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Insuffisance mitrale

Anatomie et physiopathologie

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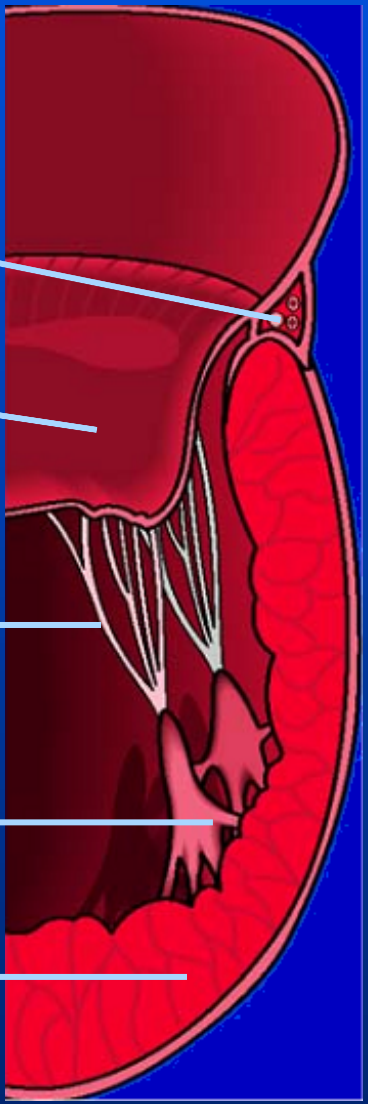
Appareil mitral



Dilatation
Calcification

Anneau

Perforation
Cleft
Redundancy
Prolapse
Thickening
Commissural fusion

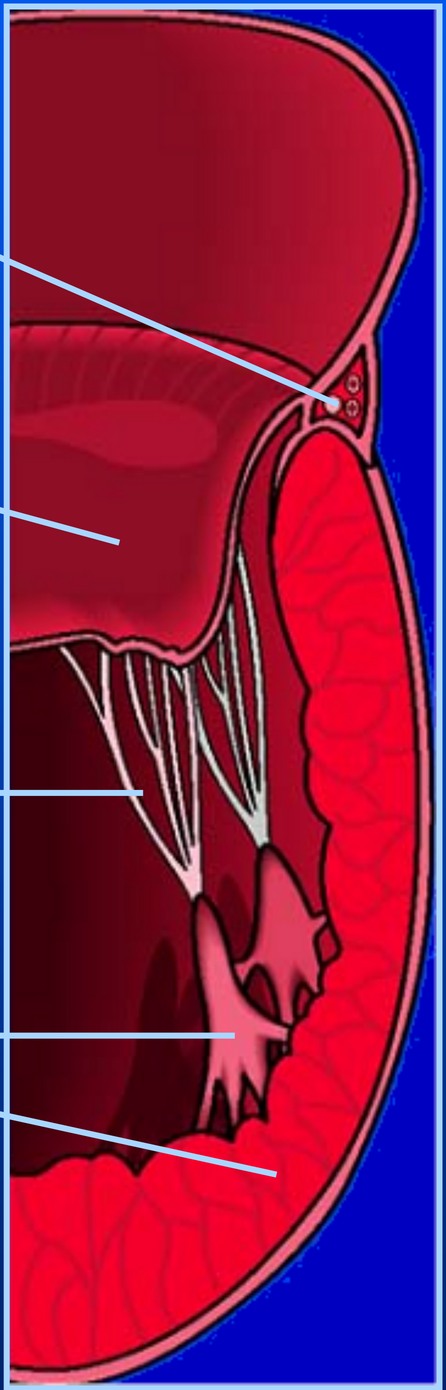
Valves

Abnormal insertion
Elongation
Rupture
Thickening/fusion

Cordages

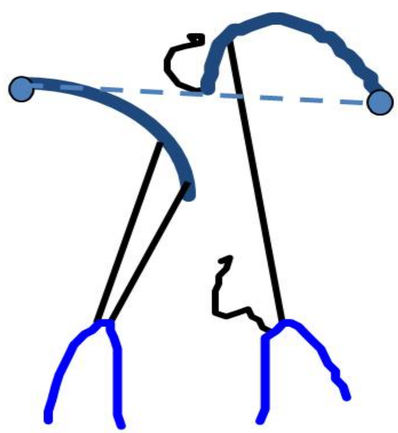
Ischemia
Fibrosis
Rupture

Muscles Papillaire et myocarde sous-jacent



Classification de Carpentier

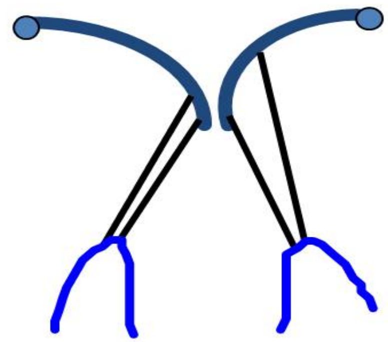
Type II



Mouvements valvulaires exagérés

Prolapsus

Type I

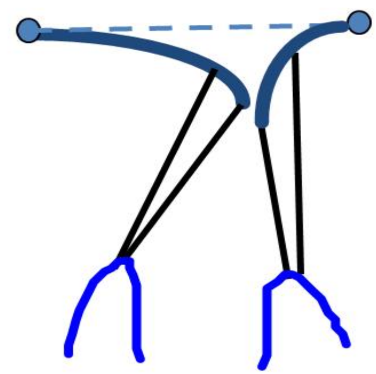


Mouvements valvulaires normaux

Dilatation annulaire ou perforation valvulaire

Fusion commissurale, rétraction des feuillets ou de l'appareil sous-valvulaire

Type III



Mouvements valvulaires limités

IM organiques vs. fonctionnelles

Anomalies structurelles

Anomalies fonctionnelles

- **Cardiopathie ischémique**
- **Cardiopathie dilatée**

IM organique

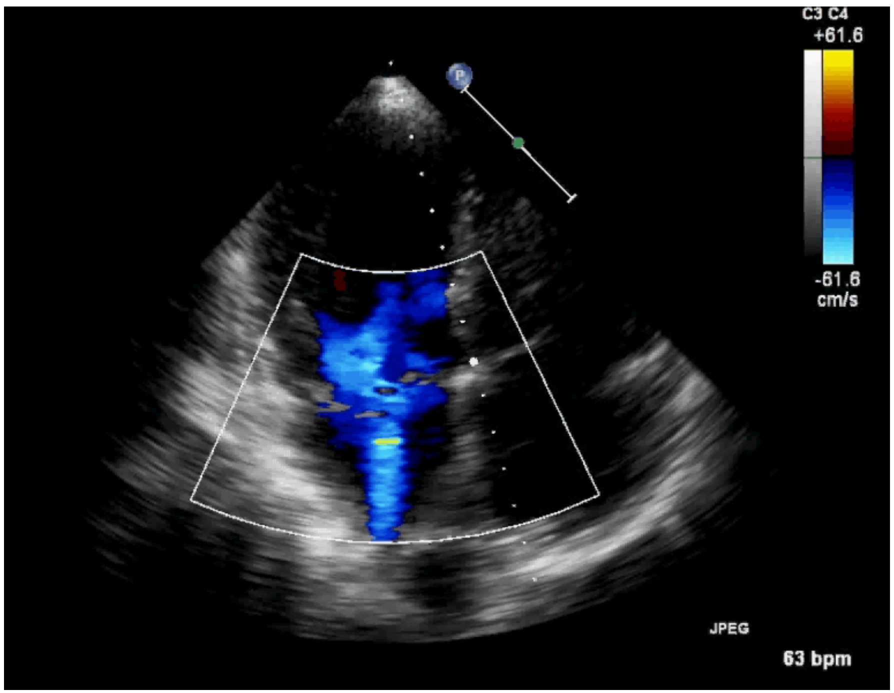
(Dystrophique, dégénérative, rhumatismale, endocardite infectieuse, causes rares: Marfan, LEAD, CMH, congénitale…)

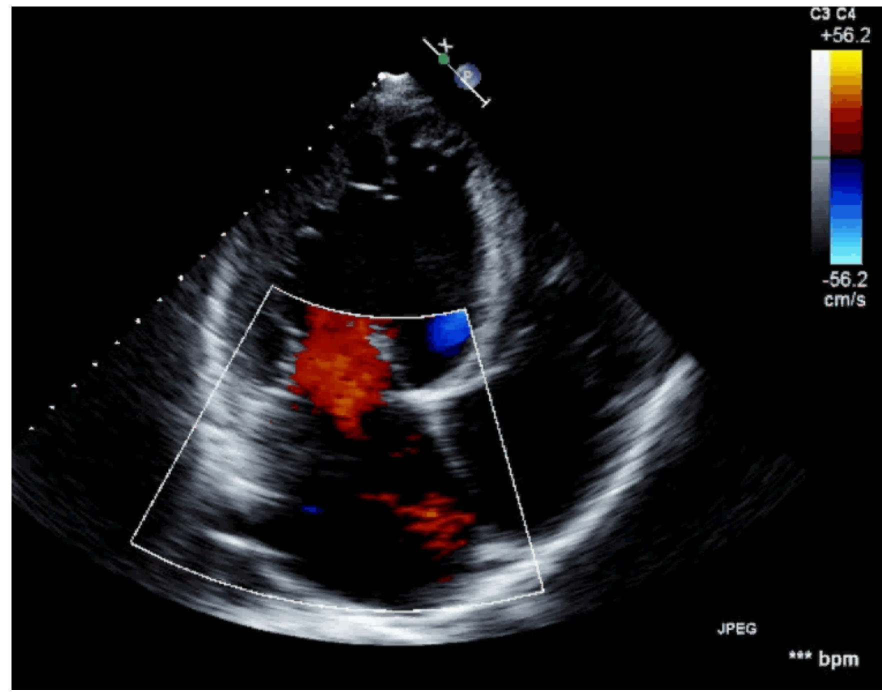
IM fonctionnelle

(Absence d'anomalie structurelle de la valve mitrale ou de l'appareil sous-valvulaire)


IM
mique

Organic (OMR) vs. Functional MR





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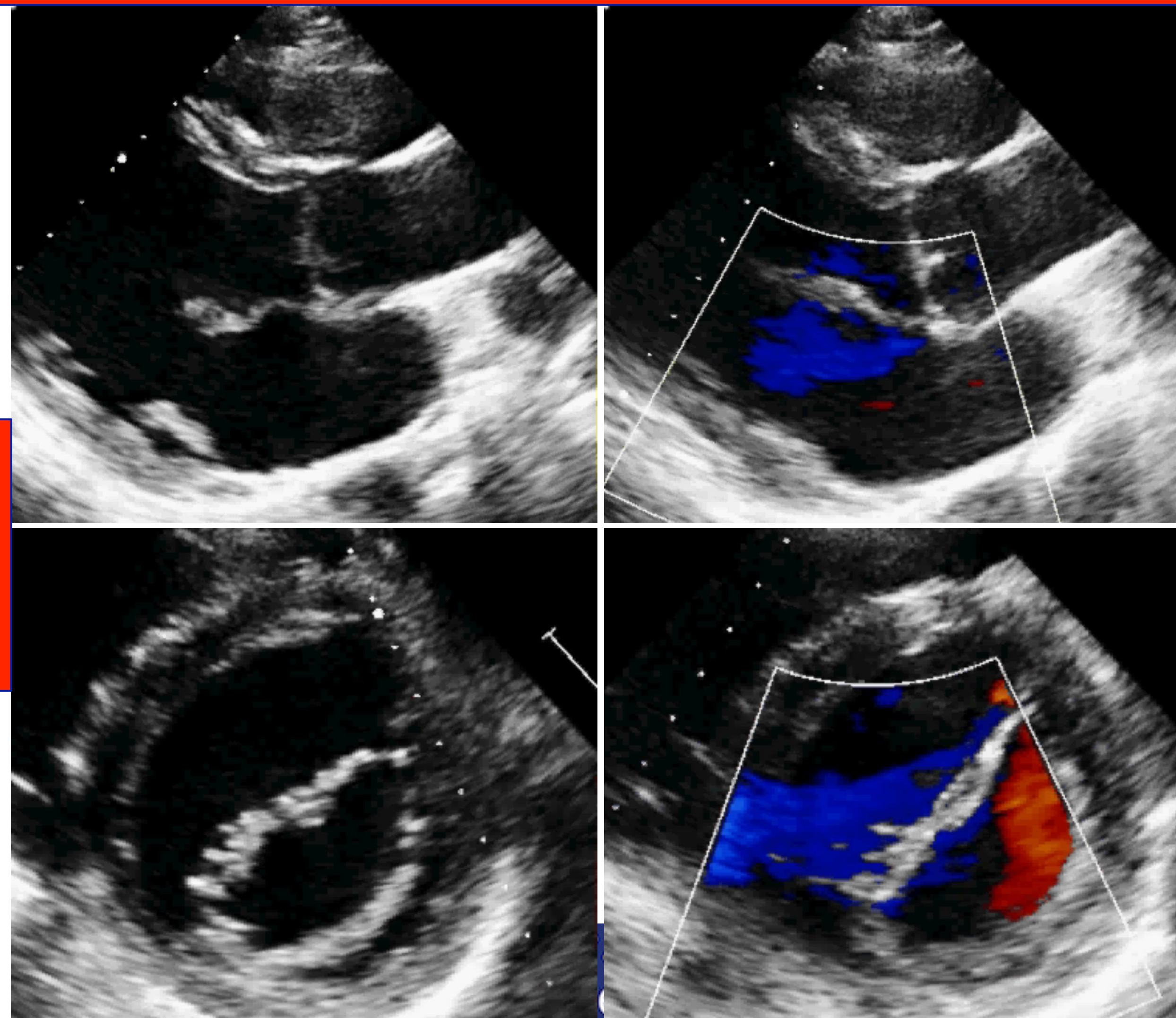

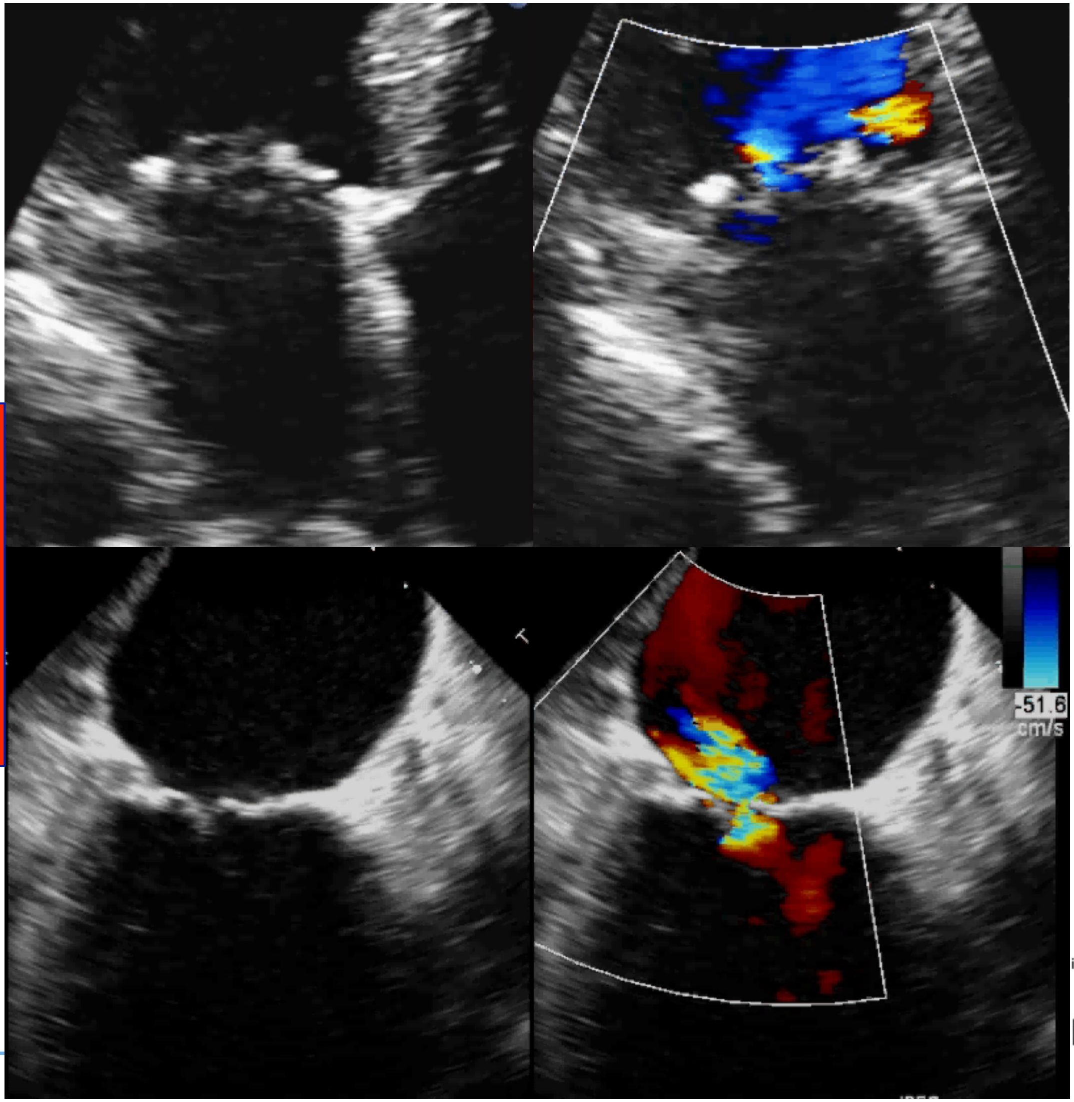

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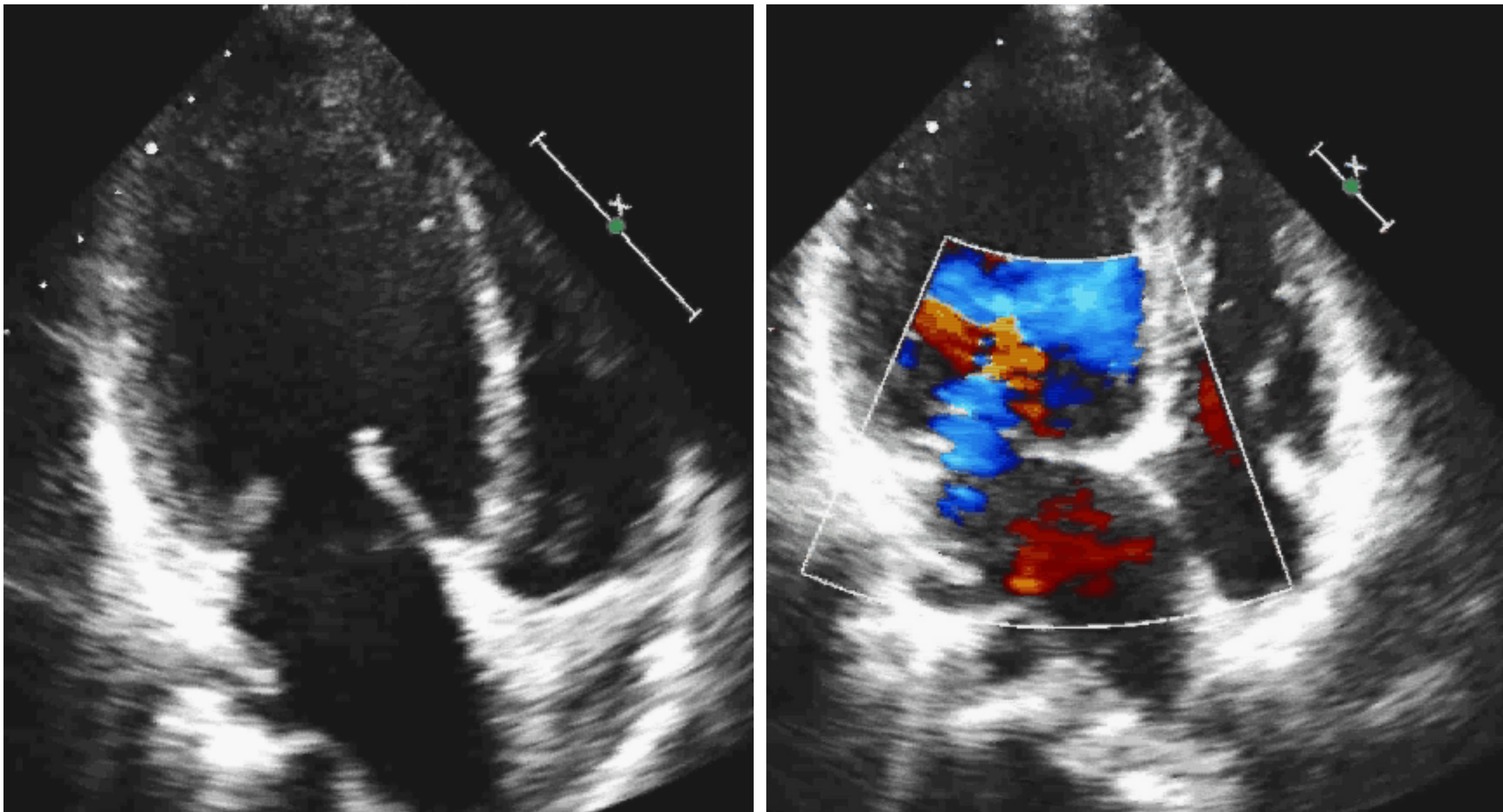

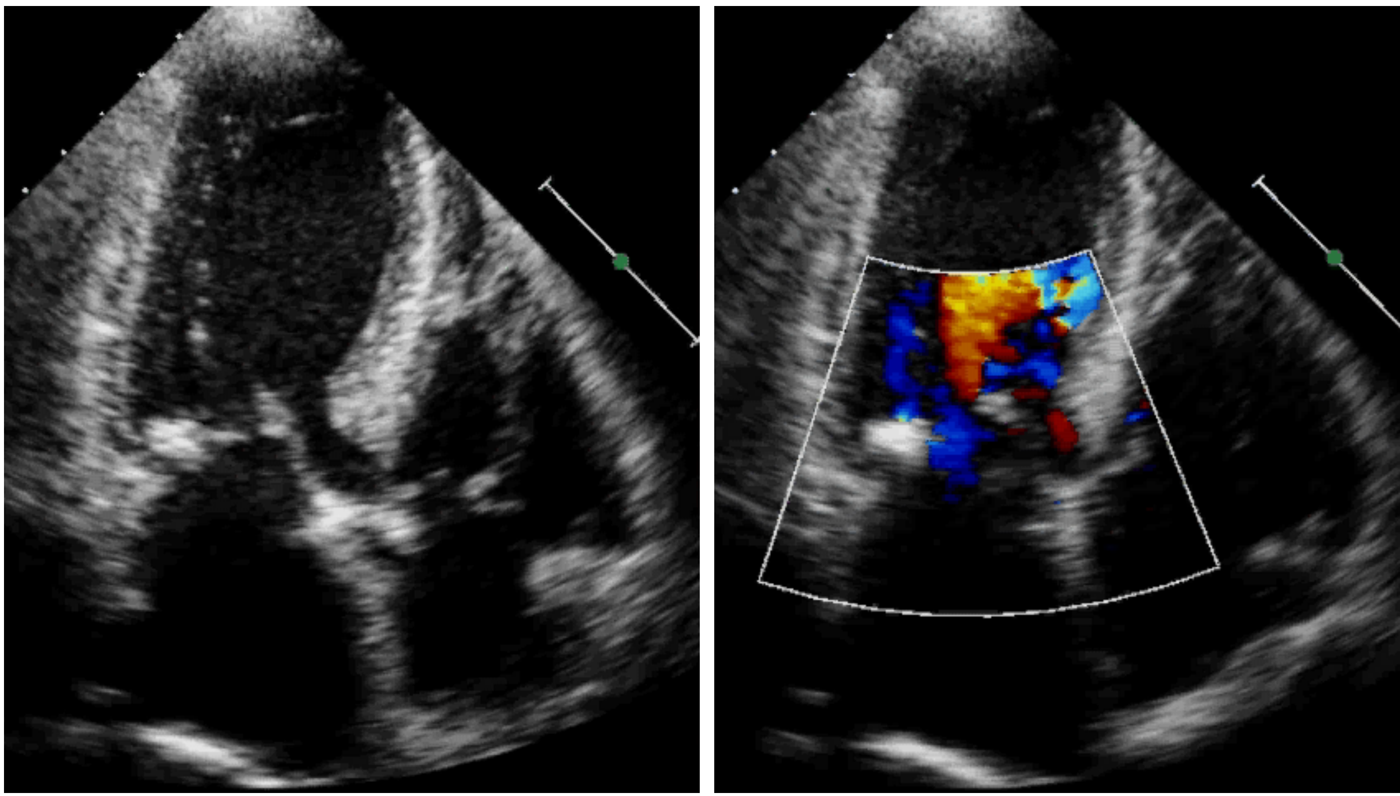

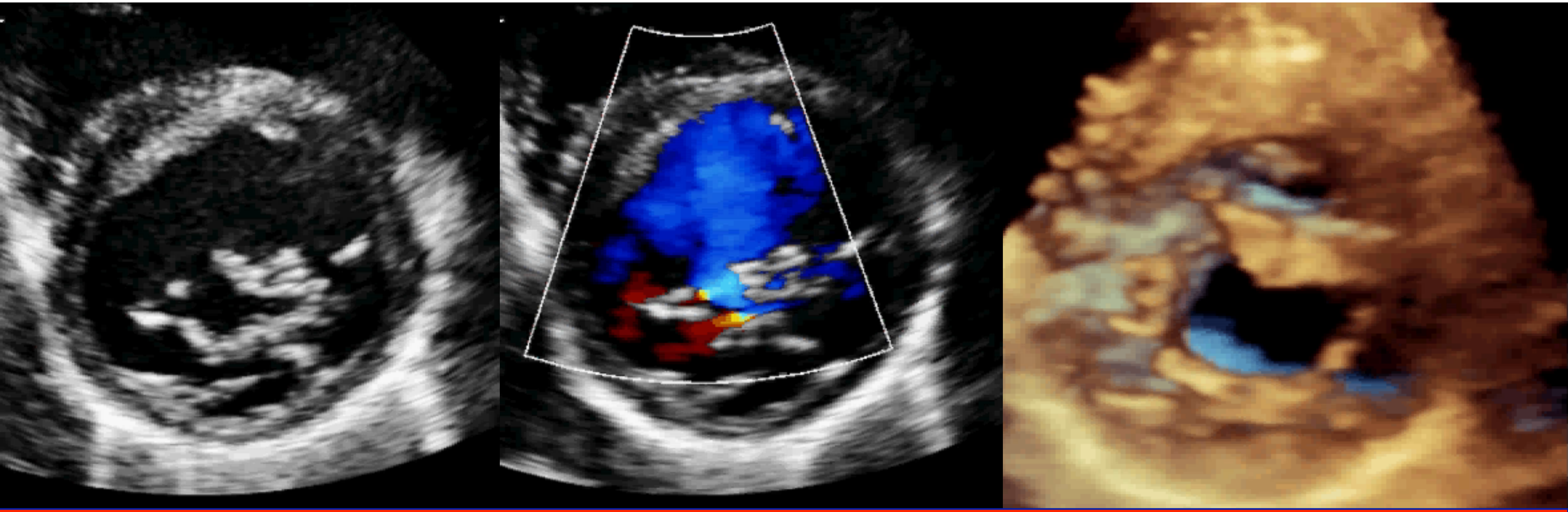

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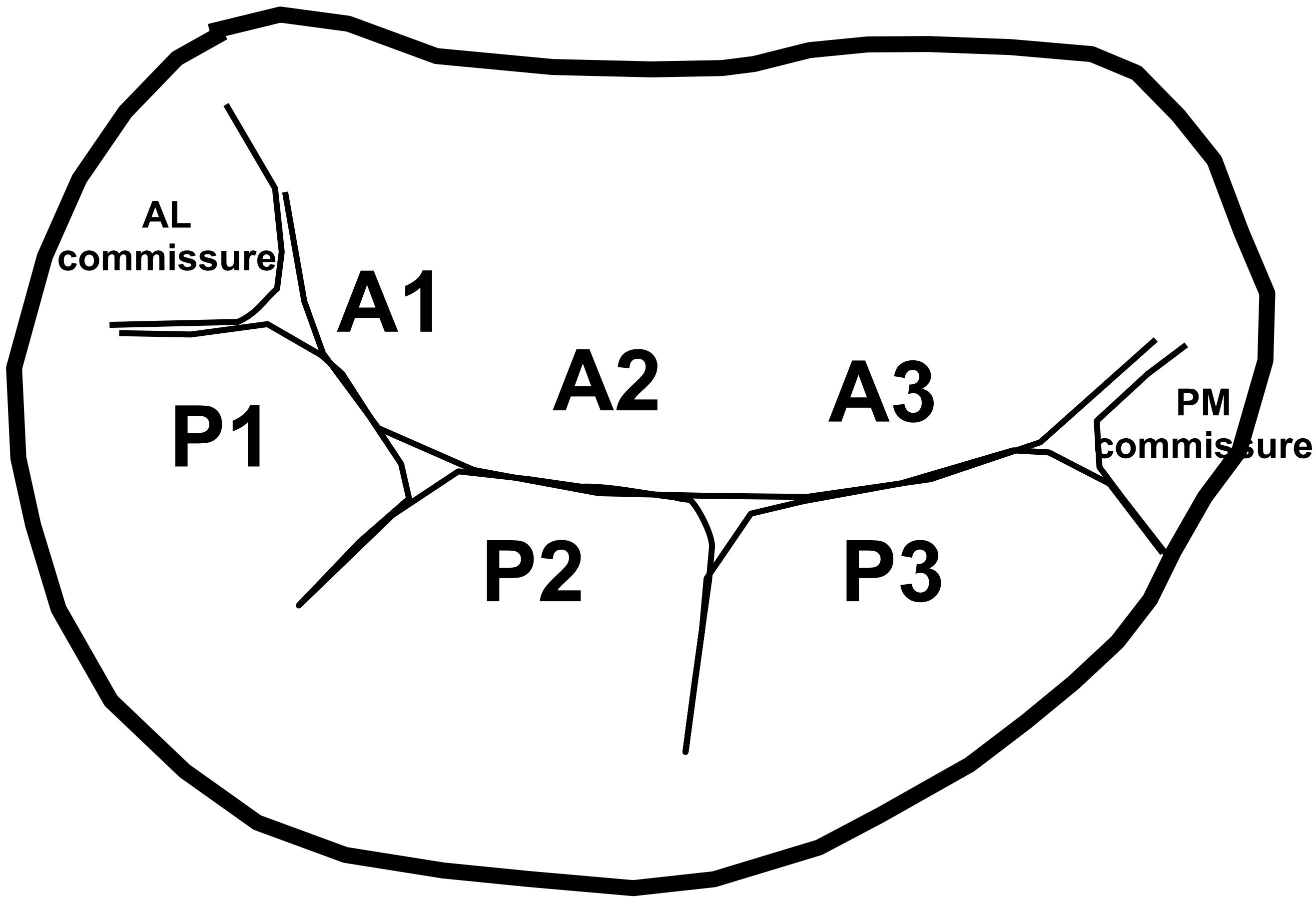
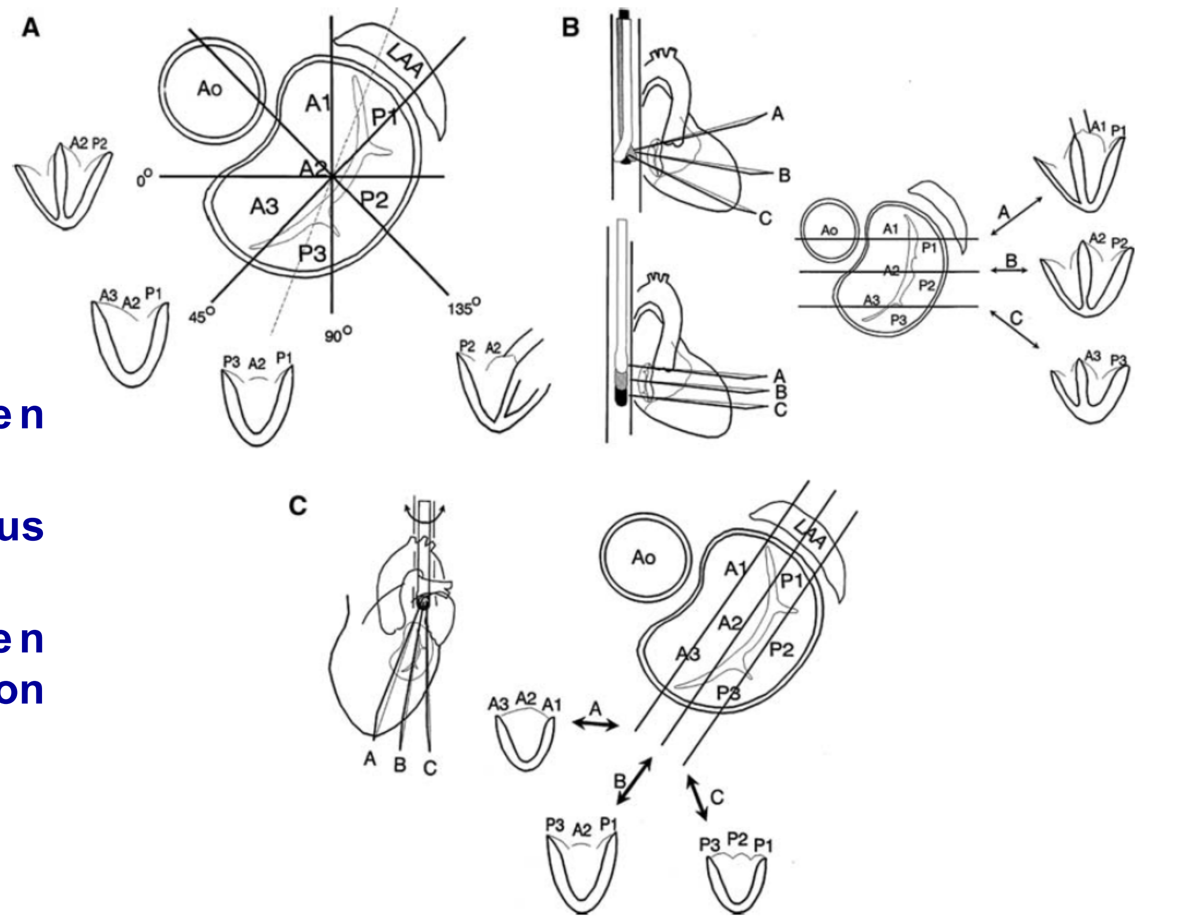
Segmentation mitrale



Analyse segmentaire de la valve mitrale en ETO

Flachskampf, Recommendations for transoesophageal echocardiography: European Journal of ehocardiography 2010 11, 557–576

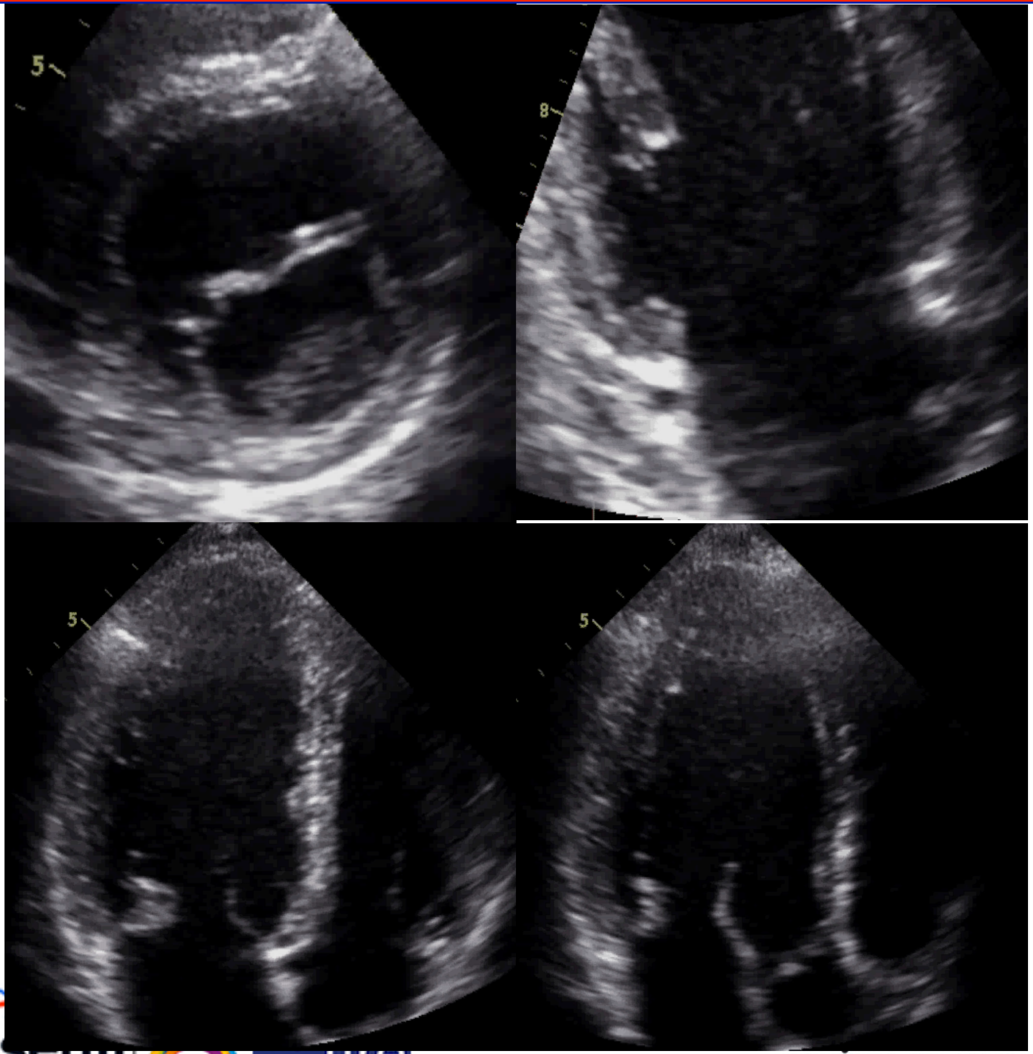


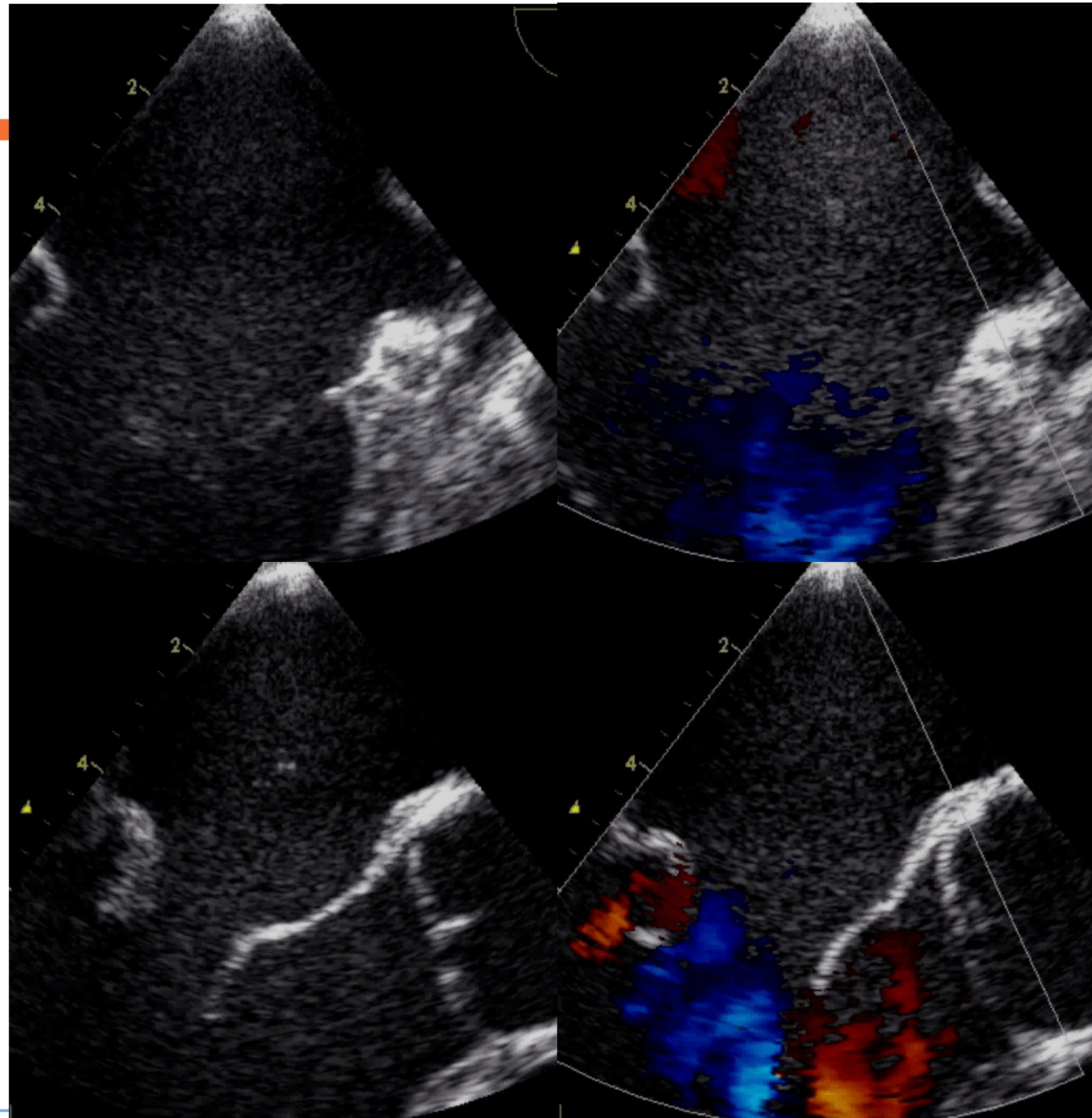
Les différents niveaux :

(A) Niveau transoesophagien médian, rotation du moteur

(B) Niveau transoesophagien plus ou moins profond

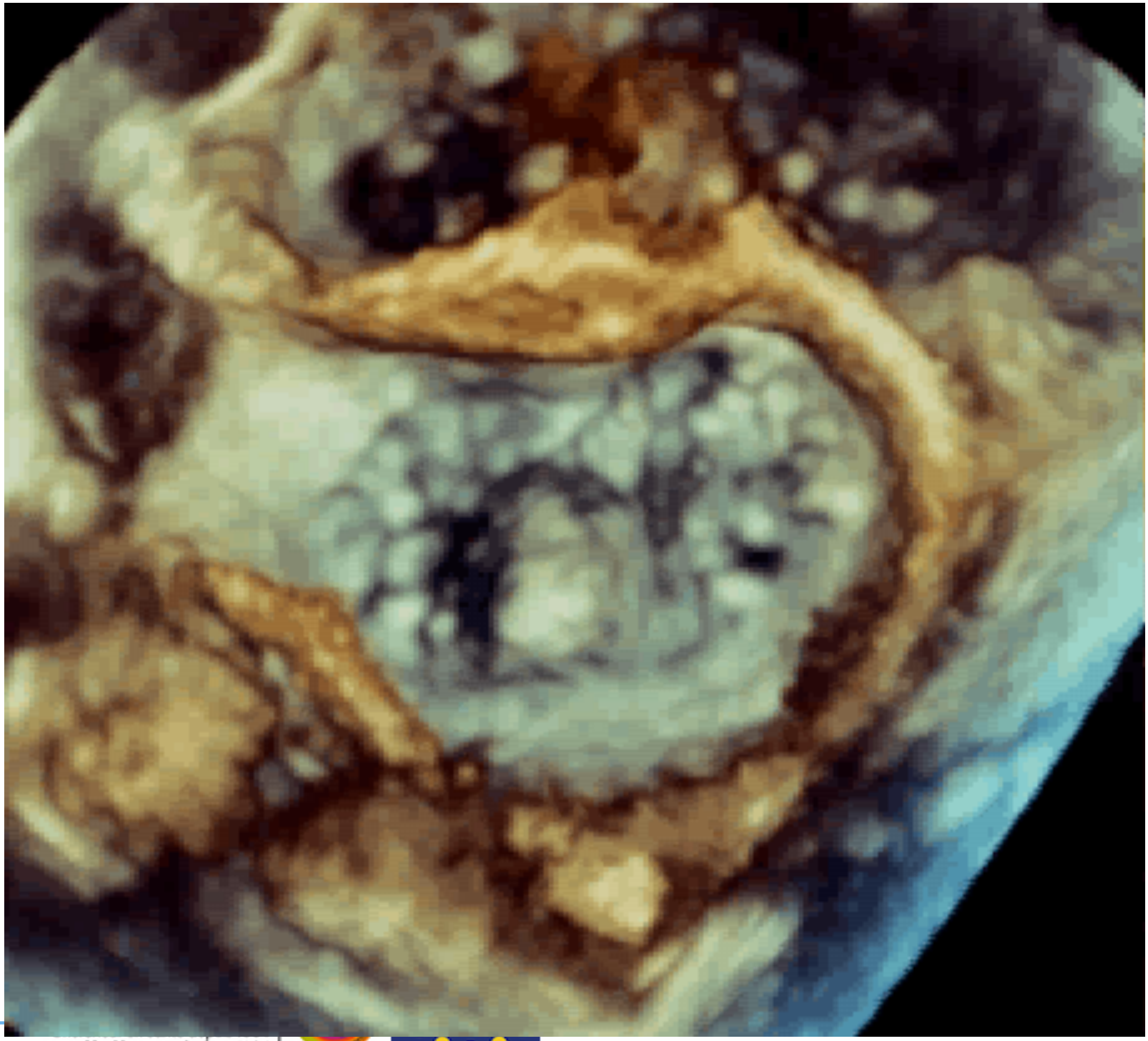
(C) Niveau transoesophagien médian à 60 dégrées et rotation latérale droite ou gauche

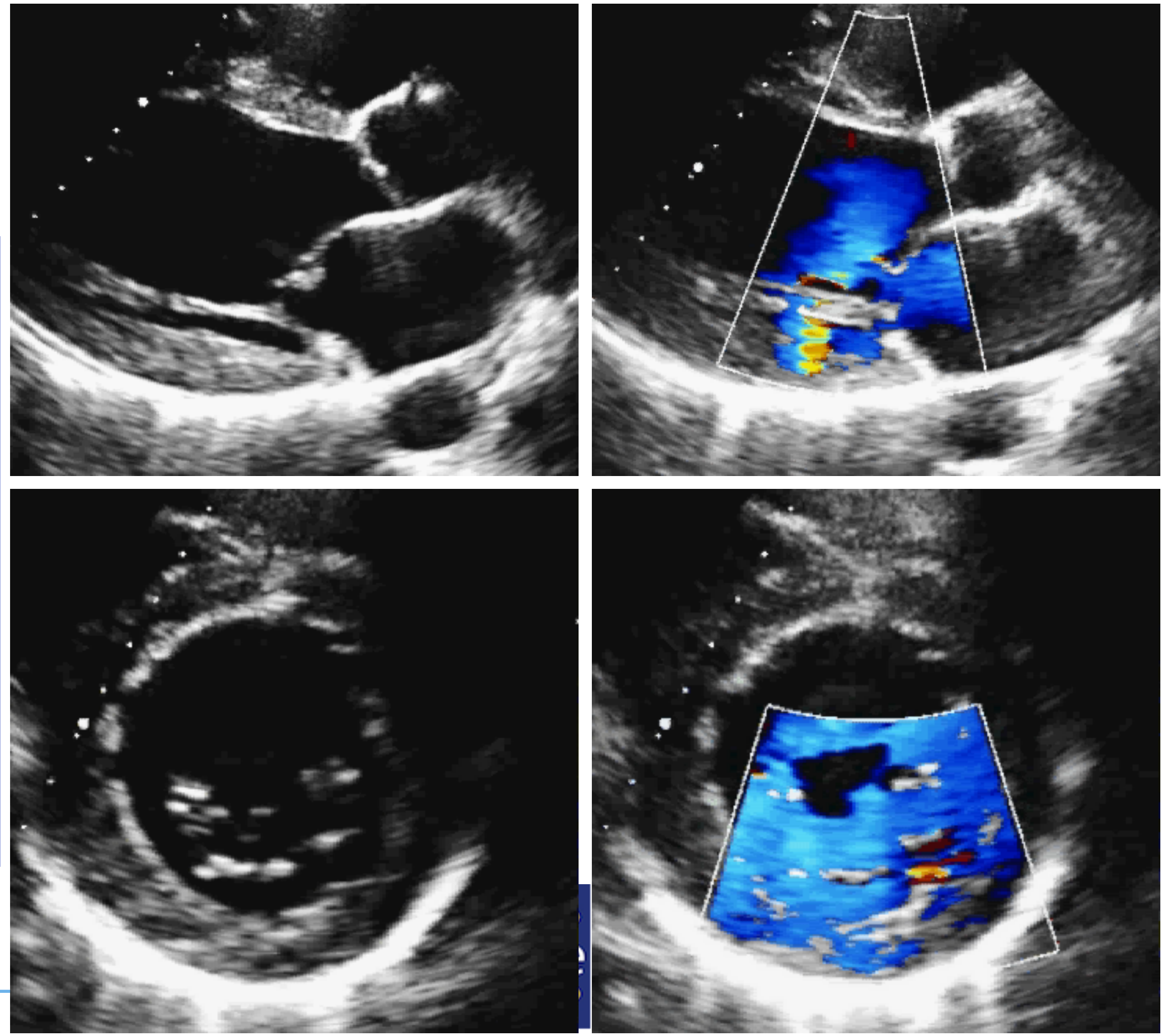


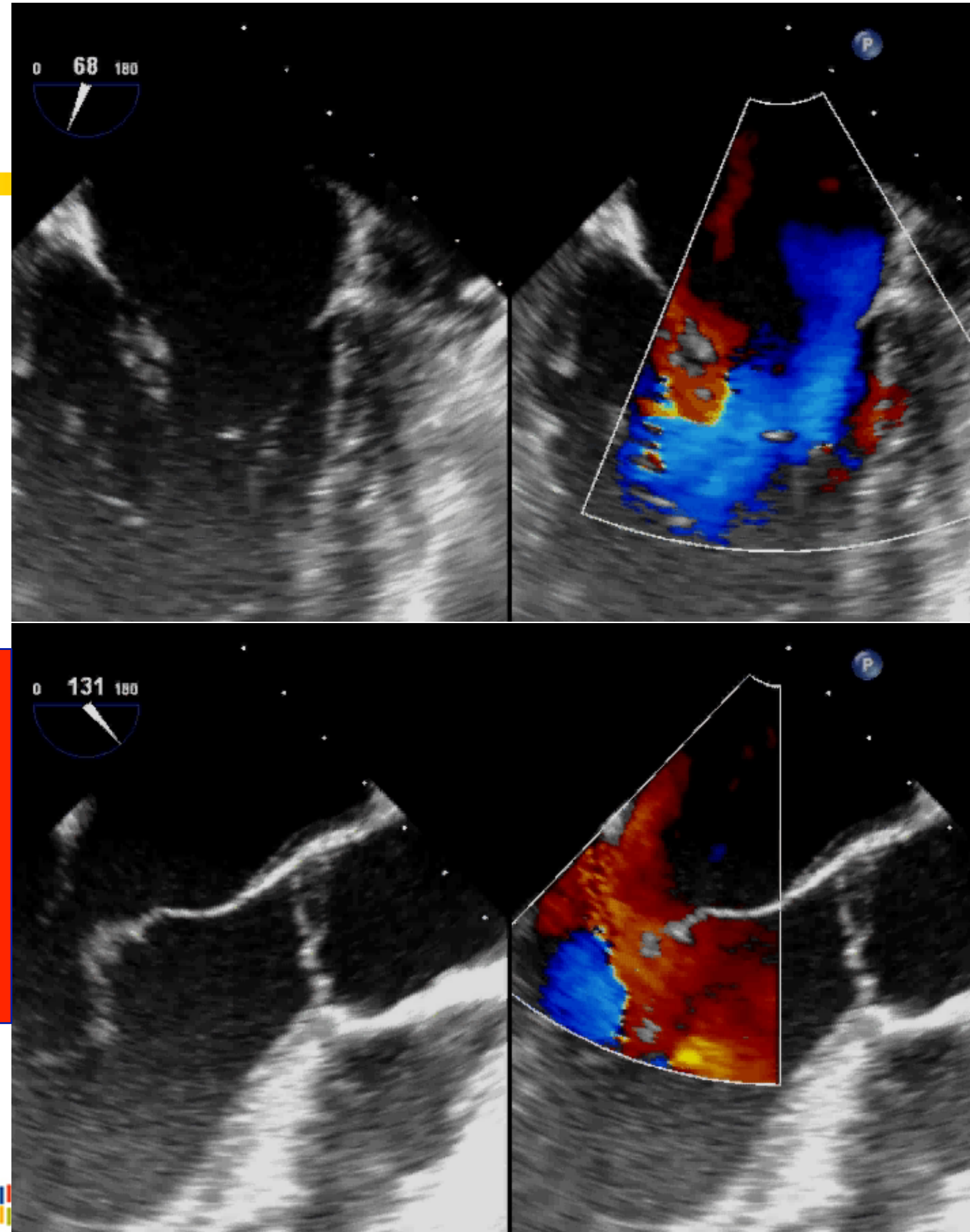


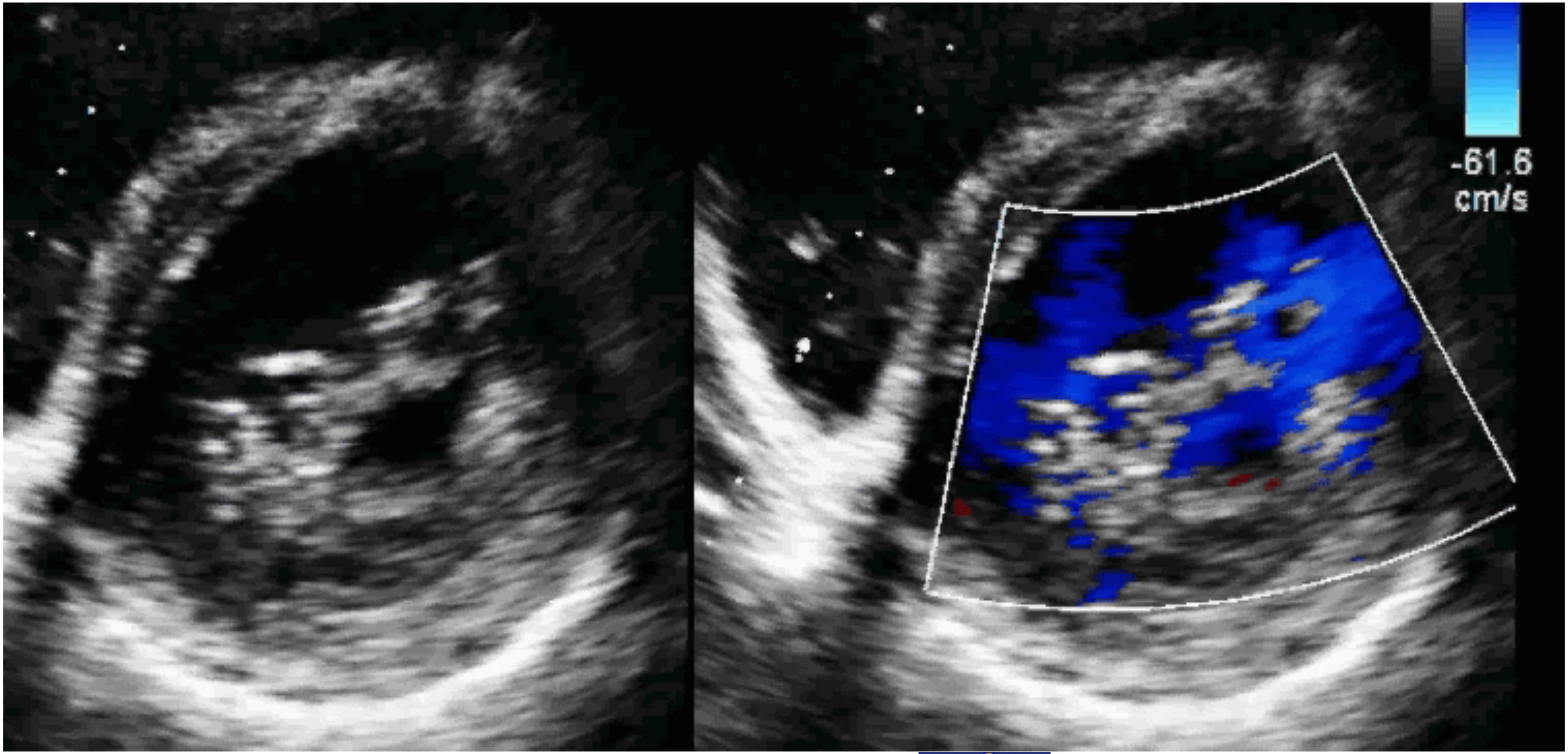
Echographie 3D transœsophagienne

Vue chirurgicale avec grande valve mitrale en haut, petite valve mitrale en bas, commissure externe à gauche et commissure interne à droite






0 68 180
P
0 131 180
P



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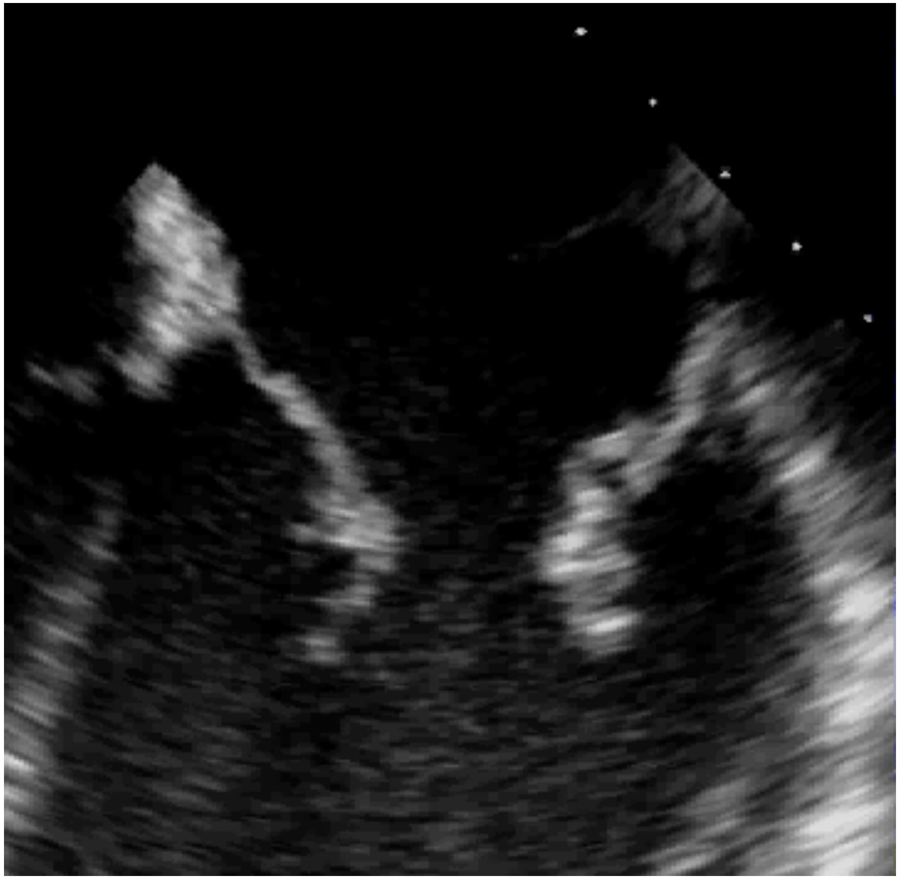
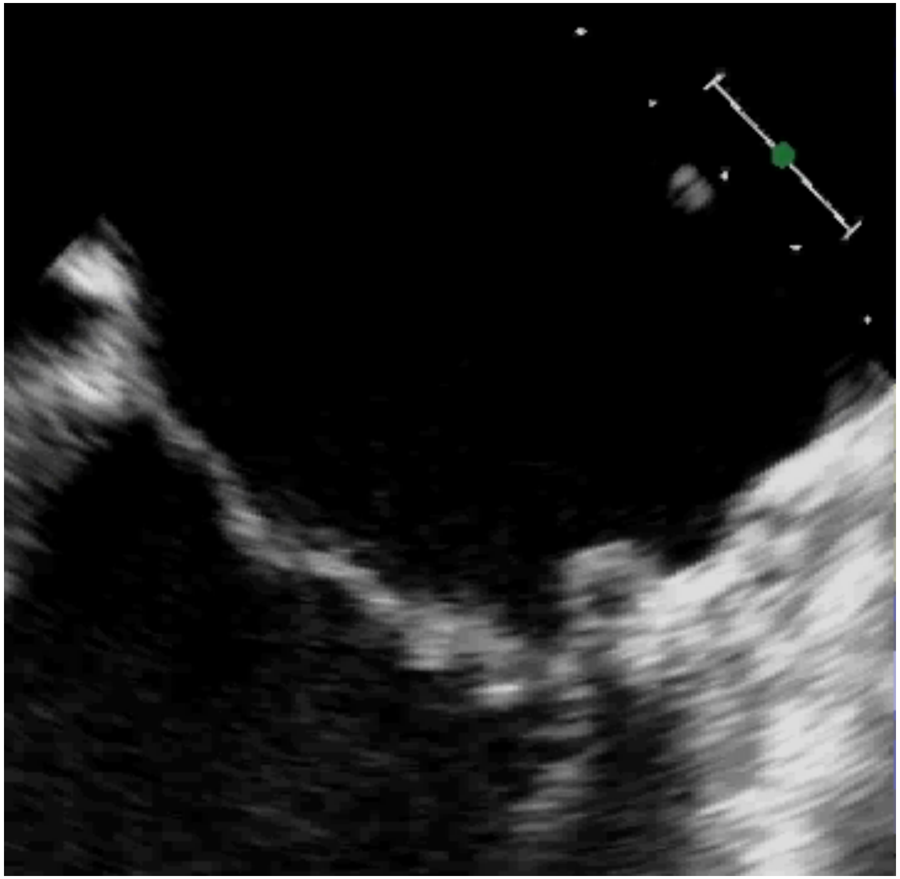
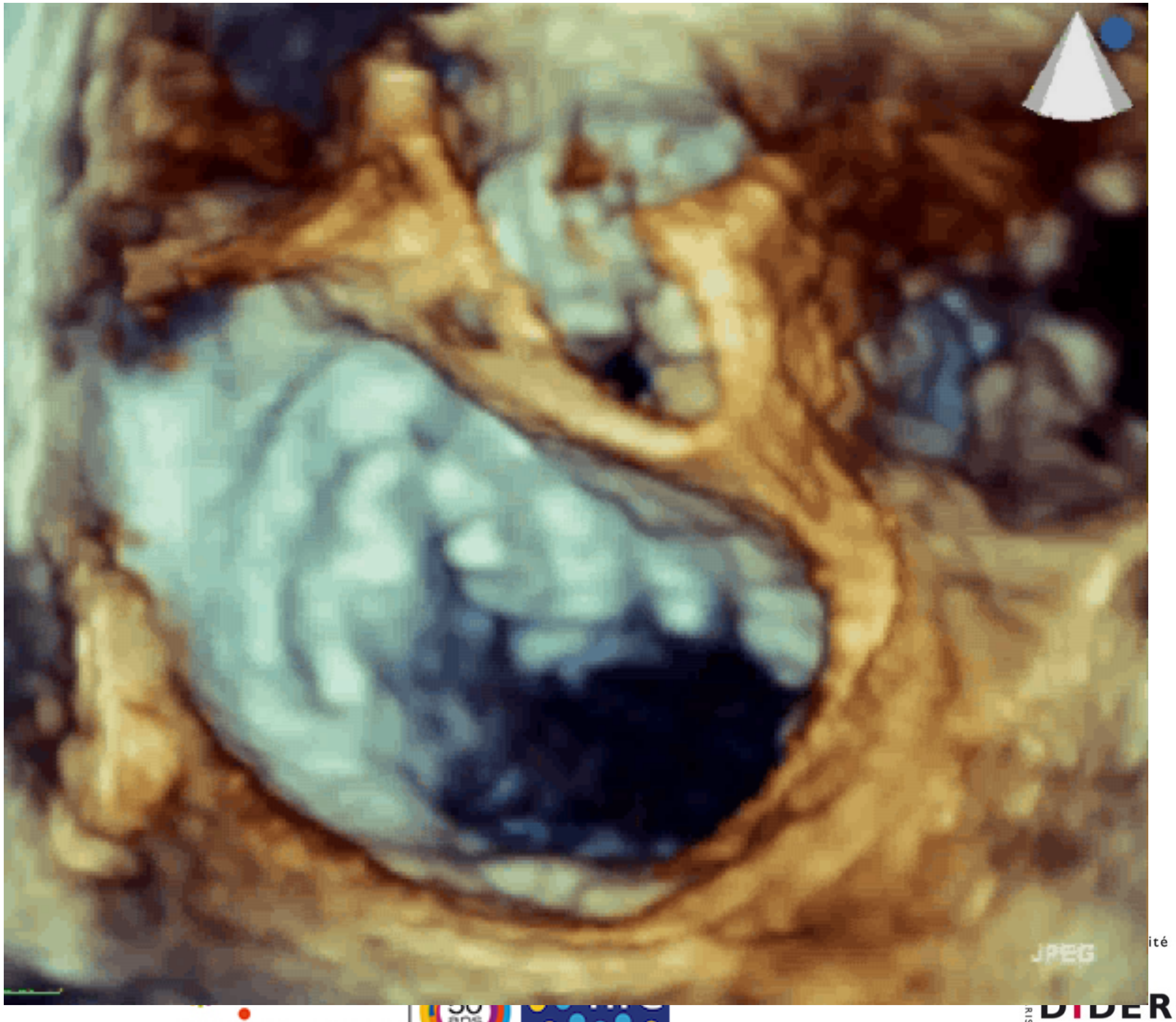
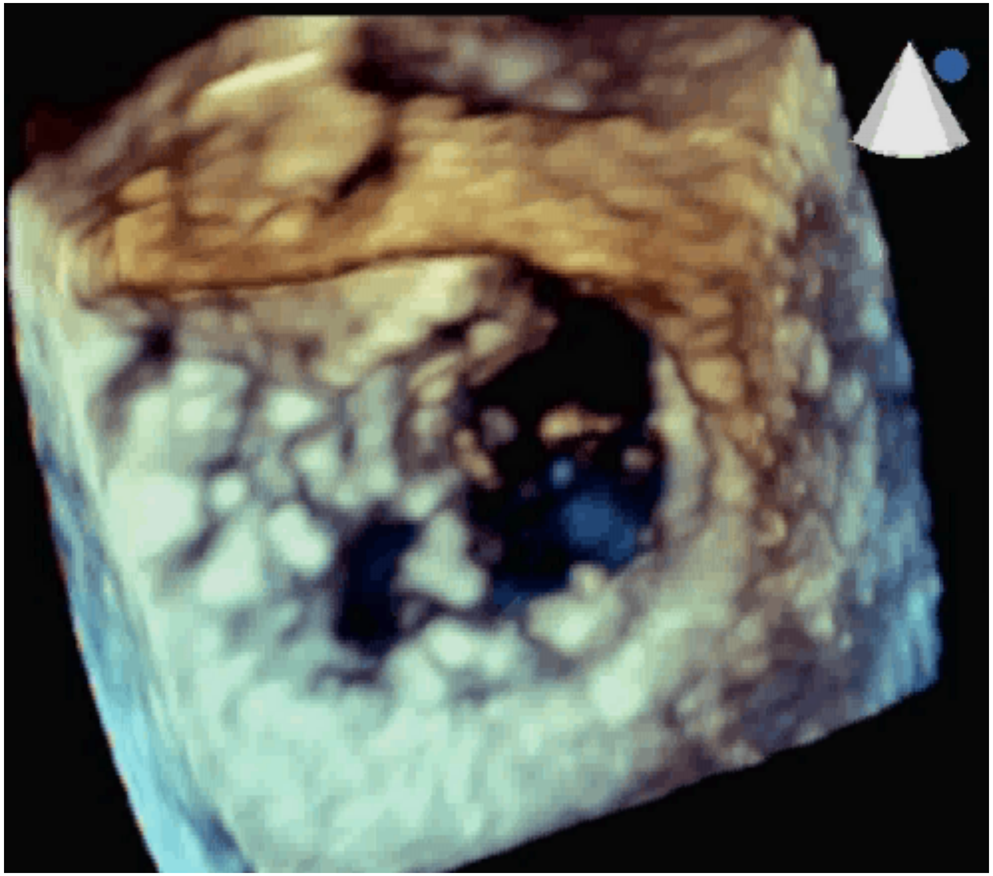


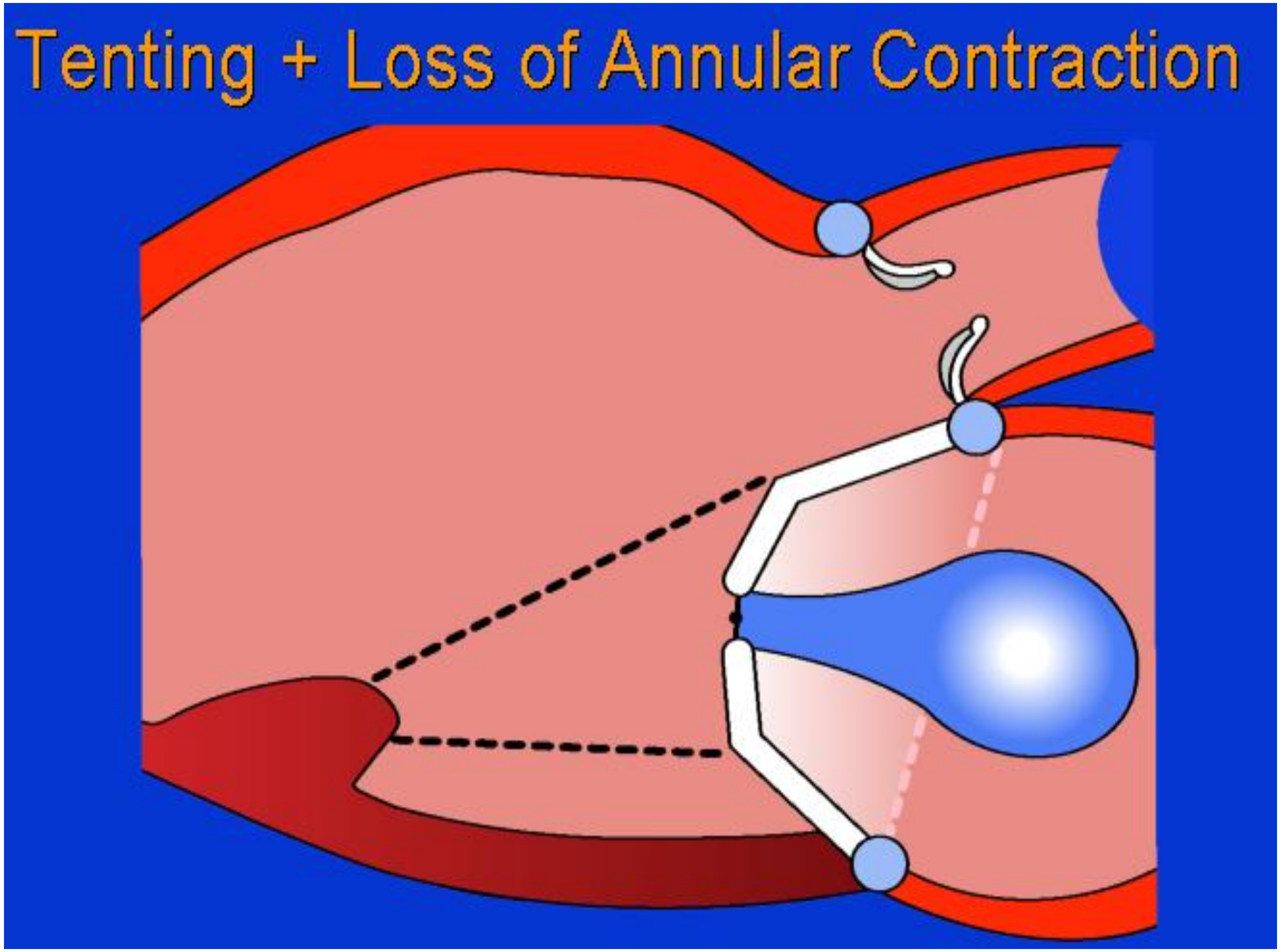


Prolapsus A1 et P1

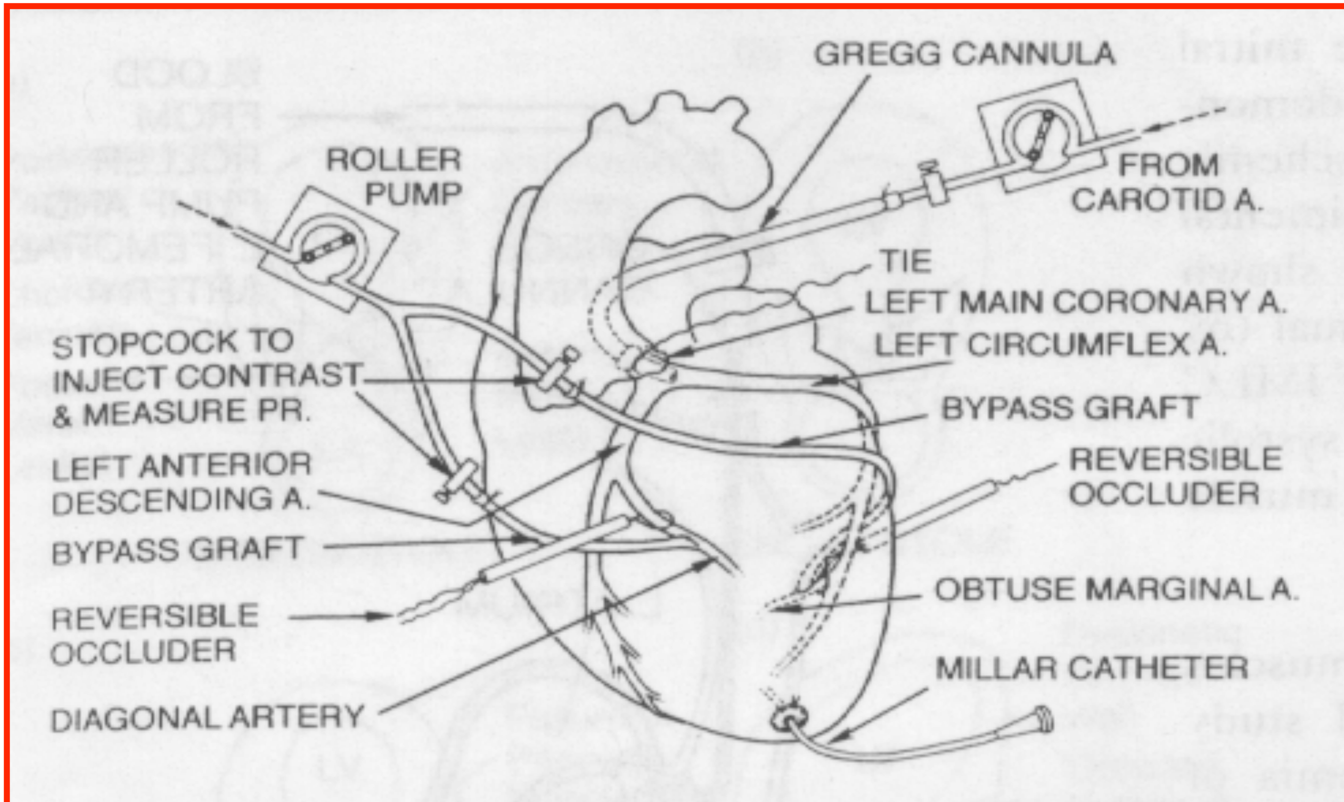




Secondary MR

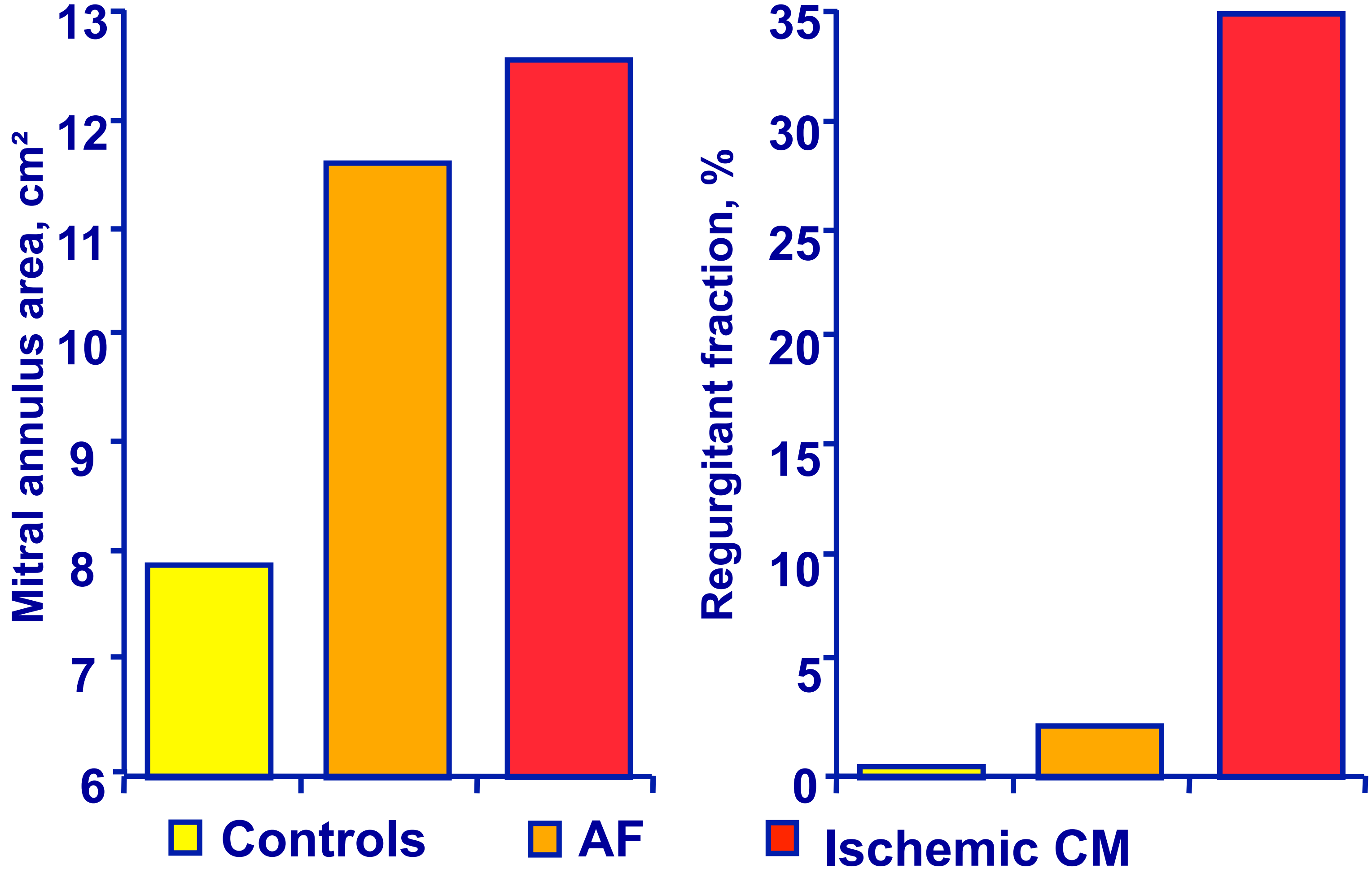


Papillary Muscle Dysfunction



KAUL S. *Circulation* 1991;84:2167-2180

Annular Dilatation



OTSUJI JACC 2002; 39: 1651-6

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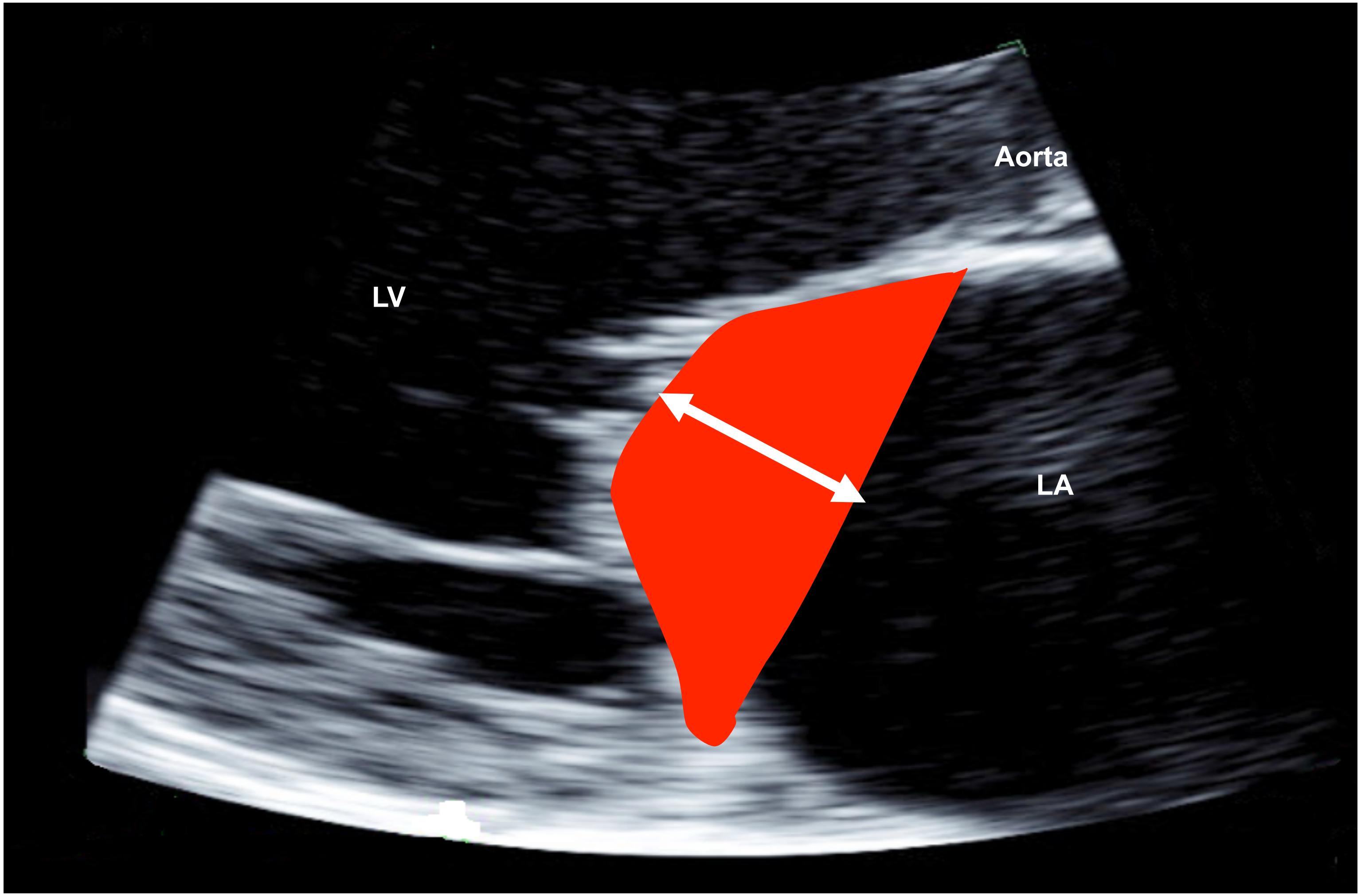
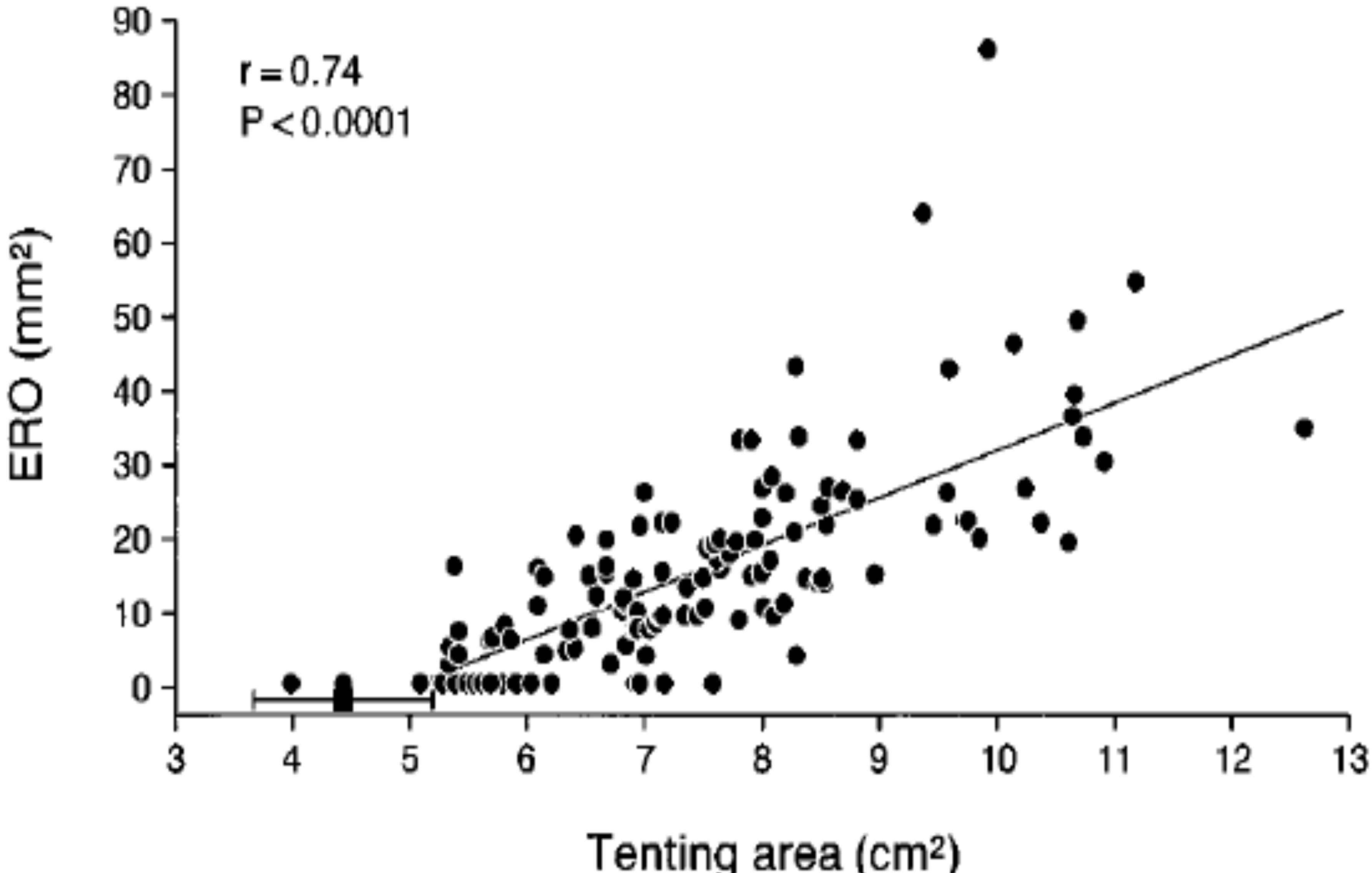
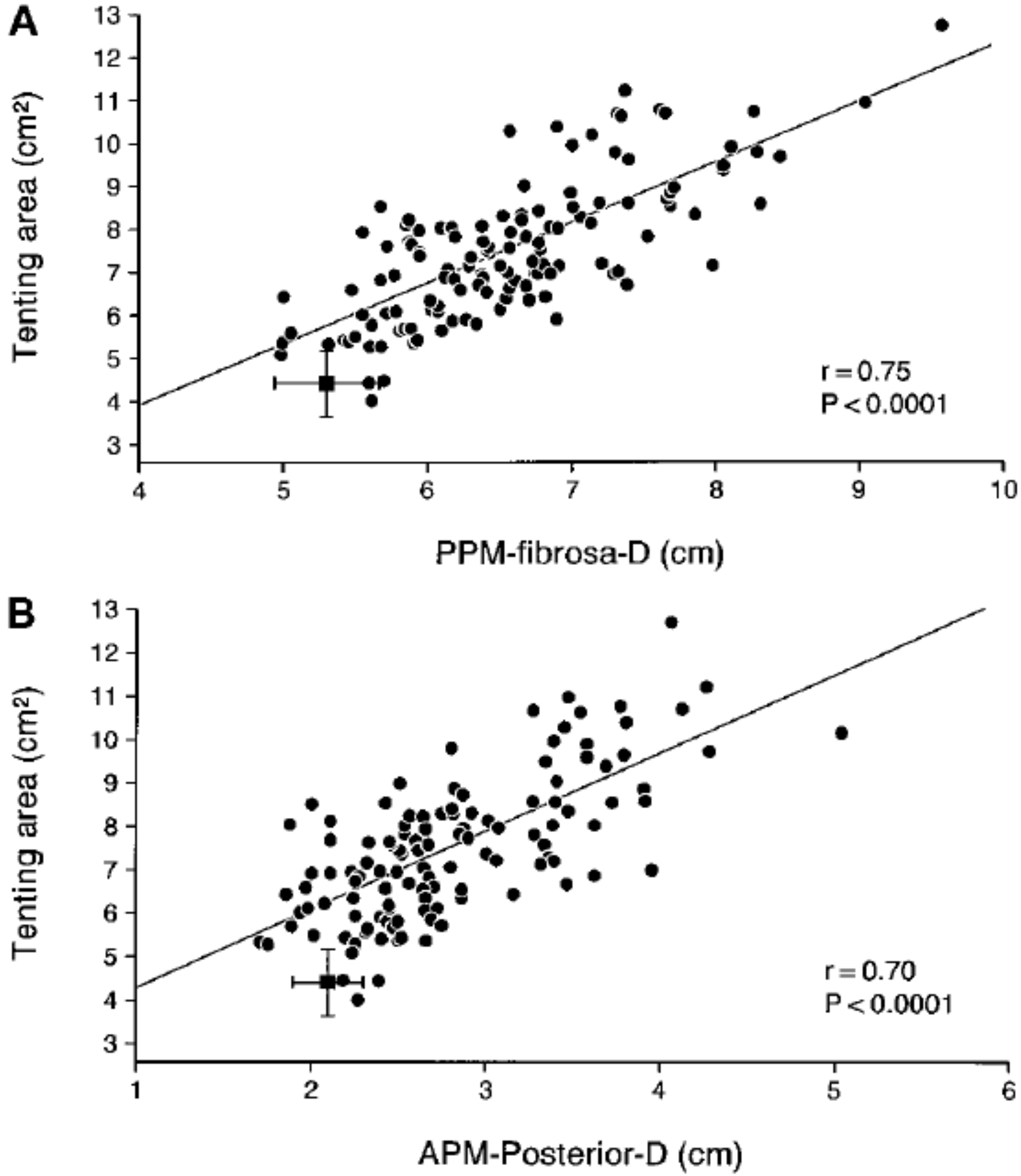
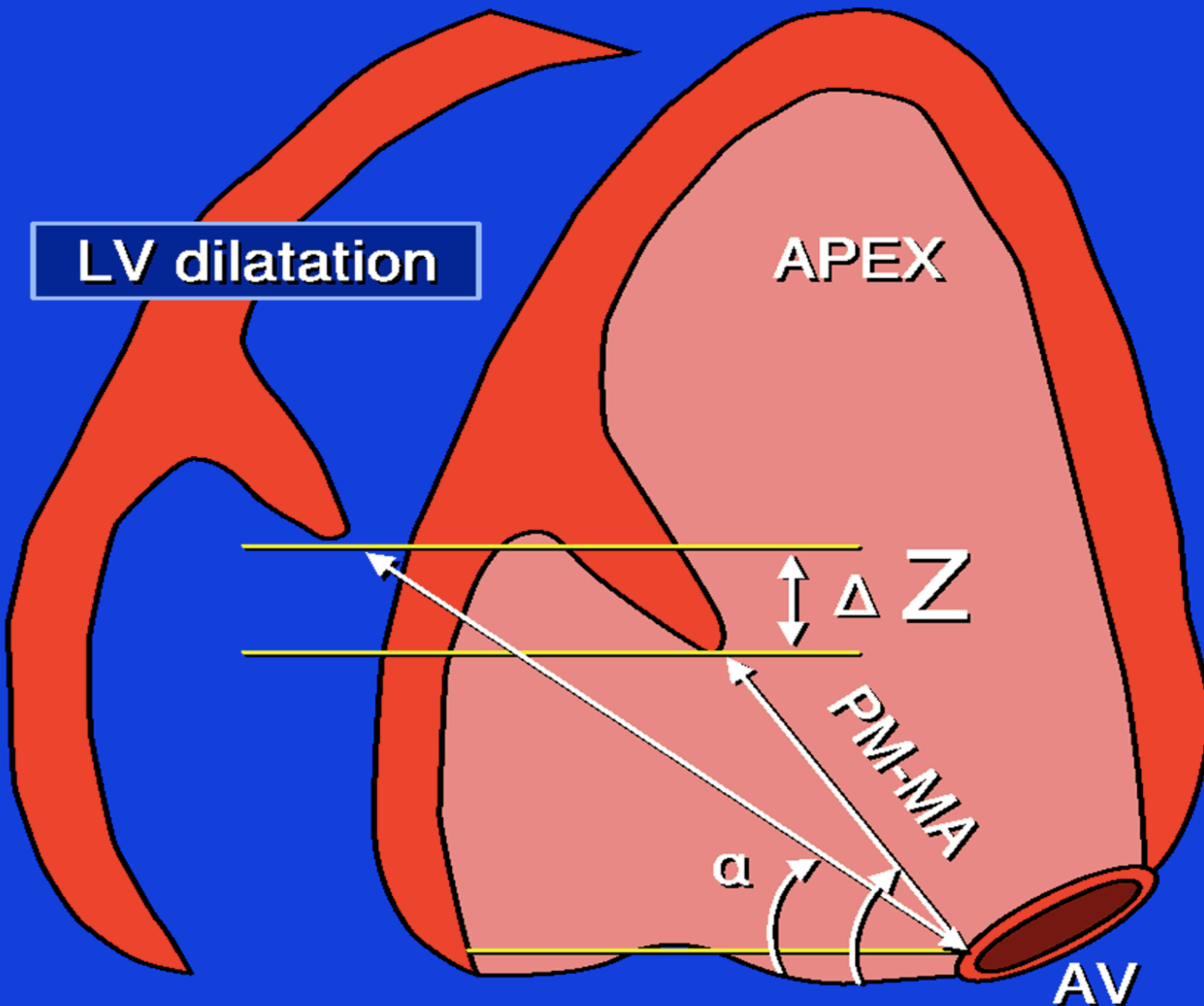
Tenting Area

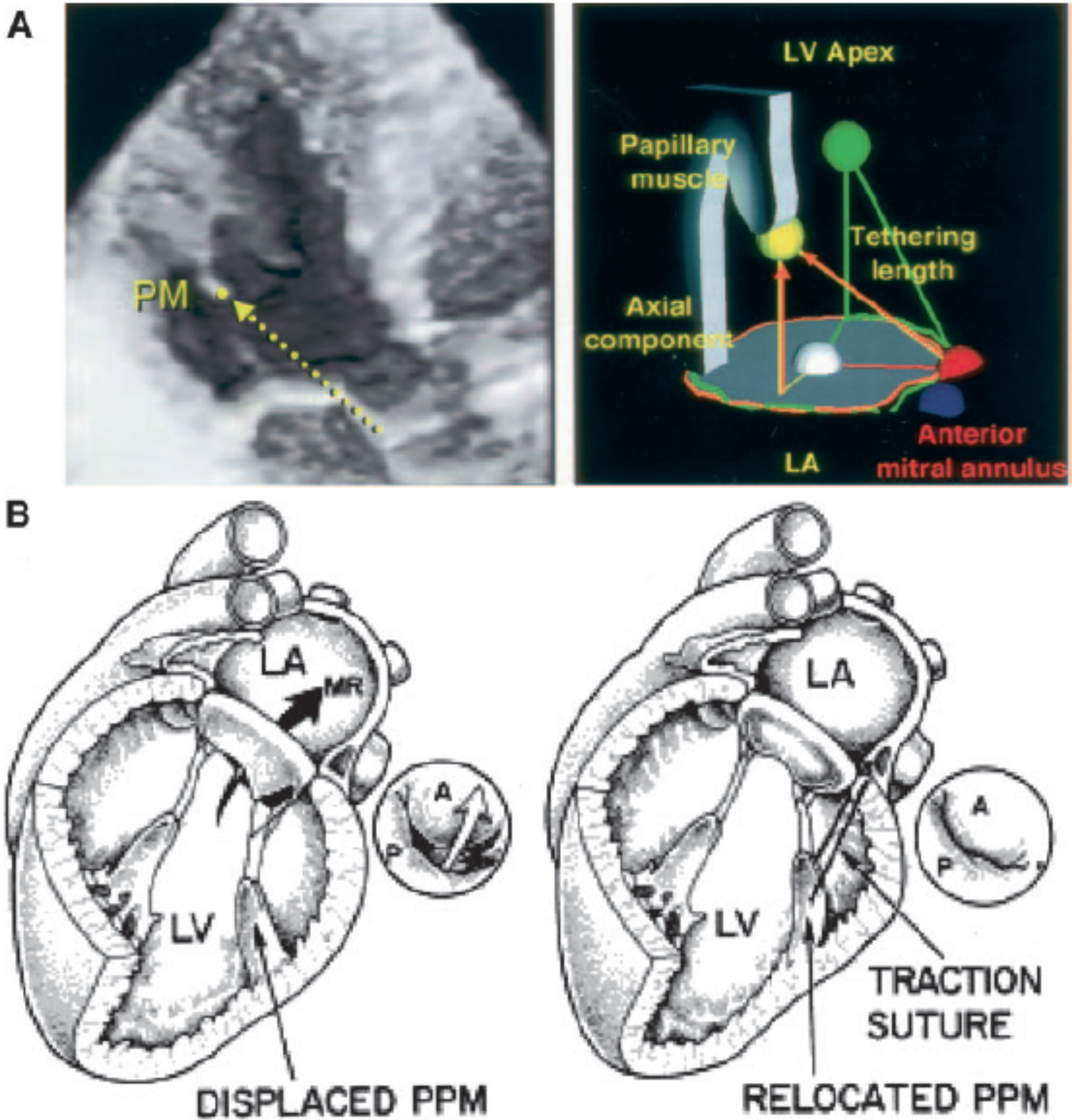



r = 0.74
P < 0.0001
ERO (mm²)
Tenting area (cm²)
0
10
20
30
40
50
60
70
80
90
3
4
5
6
7
8
9
10
11
12
13


A
Tenting area (cm²)
PPM-fibrosa-D (cm)
r = 0.75
P < 0.0001
B
Tenting area (cm²)
APM-Posterior-D (cm)
r = 0.70
P < 0.0001



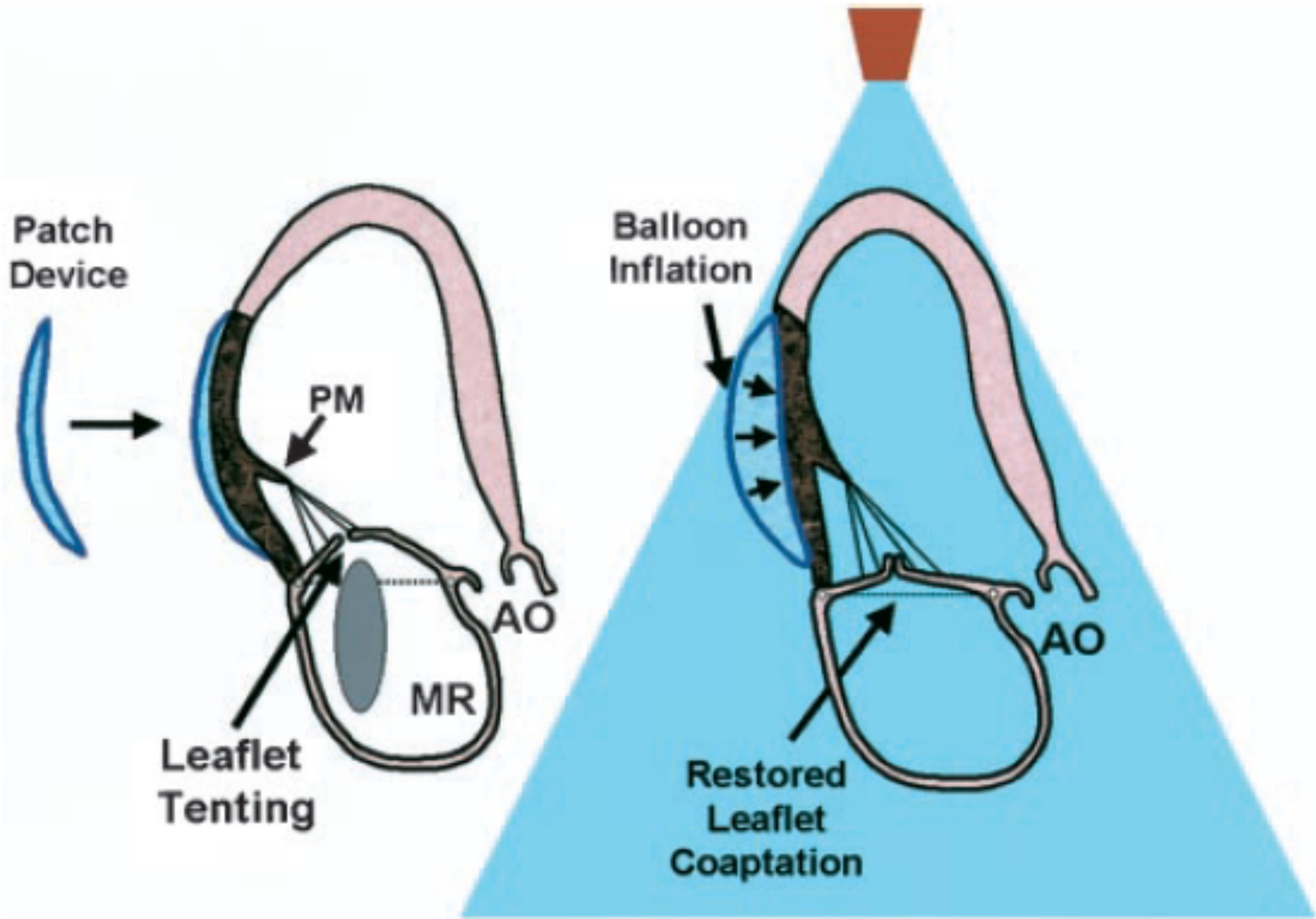
ΔZ = apical PM shift


A
PM
LV Apex
Papillary muscle
Tethering length
Axial component
Anterior mitral annulus
LA
B
LA
MR
A
P
LV
DISPLACED PPM
LA
A
P
LV
TRACTION SUTURE
RELOCATED PPM

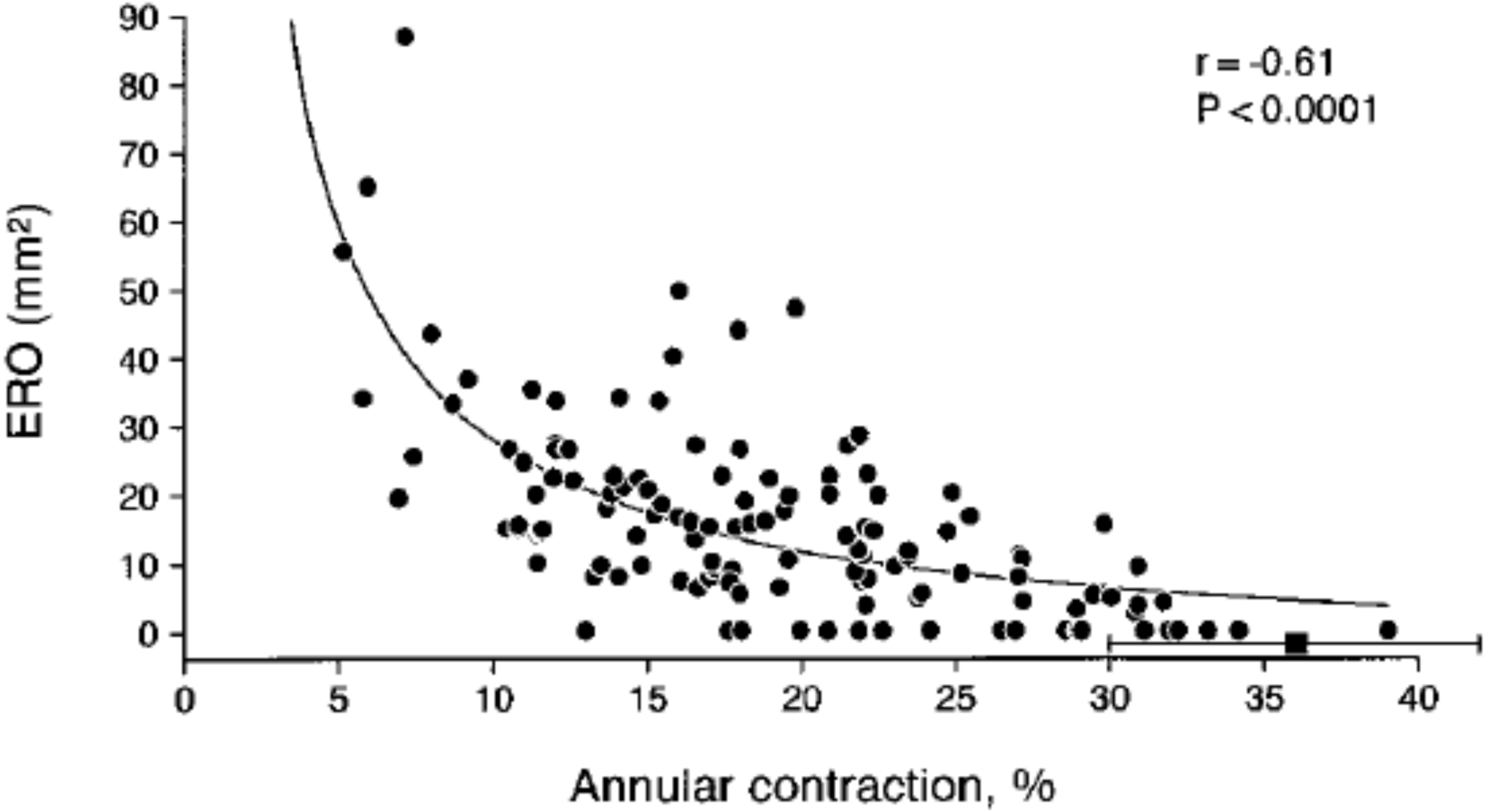
Reverse Ventricular Remodeling Reduces Ischemic Mitral Regurgitation

Echo-Guided Device Application in the Beating Heart

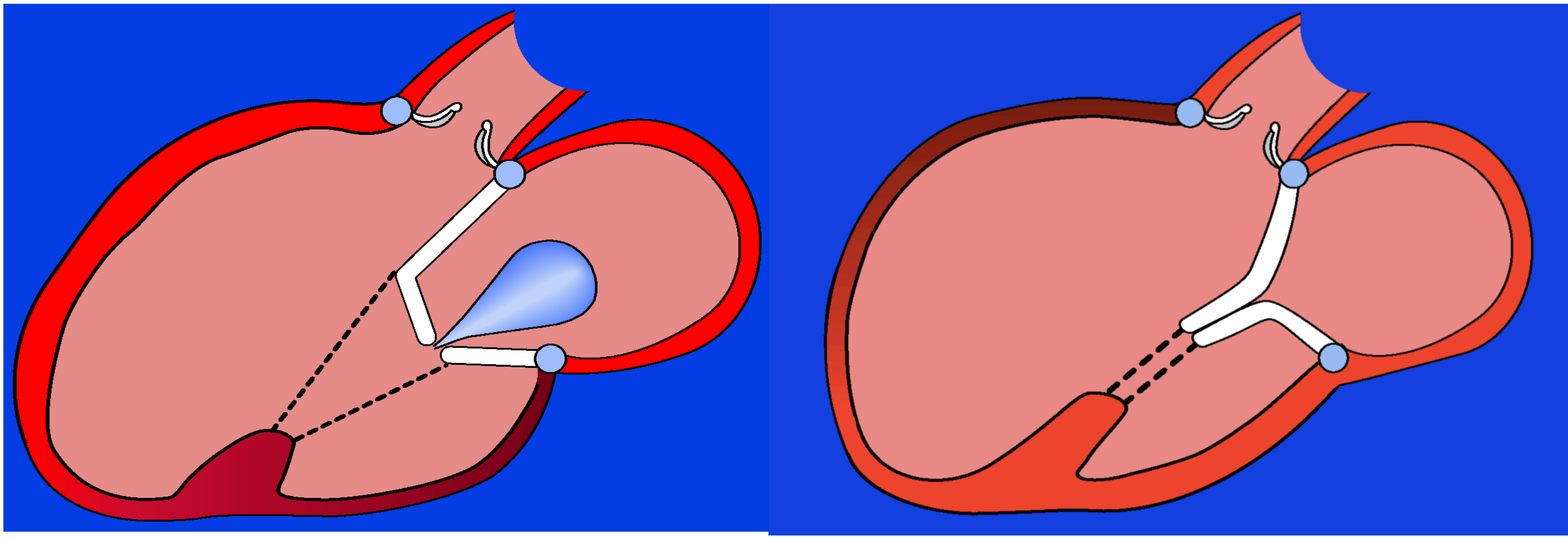
Judy Hung, MD; J. Luis Guerrero, BS; Mark D. Handschumacher, BS; Gregory Supple, BS; Suzanne Sullivan, BS; Robert A. Levine, MD



Mitral Annular Contraction

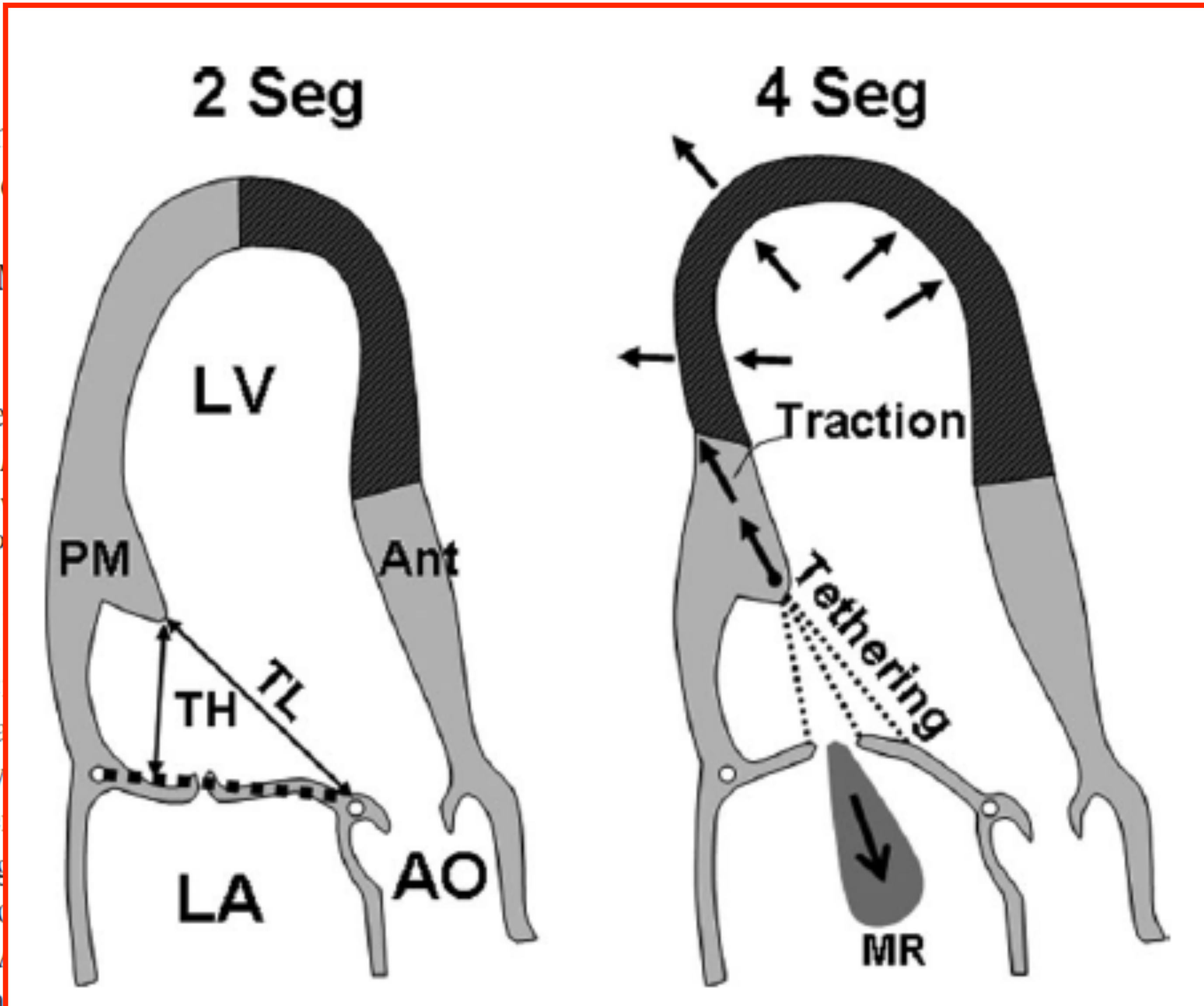


Inferior vs. Anterior MI



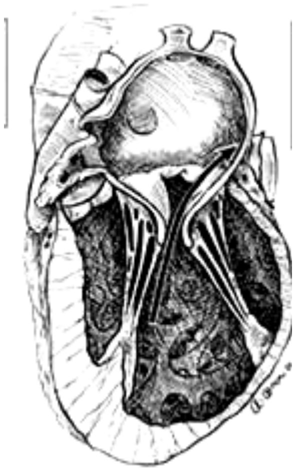
Mitral Regurgitation After Anteroapical Myocardial Infarction

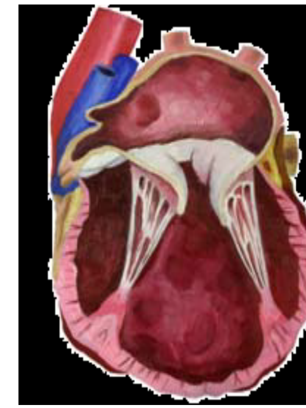
Chai ... MD;
Mari ... MD

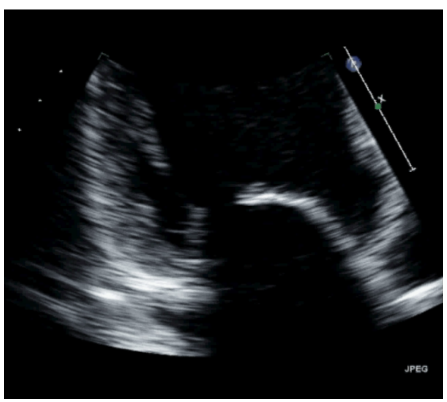


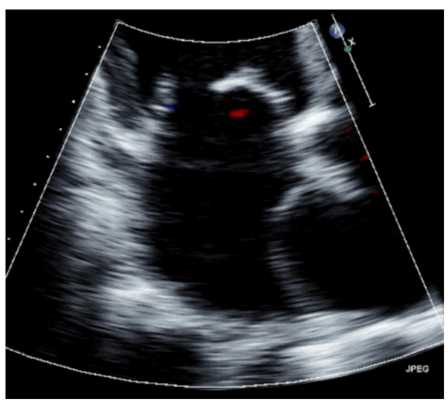
Background—I ...), with leaflet
tethering by ... without global
dilatation or ... e inferior apex
displaces the
Methods and ... were studied.
Moderate-se ... th inferoapical
extension (*P* ... In the human
mechanistic ... d and 40 with
involvement ... ontrols. Those
with MR (≥ ... l regurgitation
grade correla ... −0.65). In the
animal study ... that developed
MR had infe ... cm, *P*<0.001)
versus no sig ... ficant). In MR
sheep, the n ...
Conclusions—... s, causing MR
despite the a ... f repositioning
treatments for this condition. (*Circulation*. 2011;123:1529-1536.)

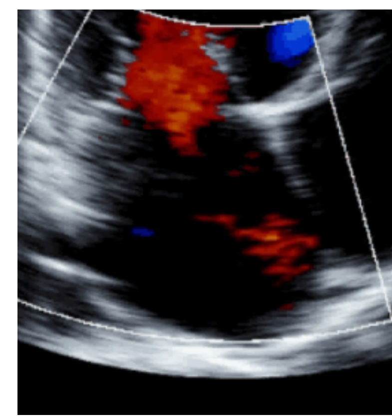
Two Different Patterns











Segmental tethering

Global tethering

Hemodynamic factors

Regurgitant Volume → **Volume overload**

Effective Regurgitant Orifice → **Anatomic lesions**

Determinants of regurgitant volume in mitral regurgitation: contrasting effect of similar effective regurgitant orifice area in functional and organic mitral regurgitation

Andrea Chiampan[1], Julien Nahum[1], Mohamed Leye[1], Johanna Oziel[1], Caroline Cueff[1], Eric Brochet[1], Bernard Iung[1], Andrea Rossi[2], Alec Vahanian[1], and David Messika-Zeitoun[3]*

[1]Cardiovascular Division, Cardiology Department, AP-HP, Bichat Hospital, 46 rue Henri Huchard, Paris 75018, France; [2]Division of Cardiology, University of Verona, Verona, Italy; and [3]INSERM, U698, University Paris 7, Paris, France

Received 20 October 2011; accepted after revision 24 October 2011

Background Quantitative assessment of the severity of mitral regurgitation (MR) is based on the calculation of the effective regurgitant orifice (ERO), a measure of lesion severity, and of the regurgitant volume (RVol), a measure of left ventricular volume overload. We aimed at evaluating the determinants of RVol in both organic (OMR) and functional mitral regurgitation (FMR).

Methods and results MR severity was quantitatively assessed using the proximal isovelocity surface area (PISA) method in 240 patients, 142 with OMR and 98 patients with FMR. By definition, ERO and RVol were strongly correlated both in patients with OMR and FMR (both $R = 0.90$, $P < 0.0001$) but the slopes of the regression lines were significantly different ($P < 0.0001$). This difference remained significant in patients with elevated systolic pulmonary artery pressure (SPAP > 40 mmHg, $P < 0.0001$) but not in patients with normal SPAP (≤40 mmHg, $P = 0.09$). In multivariate analysis, independent determinants of RVol were ERO ($P < 0.0001$), MR mechanism (FMR/OMR) ($P = 0.0003$) and SPAP ($P = 0.03$). In patients with elevated SPAP, ERO ($P < 0.0001$), left ventricular ejection fraction (LVEF) ($P = 0.03$), and MR mechanism ($P = 0.03$) were independently associated with RVol, whereas in patients with normal SPAP, ERO ($P < 0.0001$) was the only independent determinant of RVol.

Conclusion In the present study, we evaluated the contrasting effect of similar lesion severity in OMR and FMR and showed that similar ERO were associated with lower RVol in FMR compared with OMR. The regurgitant volume is the result of complex interactions of anatomic lesions, LVEF, and SPAP and our results highlight the importance of taking into account these parameters when interpreting RVol values in clinical practice, especially in FMR.

Keywords Mitral regurgitation • Echocardiography • Quantification • PISA

Determinants of regurgitant volume in mitral regurgitation: contrasting effect of similar effective regurgitant orifice area in functional and organic mitral regurgitation

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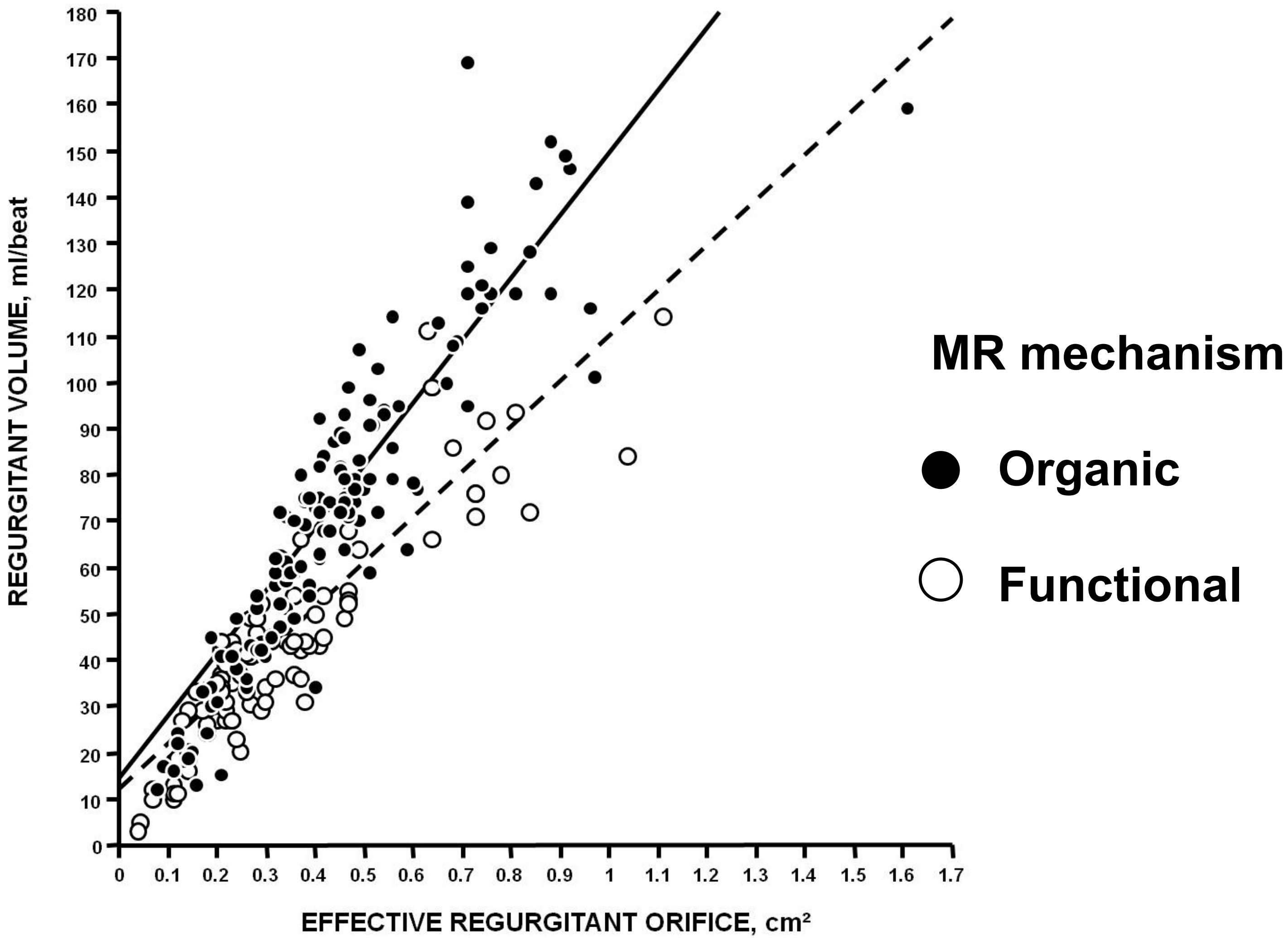
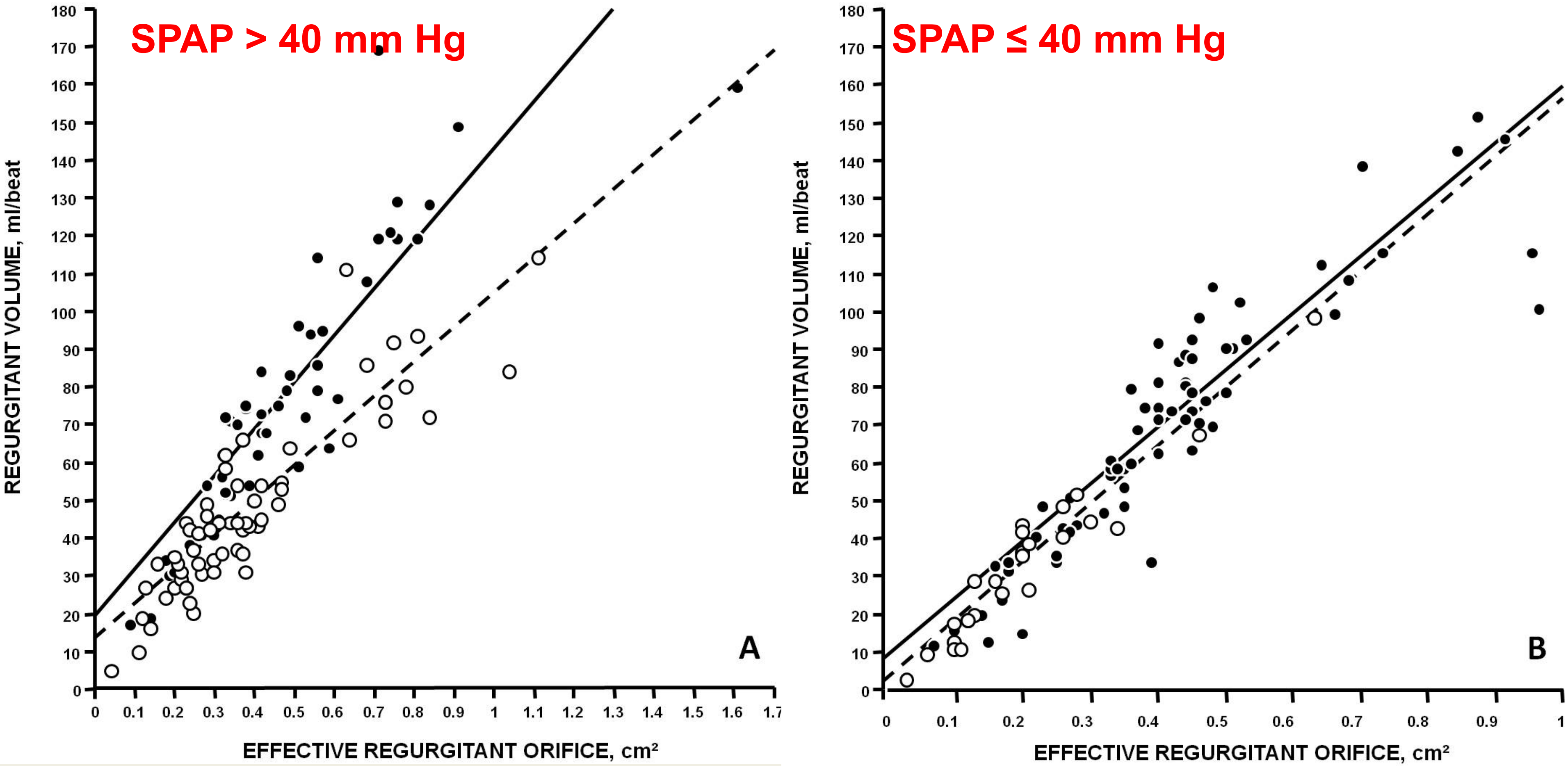
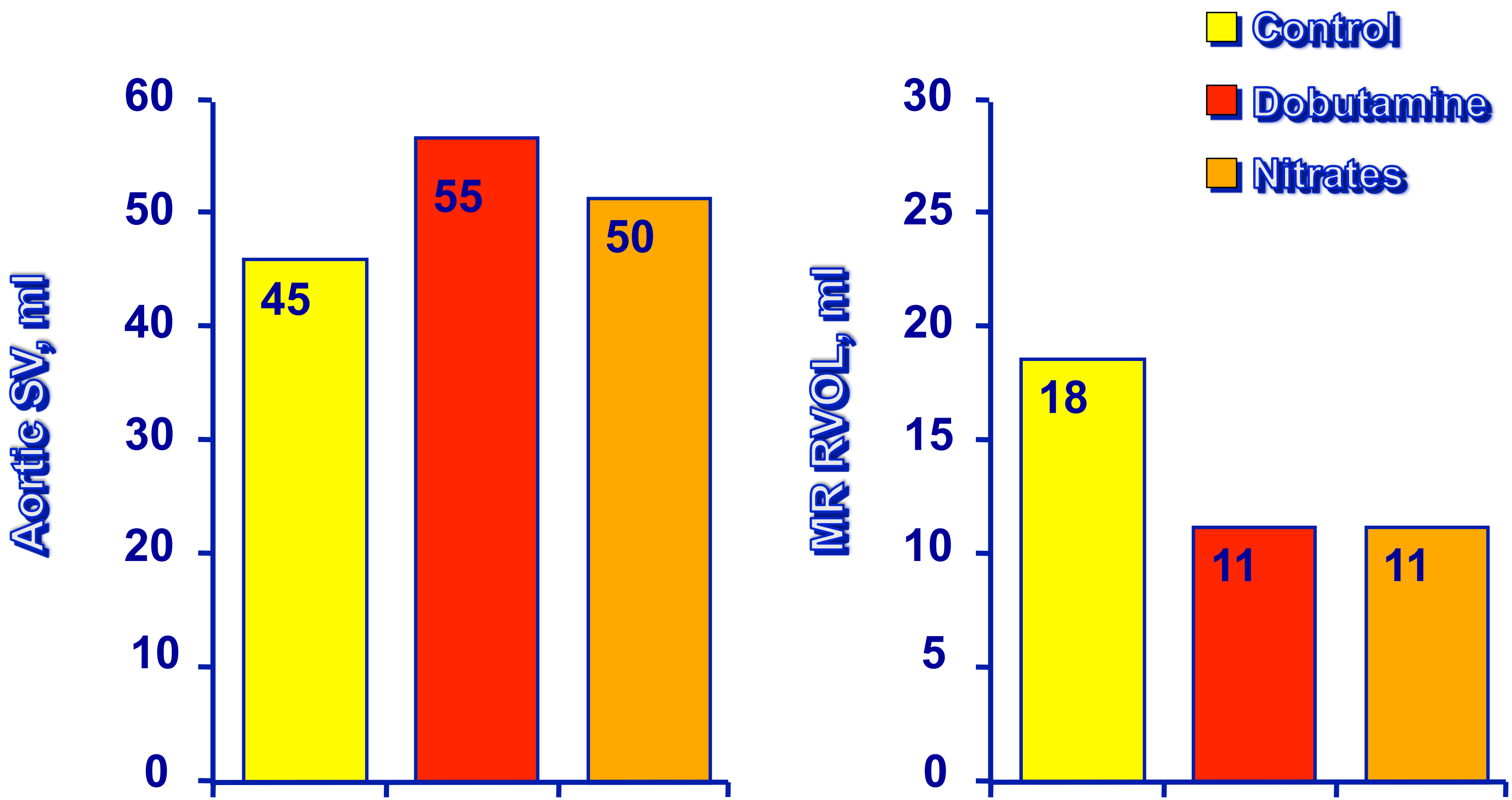


Determinants of regurgitant volume in mitral regurgitation: contrasting effect of similar effective regurgitant orifice area in functional and organic mitral regurgitation

Andrea Chiampan[1], Julien Nahum[1], Mohamed Leye[1], Johanna Oziel[1], Caroline Cueff[1], Eric Brochet[1], Bernard Iung[1], Andrea Rossi[2], Alec Vahanian[1], and David Messika-Zeitoun[3]*

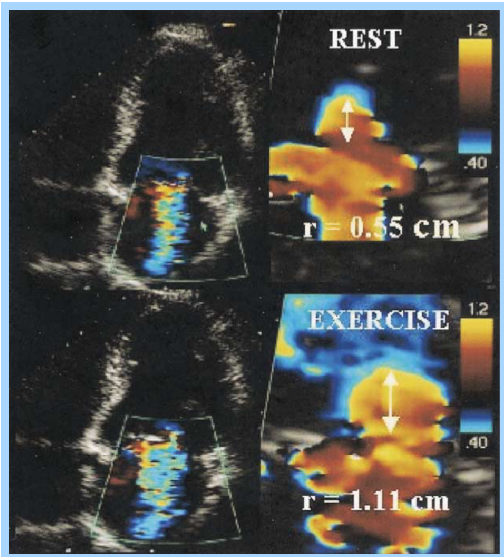


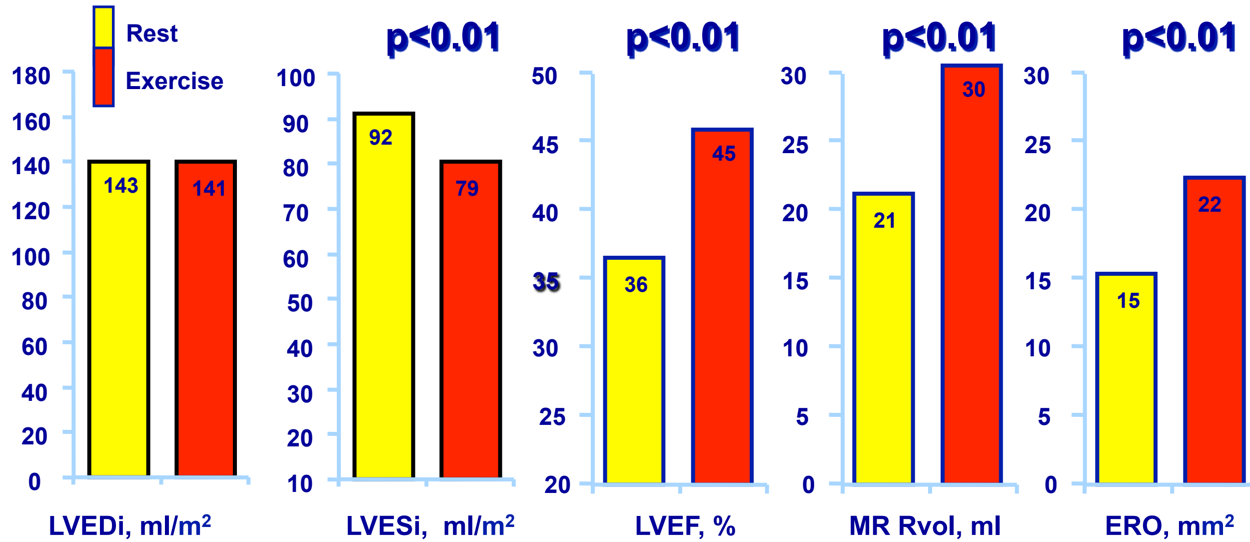
Dynamic nature of IMR

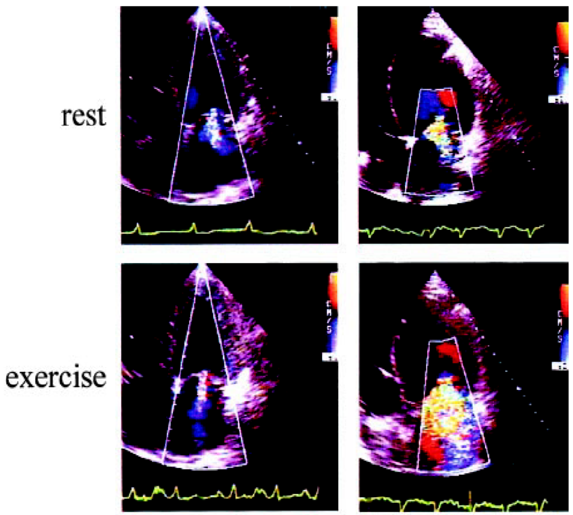


Keren Circulation 1989; 80: 306-313

Exercise-induced change in MR







Exercise-induced changes in MR severity strongly correlated to functional capacity impairment assessed by the peak VO2

Lapu-Bula Circulation 2002; 106: 1342-1348

Lancellotti Circulation 2003; 108: 1713-1717

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

The Role of Ischemic Mitral Regurgitation in the Pathogenesis of Acute Pulmonary Edema

Luc A. Piérard, M.D., Ph.D., and Patrizio Lancellotti, M.D.

ABSTRACT

BACKGROUND

Acute mitral regurgitation may cause pulmonary edema, but the pathogenetic role of chronic ischemic mitral regurgitation, a dynamic condition, has not yet been characterized.

METHODS

We prospectively studied 28 patients (mean [±SD] age, 65±11 years) with acute pulmonary edema and left ventricular systolic dysfunction and 46 patients without a history of acute pulmonary edema. The two groups were matched for all baseline characteristics. Patients underwent quantitative Doppler echocardiography during exercise. Exercise-induced changes in the left ventricular volume, the ejection fraction, the mitral regurgitant volume, the effective regurgitant orifice area, and the transtricuspid pressure gradient were compared in patients with and without acute pulmonary edema.

RESULTS

The two groups had similar clinical and baseline echocardiographic characteristics. They also had similar exercise-induced changes in heart rate, systolic blood pressure, and left ventricular volumes. In the univariate analysis, patients with recent pulmonary edema had a much higher increase than did the patients without pulmonary edema in mitral regurgitant volume (26±14 ml vs. 5±14 ml, $P<0.001$), the effective regurgitant orifice area (16±10 mm² vs. 2±9 mm², $P<0.001$), and the transtricuspid pressure gradient (29±10 mm Hg vs. 13±11 mm Hg, $P<0.001$). In the multivariate analysis, exercise-induced changes in the effective regurgitant orifice area ($P<0.001$), in the transtricuspid pressure gradient ($P=0.001$), and in the left ventricular ejection fraction ($P=0.02$) were independently associated with a history of recent pulmonary edema.

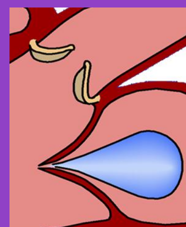
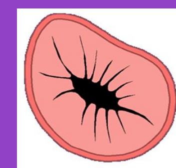
CONCLUSIONS

In patients with left ventricular systolic dysfunction, acute pulmonary edema is associated with the dynamic changes in ischemic mitral regurgitation and the resulting increase in pulmonary vascular pressure.

From the Division of Cardiology, University Hospital of Liege, Liege, Belgium. Address reprint requests to Dr. Piérard at the Department of Cardiology, University Hospital of Sart Tilman, B-4000 Liege, Belgium, or at lpierard@chu.ulg.ac.be.

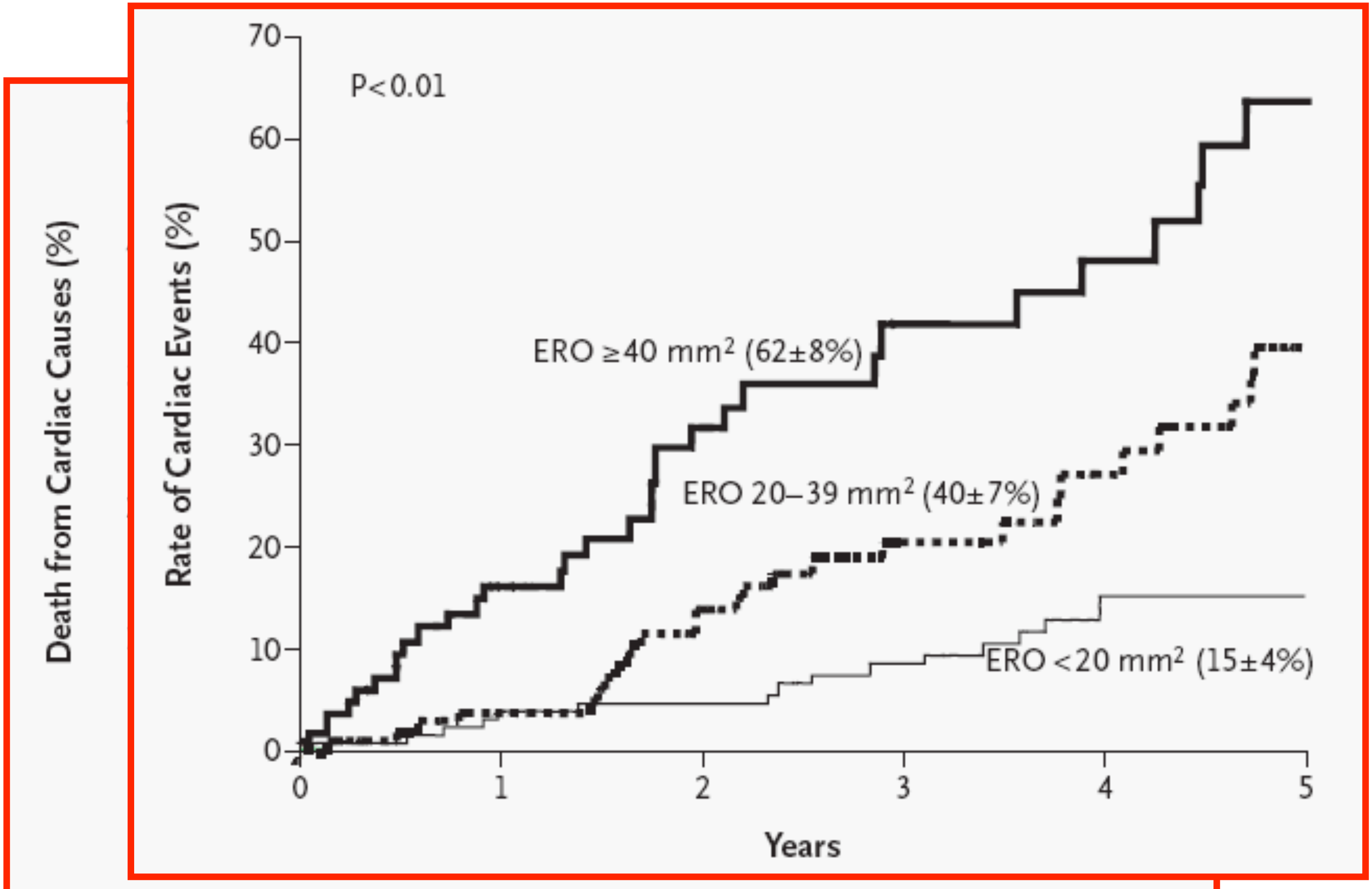
N Engl J Med 2004;351:1627-34.

Grades de Sévérité des IM organiques

GRADE	Volume Régurgitant, ml 	Surface de l'orifice régurgitant, cm2 	Fraction de Régurgitation, %
1	< 30	< 0.20	< 30
2	30-44	0.20 – 0.29	30-39
3	45-59	0.30 – 0.39	40-49
4	**≥ 60**	**≥ 40**	**≥ 50**

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.



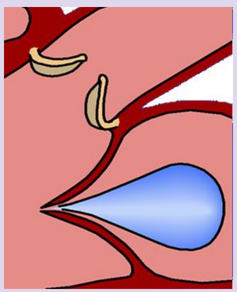
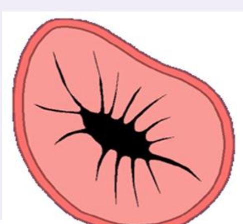
...nce of at least 40 mm² should promptly be considered for cardiac surgery.

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.

Regurgitant volume was less strongly predictive of survival after adjustment for age and the presence or absence of diabetes (P=0.04) and even less so after adjustment for age, sex, the presence or absence of diabetes and atrial fibrillation, and the ejection fraction (P=0.06). The qualitative grade of mitral regurgitation, jet area, and ratio of the jet to the left atrial area were predictive of survival on univariate analysis (all P≤0.05) but not on multivariate analysis (all P>0.30). Furthermore, nested models showed that quantitative classification based

Seuil de Sévérité des Régurgitations

	Insuffisance Mitrale Organique	Insuffisance Mitrale fonctionnelle	Insuffisance Aortique	Insuffisance Tricuspide
Volume Régurgitant, ml 	**≥ 60**	**≥ 30**	**≥ 60**	**≥ 45**
Surface de l'orifice régurgitant, cm2 	**≥ 0.40**	**≥ 0.20**	**≥ 0.30**	**≥ 0.40**

Ischemic Mitral Regurgitation

Long-Term Outcome and Prognostic Implications With Quantitative Doppler Assessment

Ba ... ted
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Me ... ent
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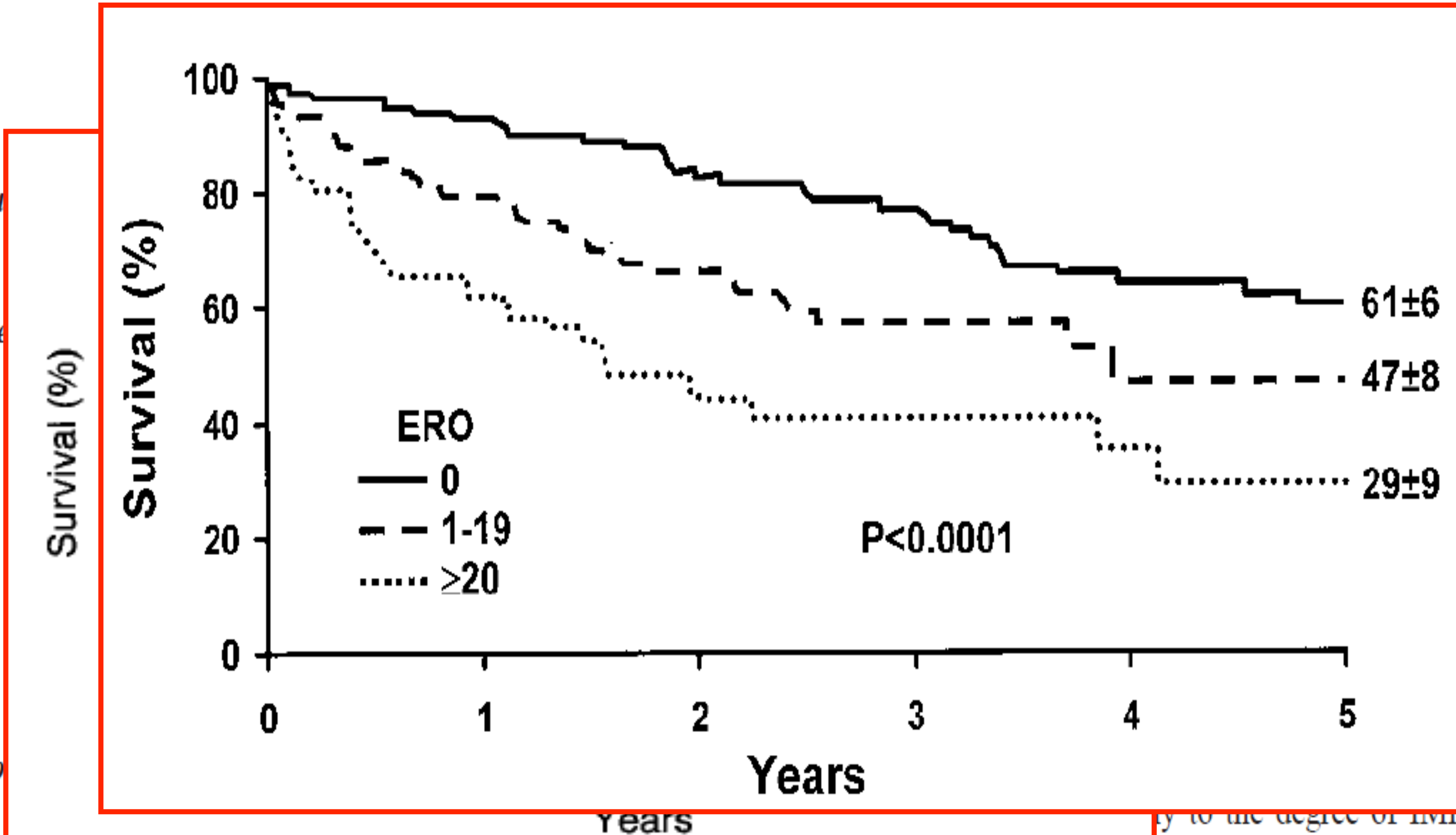
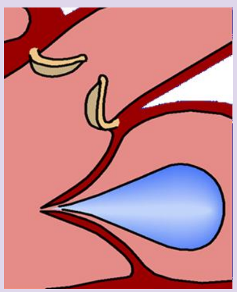
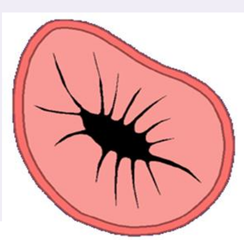


Co ... ine
... y to the degree of IMR as
... mation for risk stratification
and clinical decision making in the chronic post-MI phase. (*Circulation*. 2001;103:1759-1764.)

Seuil de Sévérité des Régurgitations

	Insuffisance Mitrale Organique	Insuffisance Mitrale fonctionnelle	Insuffisance Aortique	Insuffisance Tricuspide
Volume Régurgitant, ml 	**≥ 60**	**≥ 30**	≥ 60	≥ 45
Surface de l'orifice régurgitant, cm2 	**≥ 0.40**	**≥ 0.20**	≥ 0.30	≥ 0.40