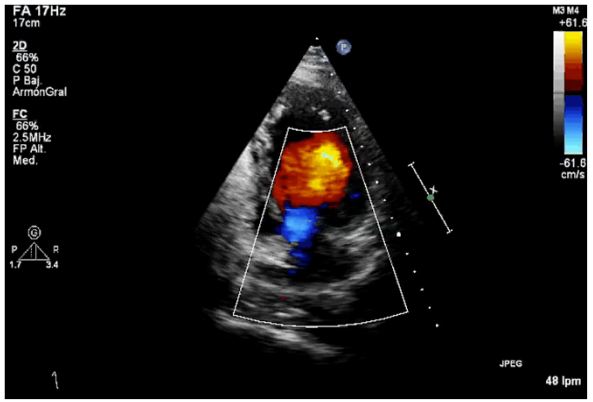

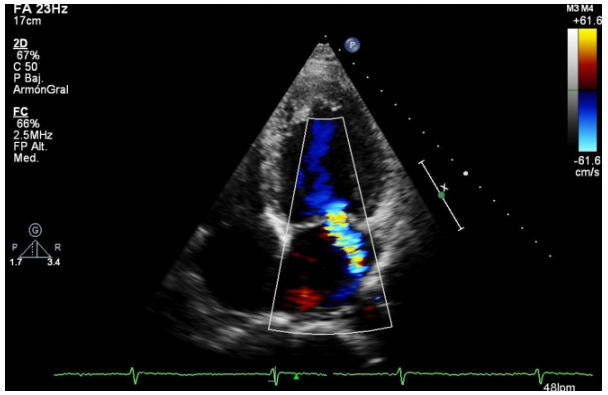

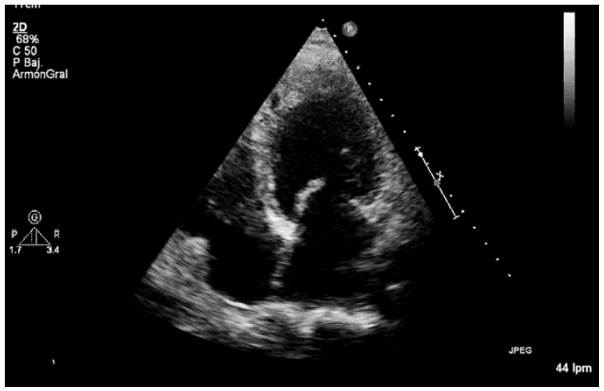

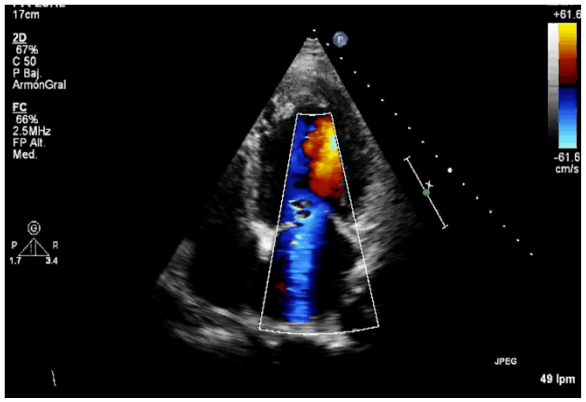

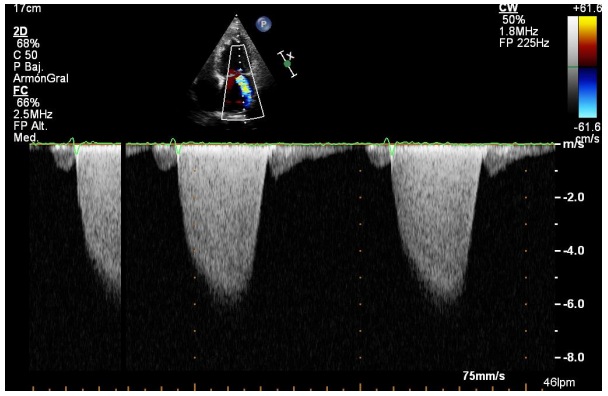

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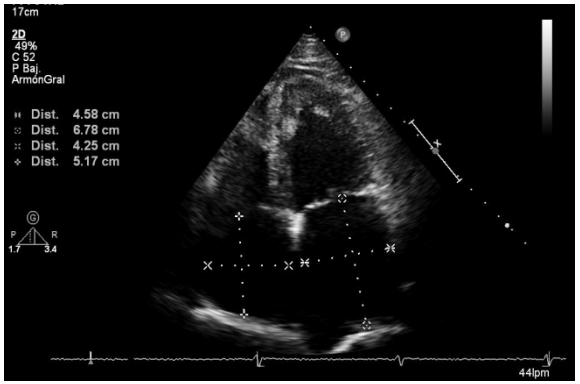

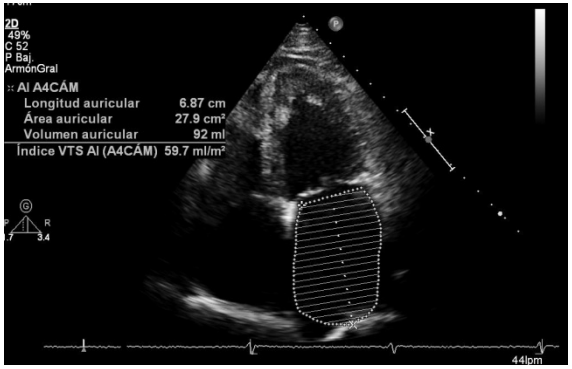

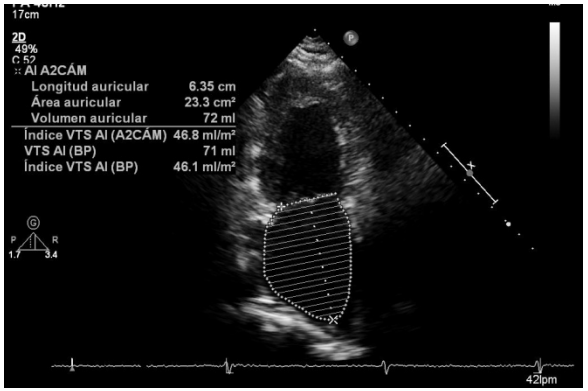

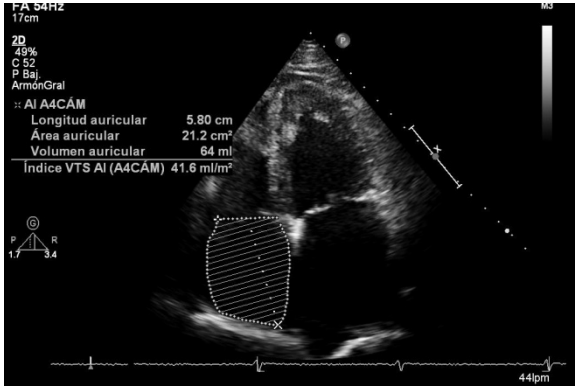

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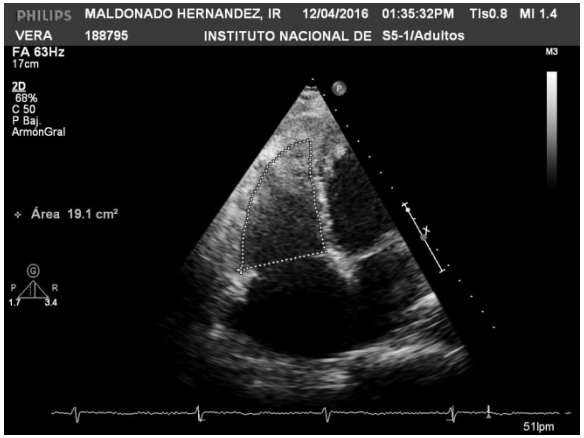

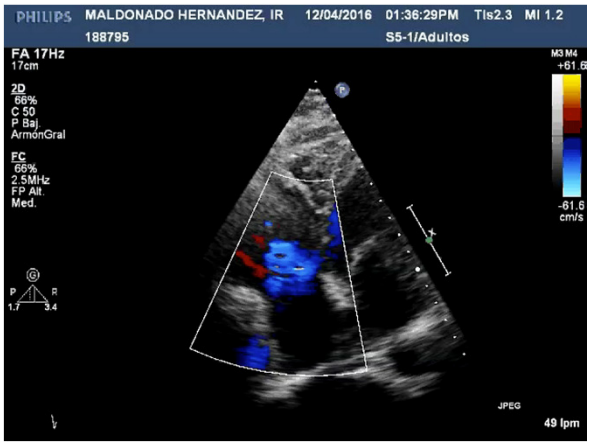

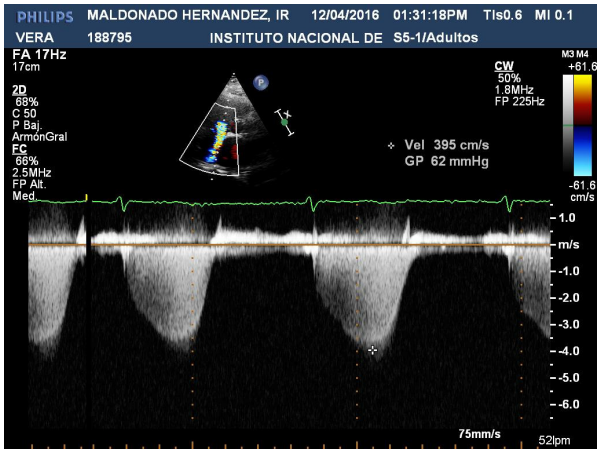

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Holosystolic eccentric jet of MR

RO = 0.3 cm ^{2}

EROA = 40 mm ^{2} (>= 40 mm ^{2})

Vena contracta = 6 mm

PISA could not be cuantified.

Moderate tricuspid regurgitation

Normal RV function

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Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
D	**Symptomatic severe MR**	• **Severe mitral valve prolapse with loss of coaptation or flail leaflet** • Rheumatic valve changes with leaflet restriction and loss of central coaptation • Prior IE • Thickening of leaflets with radiation heart disease	• Central jet MR >40% LA or **holosystolic eccentric jet MR** • Vena contracta ≥0.7 cm • Regurgitant volume ≥60 cc • Regurgitant fraction ≥50% • ERO ≥0.40 cm^2 • Angiographic grade 3–4+	• **Moderate or severe LA enlargement** • **LV enlargement** • **Pulmonary hypertension present**	• **Decreased exercise tolerance** • **Exertional dyspnea**

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Questions:

Which are the key points in the echocardiographic evaluation of the mitral valve?

In this case of eccentric jet what else you recommend in the assessment of mitral valve regurgitation? TEE?, 3D-TEE?, stress or exercise echocardiogram?

Is indicated (class I) to perform catheterization with angiography and ventriculography?

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Valve analysis should integrate the assessment of the aetiology, the lesion process and the type of dysfunction. The distinction between a primary and a secondary cause of MR is mandatory. The diameter of the mitral annulus, the leaflet involved in the disease process and the associated valvular lesions should be carefully described in the final report

TTE is recommended as the first-line imaging modality for mitral valve analysis. TEE is advocated when TTE is of non-diagnostic value or when further diagnostic refinement is required. 3D-TEE or TTE is reasonable to provide additional information in patients with complex mitral valve lesion.

TEE is not indicated in patients with a good-quality TTE except in the operating room when a mitral valve surgery is performed.

European Journal of Echocardiography (2010) 11, 307–332 doi:10.1093/ejechocard/jeq031

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The colour flow area of the regurgitant jet is not recommended to quantify the severity of MR. The colour flow imaging should only be used for diagnosing MR. A more quantitative approach is required when more than a small central MR jet is observed

When feasible, the measurement of vena contracta is recommended to quantify MR. **Intermediate vena contracta values (3–7 mm) need confirmation** by a more quantitative method, when feasible. The vena contracta can often be obtained in eccentric jet. In case of multiple jets, the respective values of the vena contracta width are not additive. The assessment of the vena contracta by 3D echo is still reserved for research purposes.

PISA method is highly recommended to quantitate the severity of MR. **It can be used in both central and eccentric jets.** An EROA ≥ 40 mm2 or a R Vol ≥ 60 mL indicates severe organic MR. In functional ischaemic MR, an EROA ≥ 20 mm2 or a R Vol ≥ 30 mL identifies a subset of patients at increased risk of cardiovascular event

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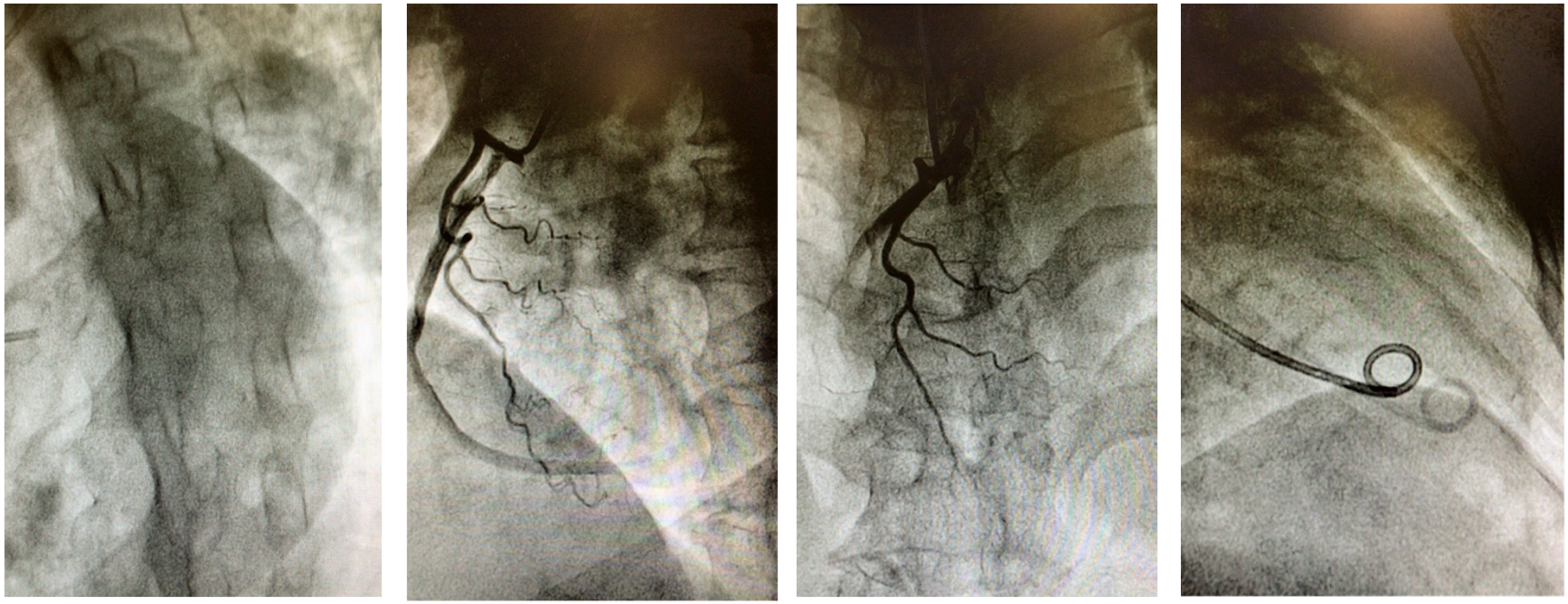

CATH – Angiography & Ventriculography

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The patient continues with dyspnea to moderate efforts
Chest pain no related with exertion
Same cardiovascular examination

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Questions:

Whtat do you recommend?

1. Transesophagic Echocardiogram (3D echo)
2. Stress exercise echocardiogram
3. Cardiac Tomography
4. Cardiac Magnetic Resonance

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Primary Mitral Regurgitation

Recommendations	COR	LOE
Exercise hemodynamics with either Doppler echocardiography or cardiac catheterization is reasonable in symptomatic patients with chronic primary MR where there is a discrepancy between symptoms and the severity of MR at rest (stages B and C)	IIa	B
Exercise treadmill testing can be useful in patients with chronic primary MR to establish symptom status and exercise tolerance (stages B and C)	IIa	C

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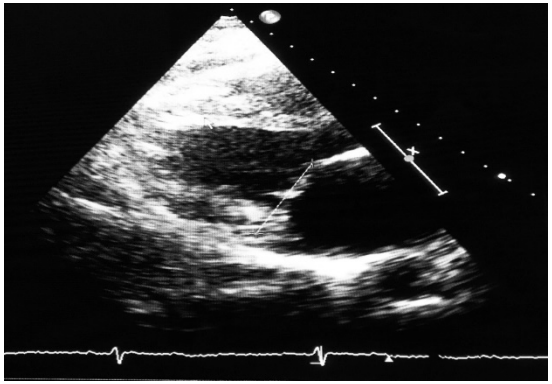
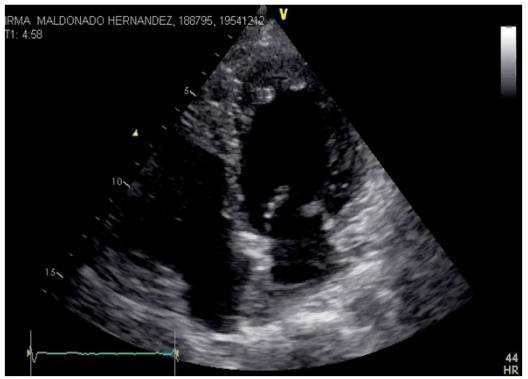
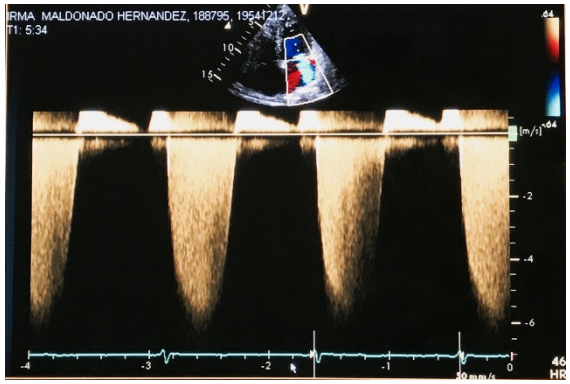
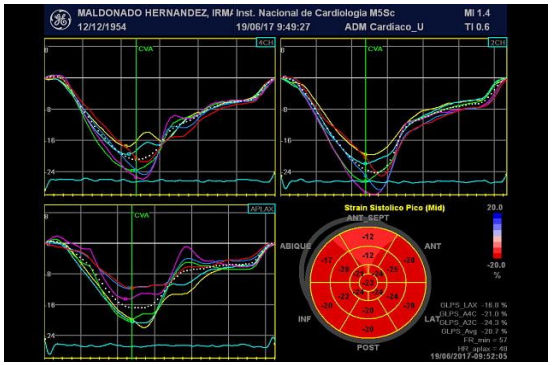
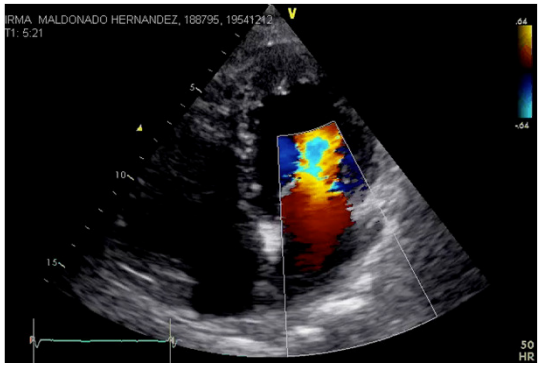
Exercise Stress Echocardiography

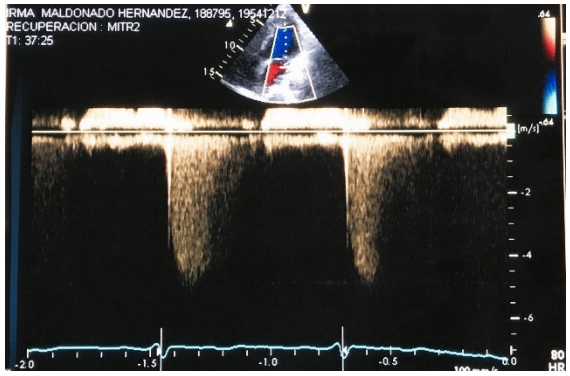












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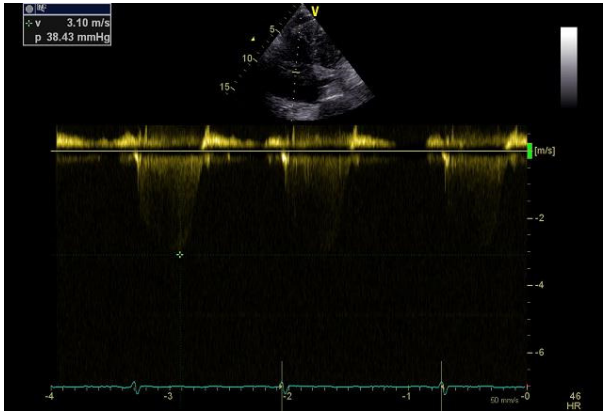
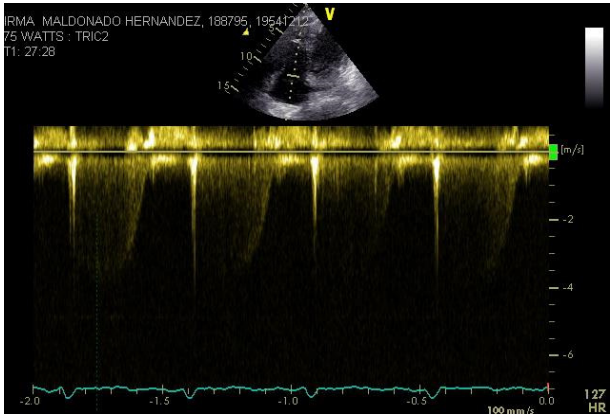
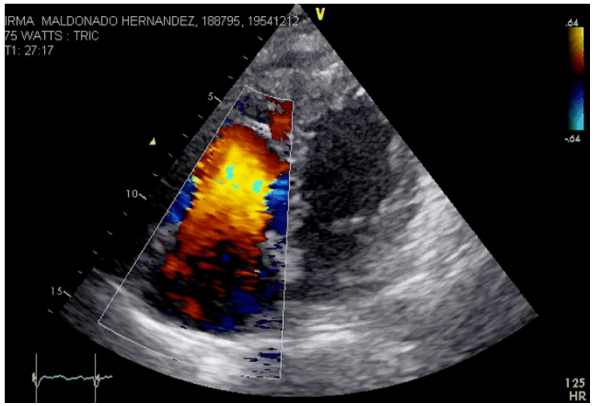
Exercise Stress Echocardiography







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Holosystolic eccentric jet of MR

RO = 0.42 cm ^{2}

EROA = 40 mm ^{2} (>= 40 mm ^{2})

Vena contracta = 7 mm

PISA could not be cuantified.

Moderate tricuspid regurgitation

Syst Pulmonary Pressure

From 32 to 60 mmHg.

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Questions:

Which are the key points in the exercise stress echocardiographic evaluation of the mitral valve?

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Both the pulsed Doppler mitral to aortic TVI ratio and the systolic pulmonary flow reversal are specific for severe MR. They represent the strongest additional parameters for evaluating MR severity

Exercise echocardiography is useful in asymptomatic patients with severe organic MR and borderline values of LV ejection fraction (60 –65%) or LV end-systolic diameter (closed to 40 mm or 22 mm/m2). The absence of contractile reserve could identify patients at increased risk of cardiovascular events. Moreover, exercise echocardiography may also be helpful in patients with equivocal symptoms out of proportion of MR severity at rest.

In the presence of TR, tricuspid valve analysis is mandatory. 2D-TTE imaging is the technique of choice. 3D-TTE can be used as an additive approach. TEE is advised in case of suboptimal TTE images. Distinction between primary and secondary TR is warrante

The colour flow area of the regurgitant jet is not recommended to quantify the severity of TR. When feasible, vena contracta and the PISA method is reasonable to quantify the TR severity

European Journal of Echocardiography (2010) 11, 307–332 doi:10.1093/ejechocard/jeq031

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Questions:

Whtat procedure do you recommend?

1. MitraClip
2. Mitral valve plasty with mitral annulus
3. Mitral Valve Replacement Surgery
4. Mitral Valve Replacement with tricuspid plasty
5. Mitral and Tricuspid Replacement

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Mitral Regurgitation

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Thak you