

Valvulopathies

Intérêts de l'imagerie en coupe

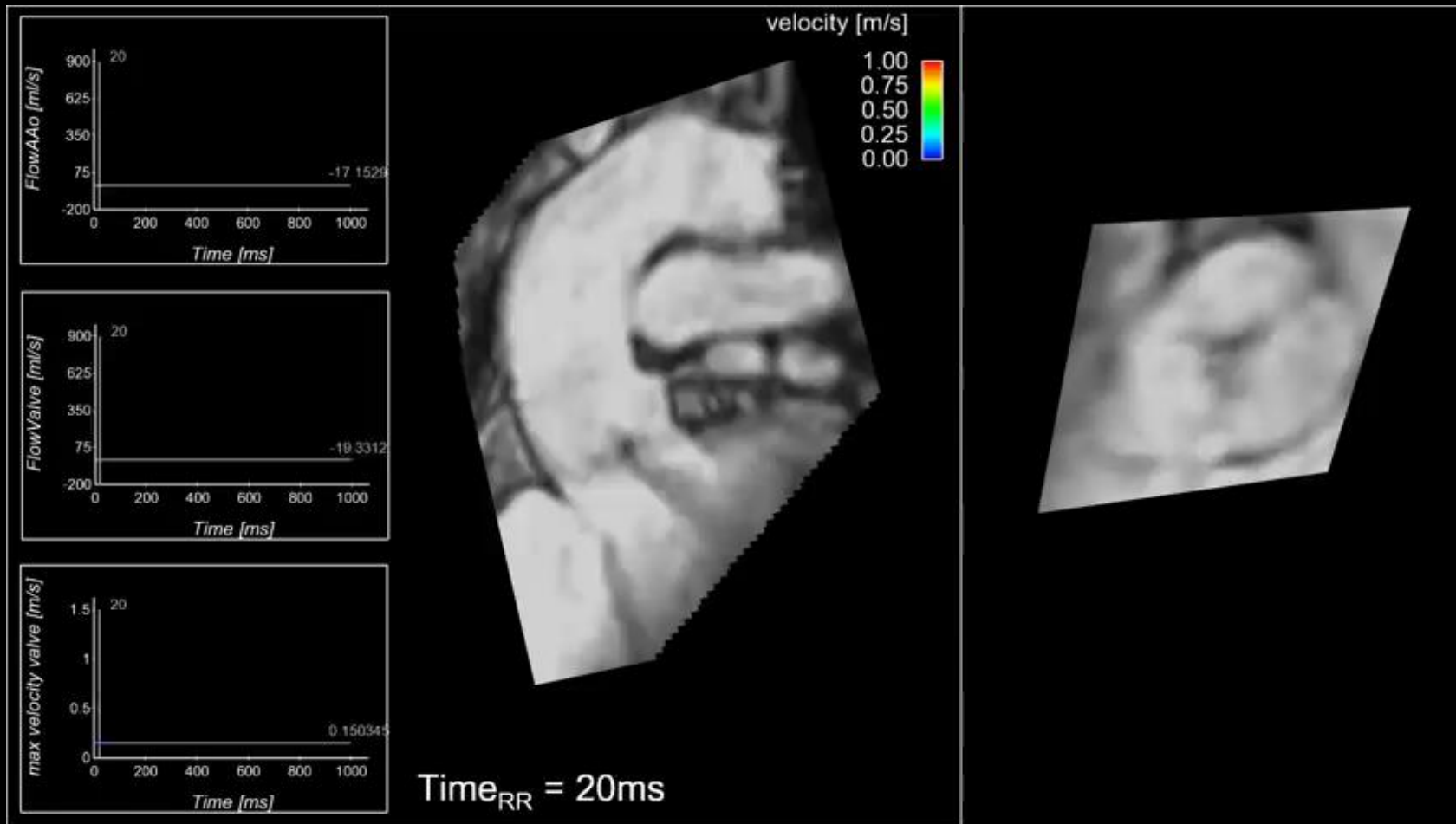
- Pas de problème d'échogénicité
- Reproductible
- Images tridimensionnelles de bonne résolution
- Analyse médiastin + facile (Vaisseaux, masses...)
- Caractérisation tissulaire +++

Séquence de flux

- Contraste de phase



4D flow

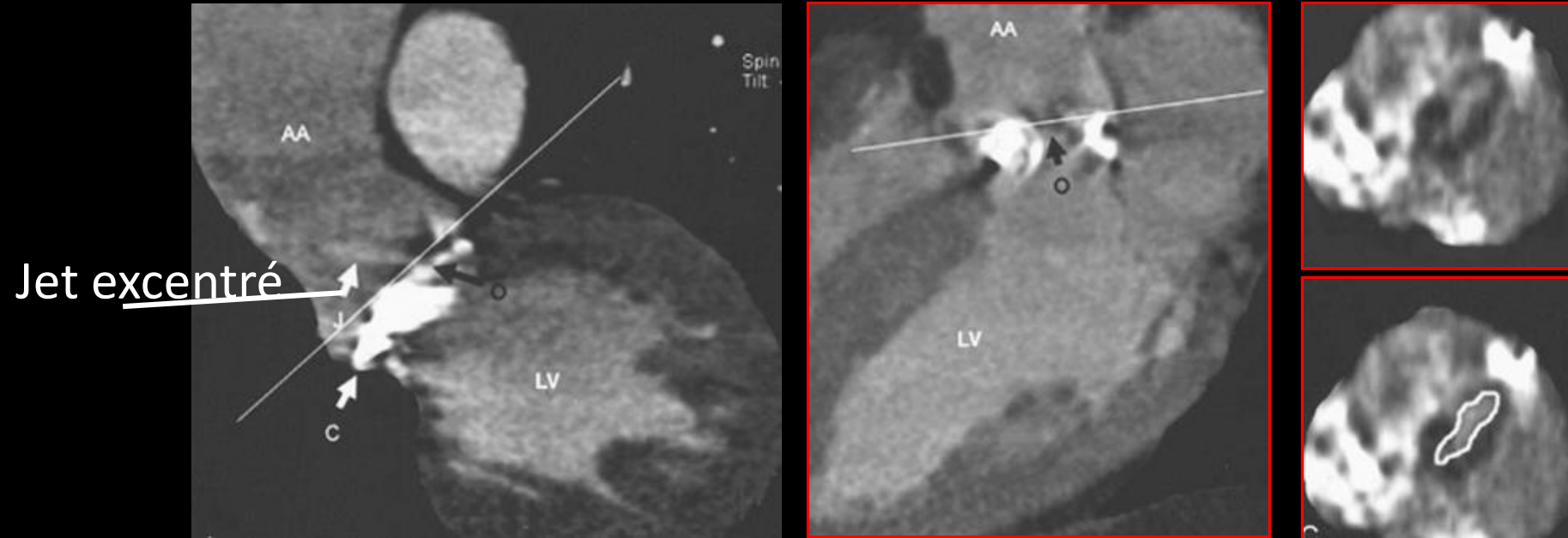


APPLICATIONS:

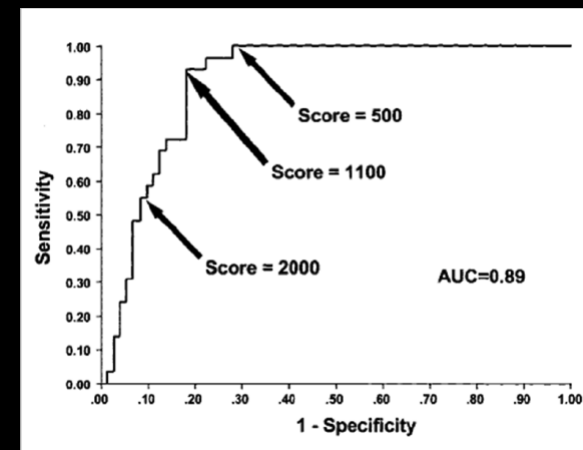
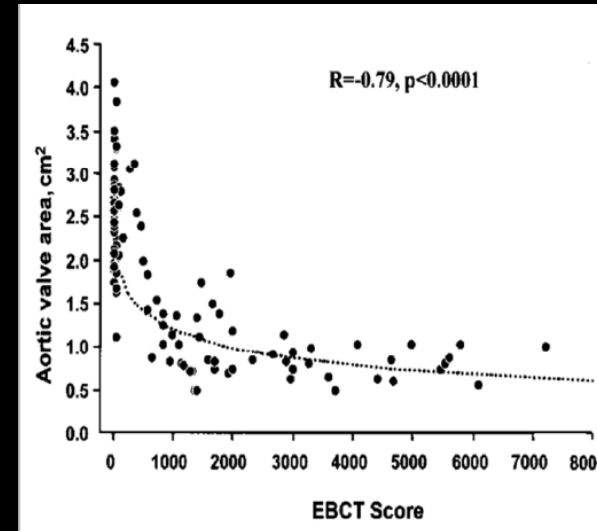
RA

RA

Diagnostic d'un Rao significatif par Scanner multicoupes

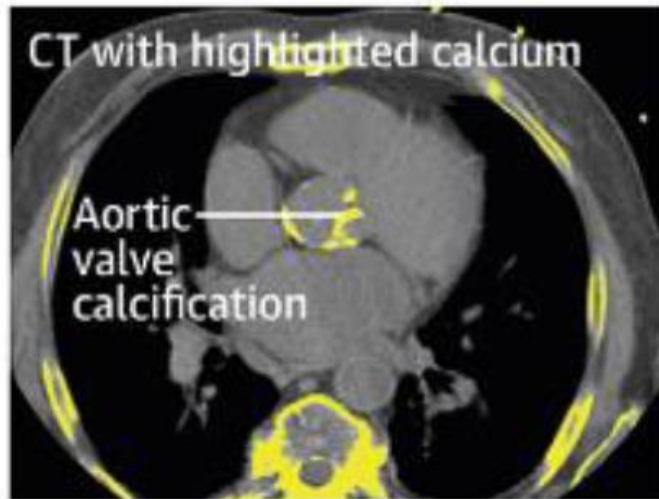


Intérêt du Score Calcique Valvulaire



Score calcique

Calcium Measurement



Thresholds of Aortic Valve Calcification

Aortic Valve Calcification (AVC total)

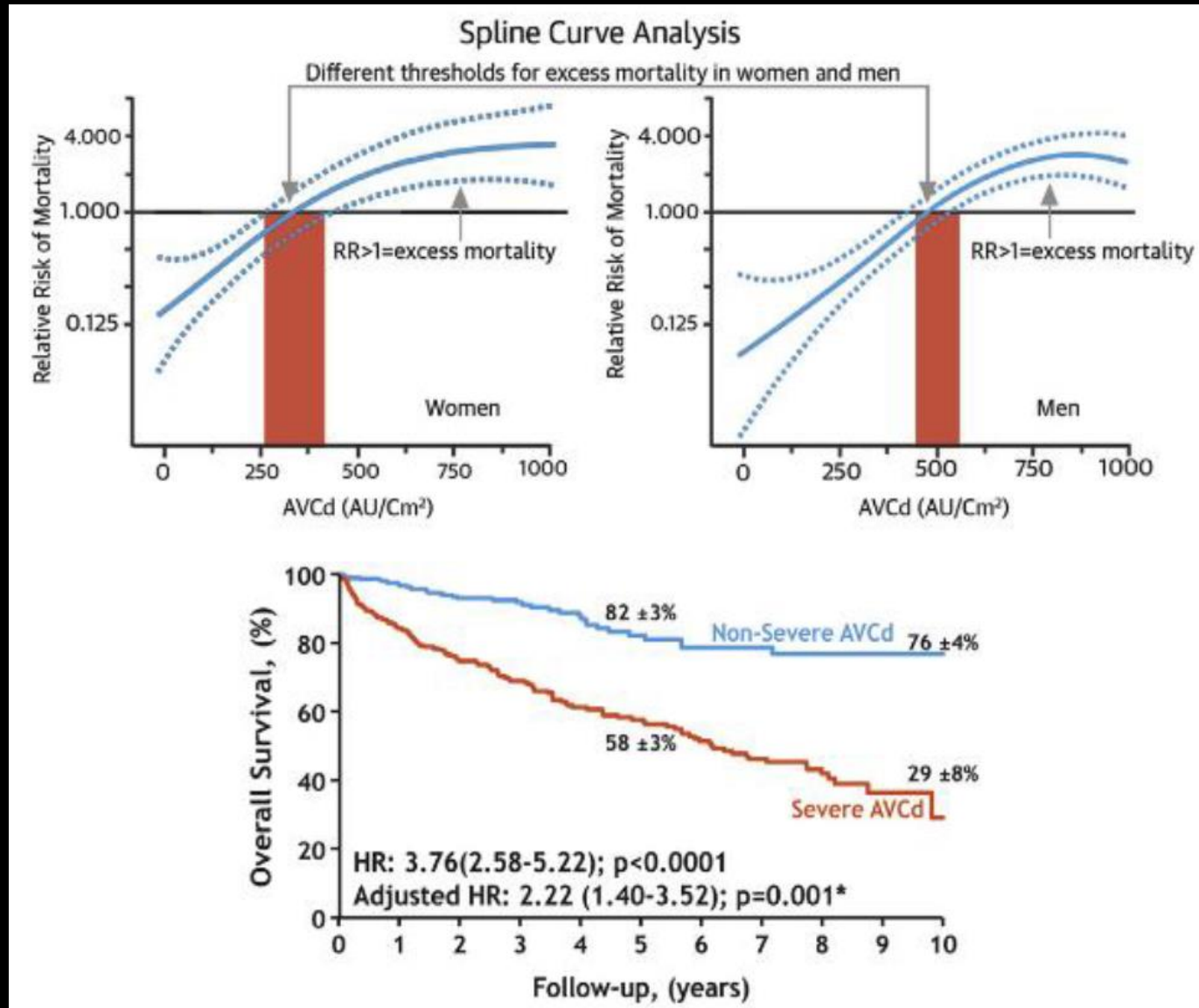
Women	Men
1274 AU	2065 AU

Aortic Valve Calcification Density (AVCd)

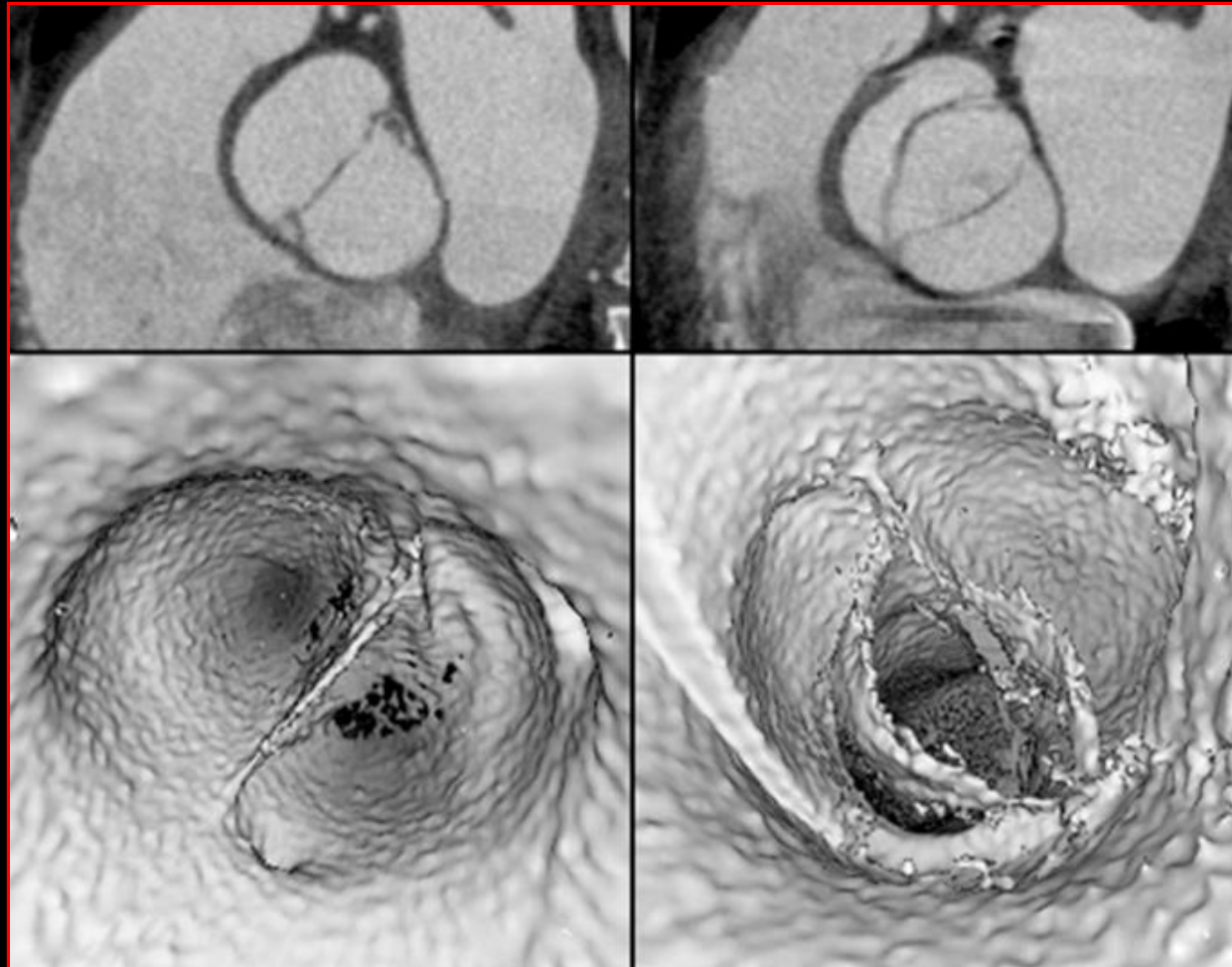
$$AVCd = \frac{AVC}{\text{aortic annulus area}}$$

Women	Men
292 AU/cm ²	476 AU/cm ²

Score calcique



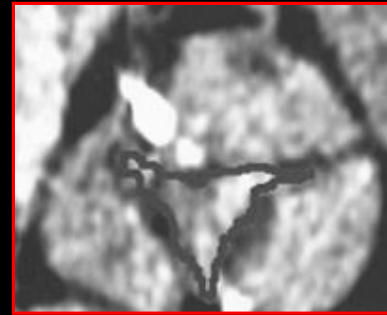
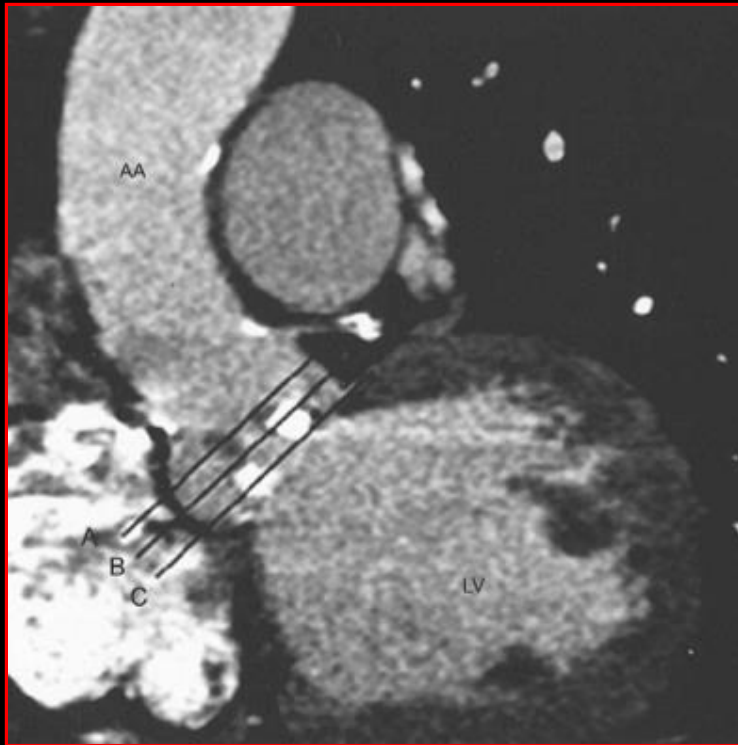
RA



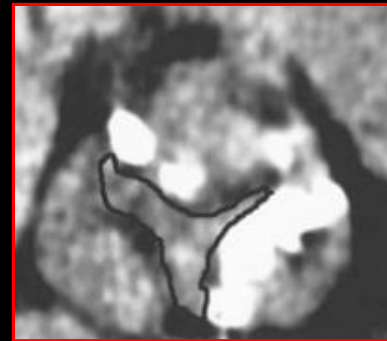
Bouvier et al Eur Heart J 2006;27:3033-38

RA

Diagnostic d' un Rao significatif par Scanner multicoupes

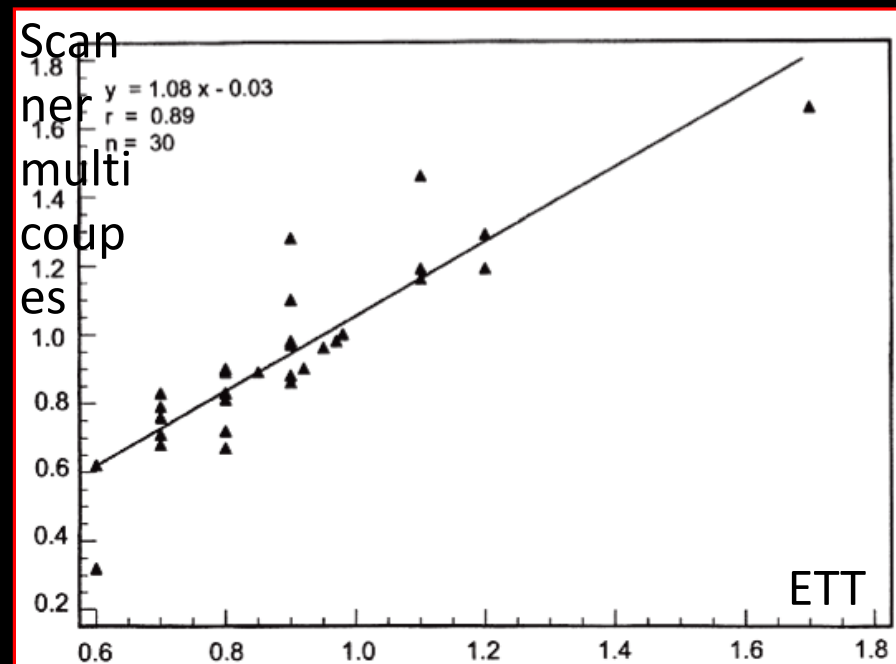


Sao la + petite



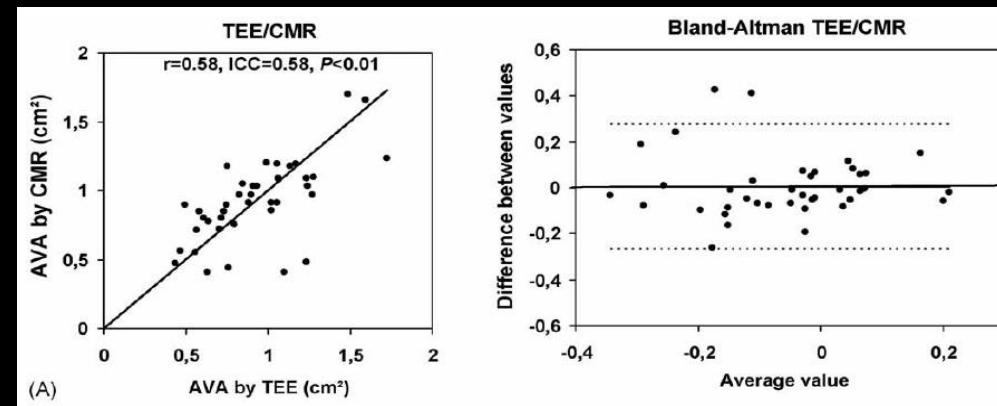
RA

Diagnostic d'un Rao significatif par Scanner multicoups



Evaluation de la sévérité

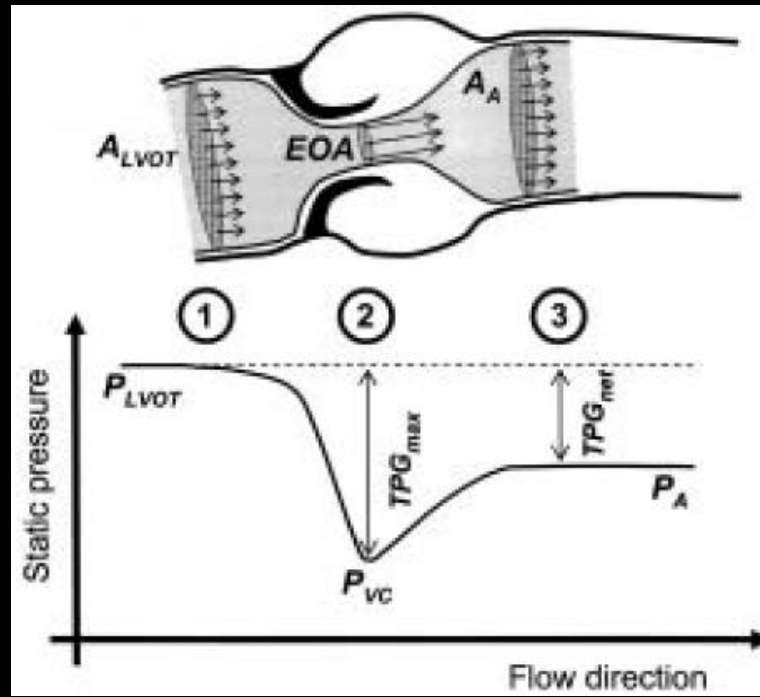
Aire valvulaire géométrique



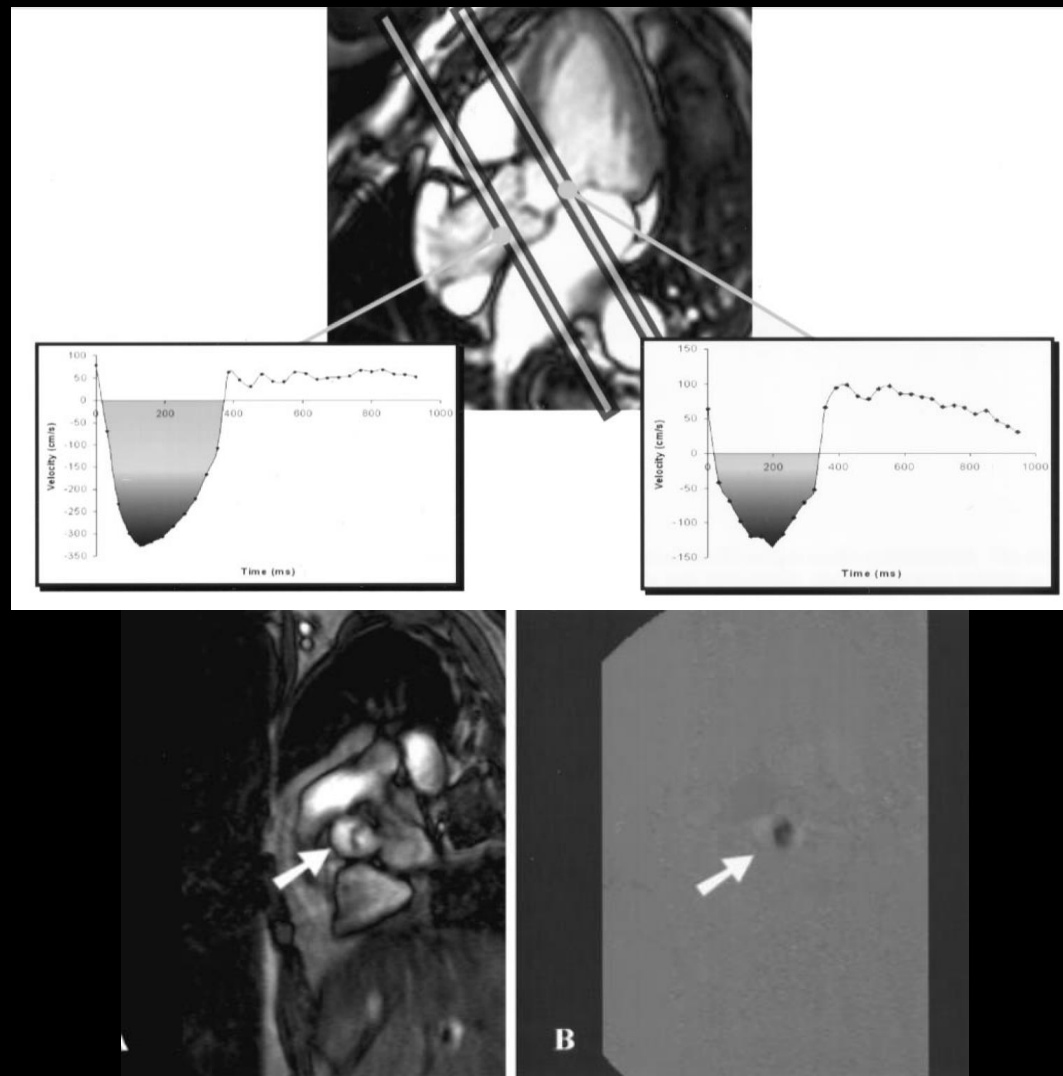
Anatomic valve area					
John ²⁷ (2003)	planimetry	TEE	40	0.96	0.02±0.08 cm ²
Kupfahl ²⁸ (2004)	planimetry	TEE	32	...	0.02±0.21 cm ²
Debl ²⁹ (2005)	planimetry	TEE	25	0.86	0.13±0.16 cm ²
Reant ³⁰ (2006)	planimetry	TEE	39	0.58	0.01±0.14 cm ²
Schlosser ³¹ (2007)	planimetry	TEE	32	0.82	(Echo – CMR) 0.15±0.13 cm ²

Limites de l'aire valvulaire géométrique

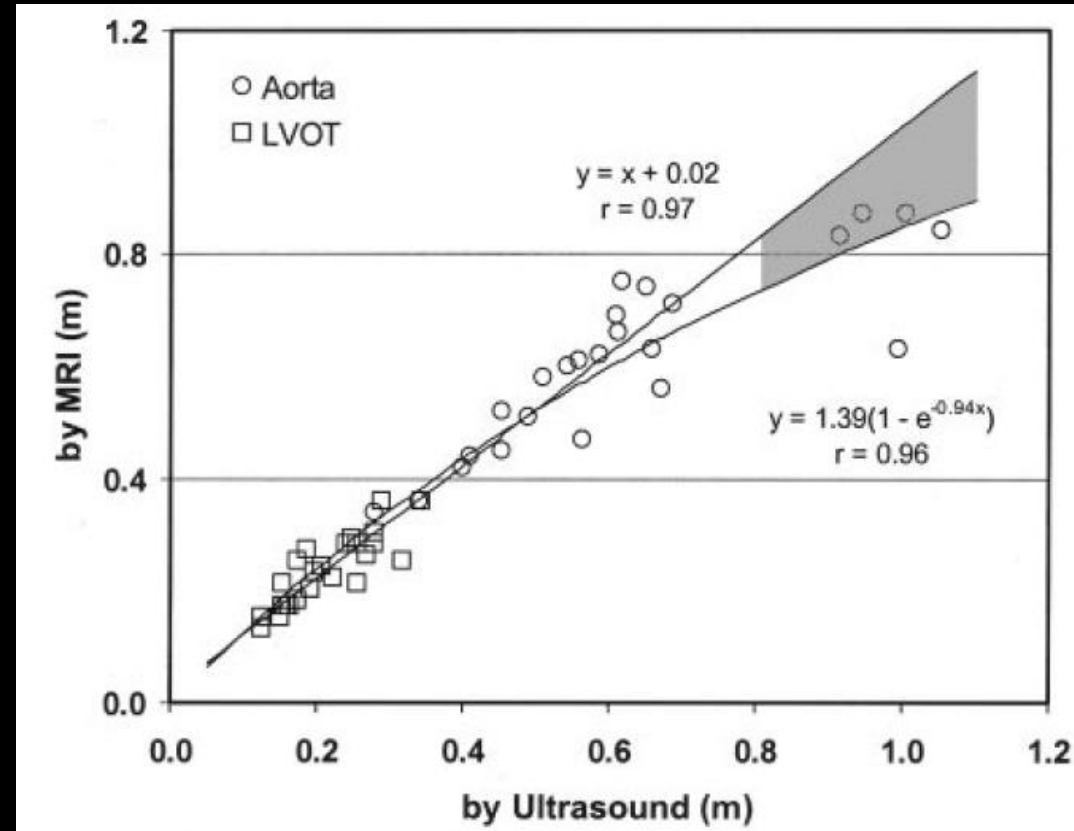
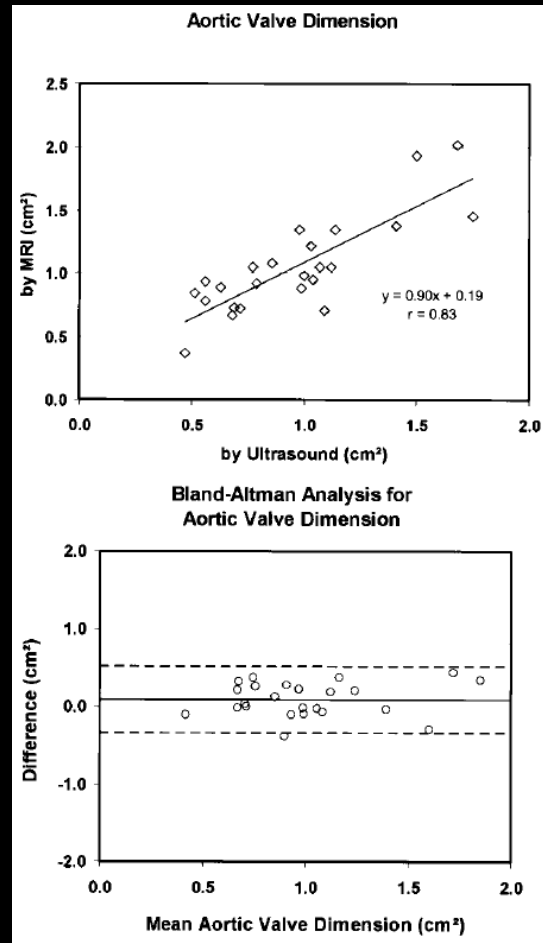
« What our eyes see is not necessarily what our heart feels »



Aire valvulaire effective



Aire valvulaire effective



Aire valvulaire effective

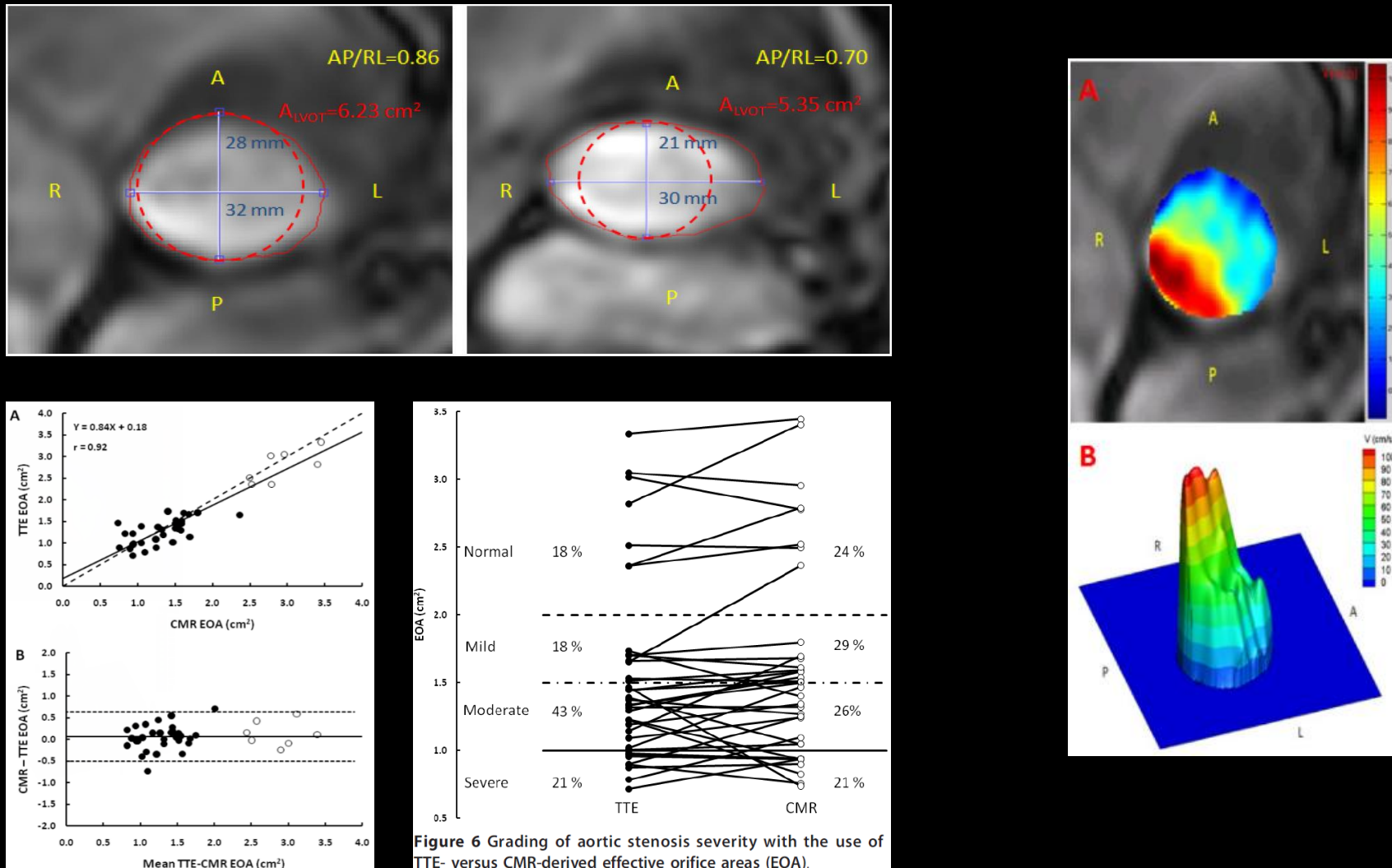
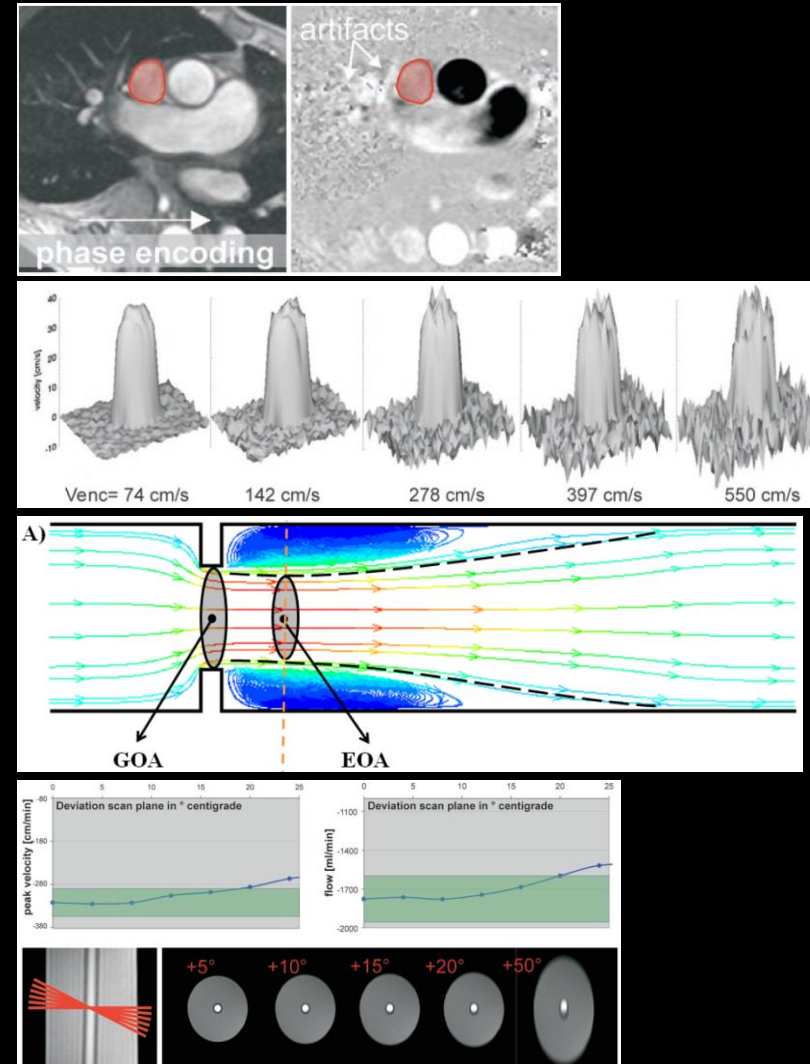


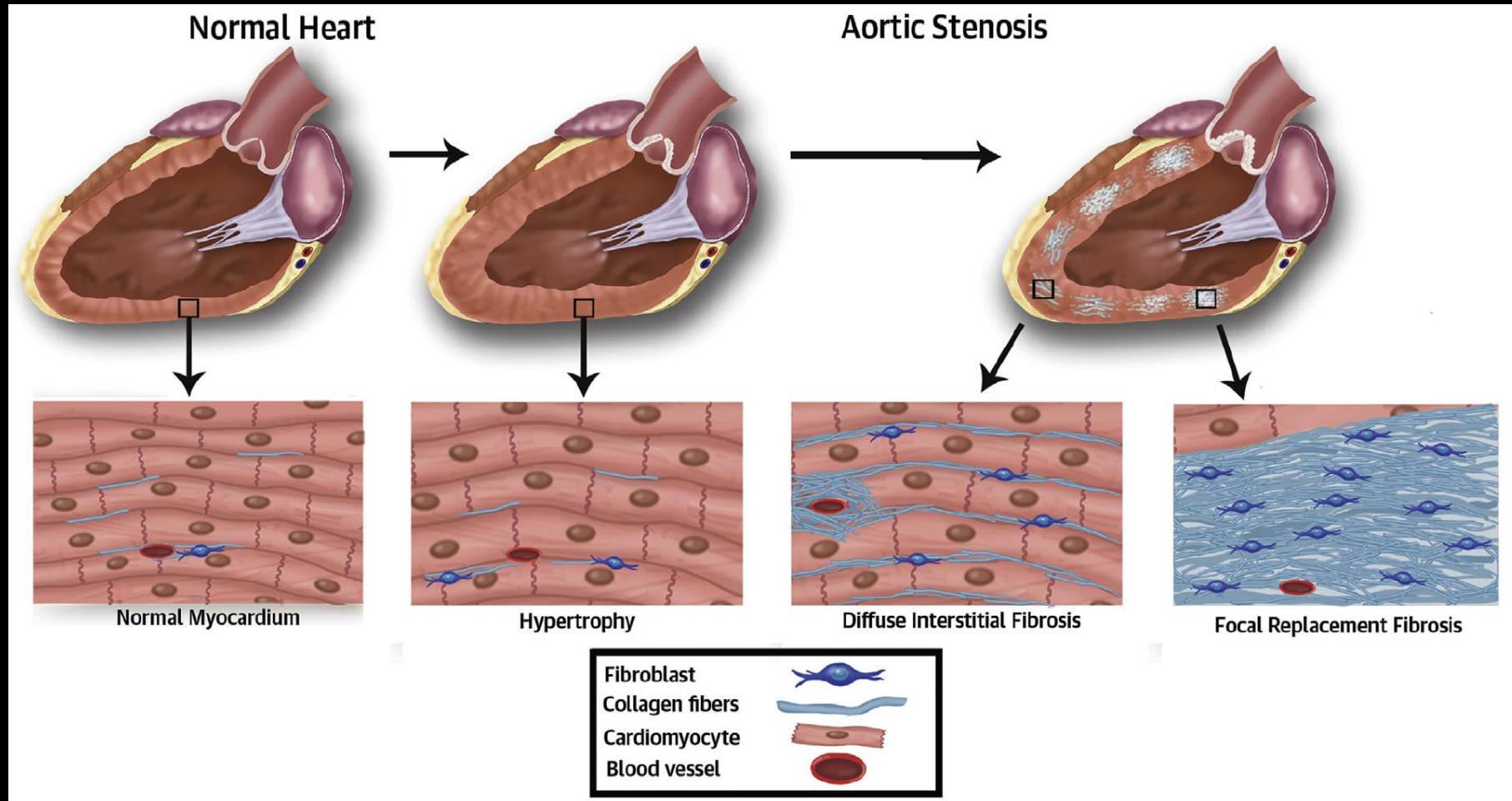
Figure 6 Grading of aortic stenosis severity with the use of TTE- versus CMR-derived effective orifice areas (EOA).

Limites

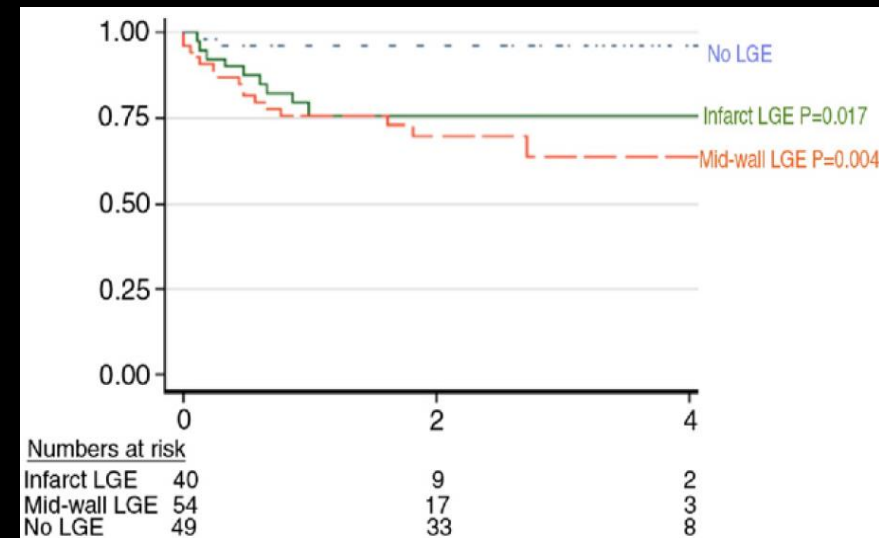
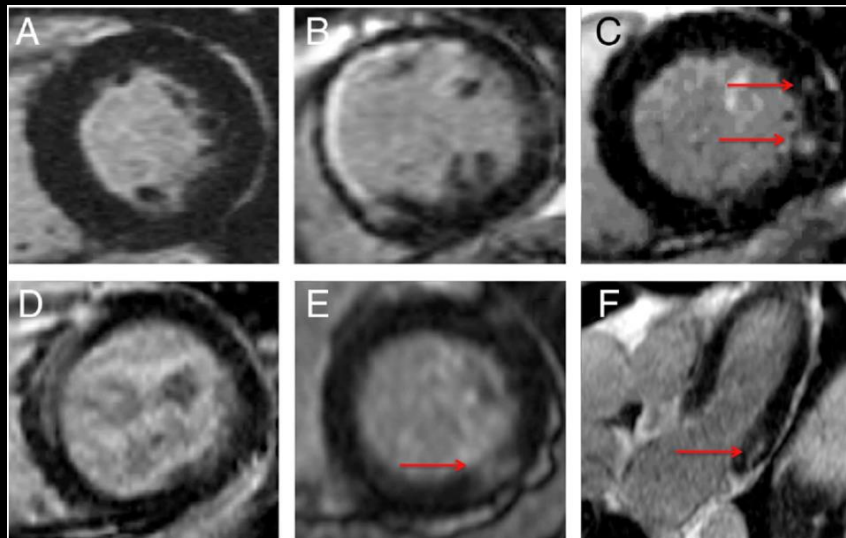
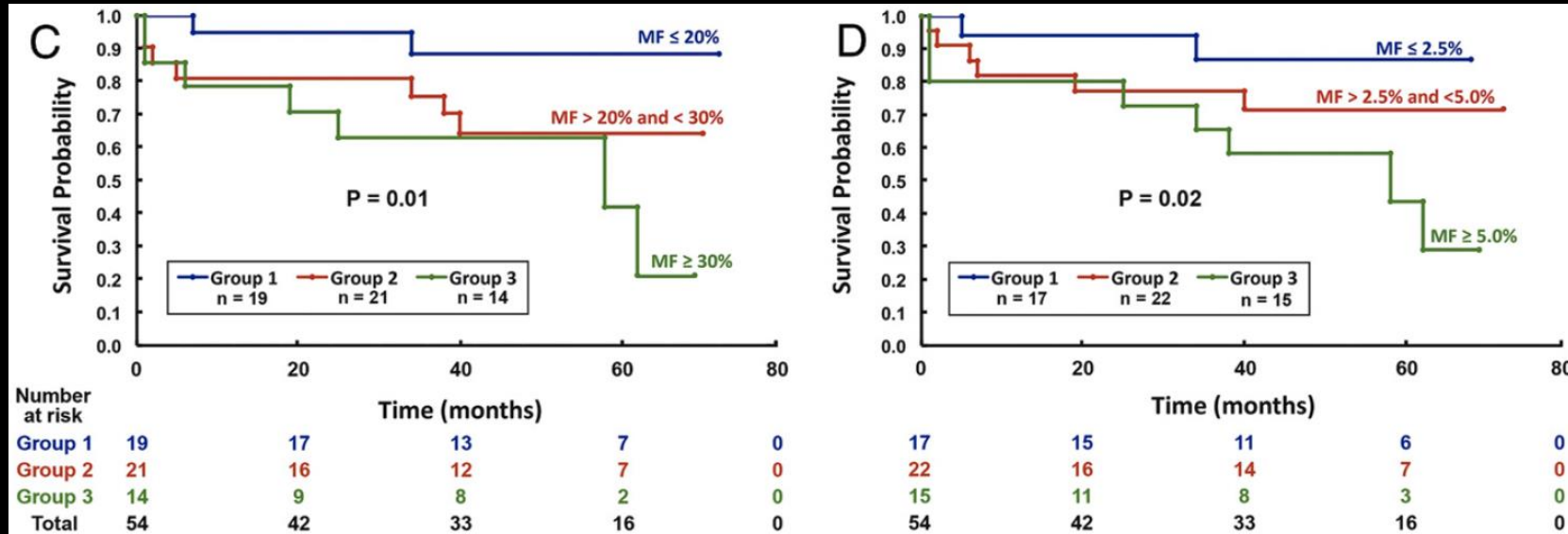
- Perte de signal local
- Turbulences
- Repliement
- Bruit de fond
- Résolution temporelle limitée
- Effet de volume partiel
- Jets excentriques...



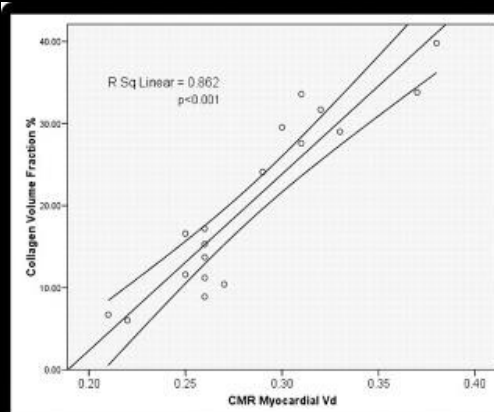
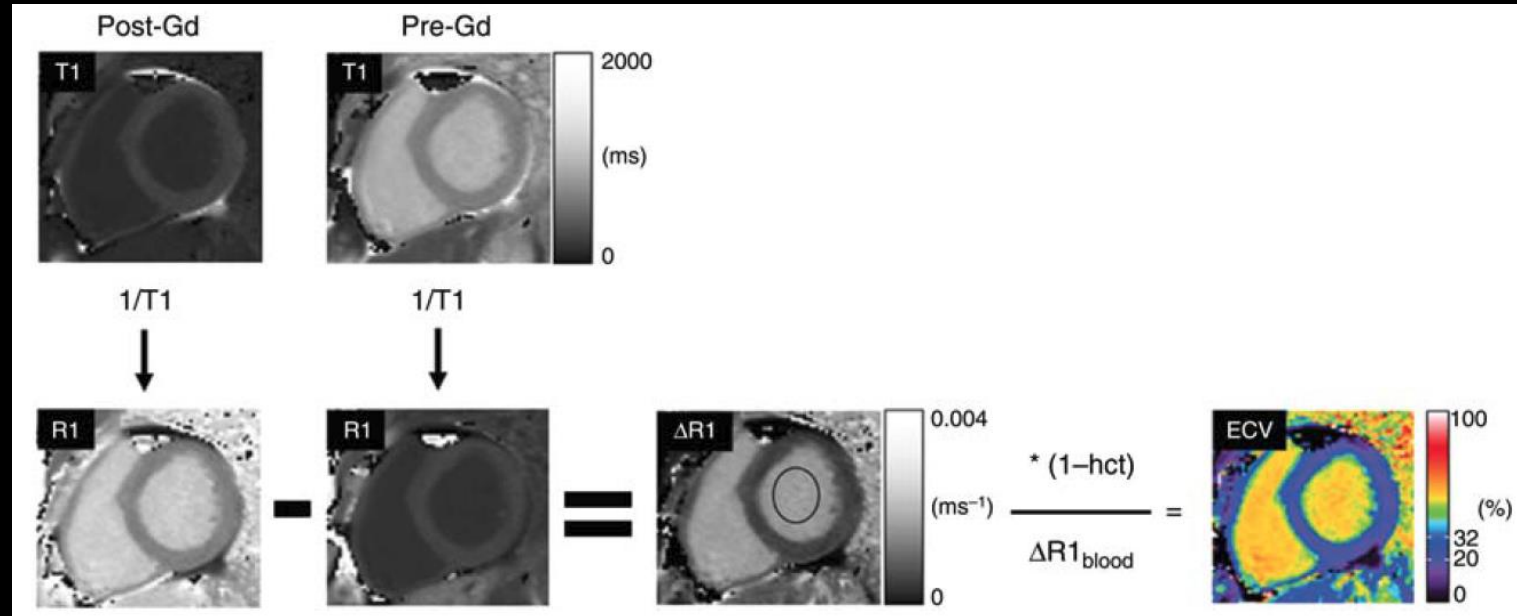
Fibrose myocardique



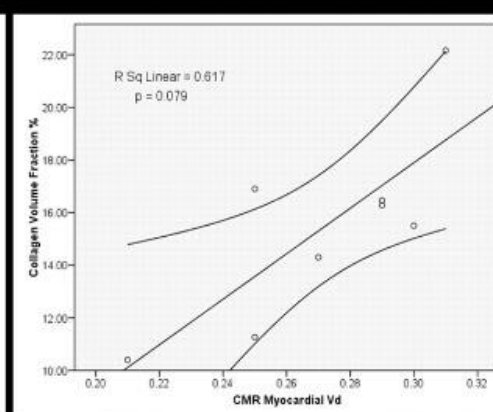
Fibrose focale



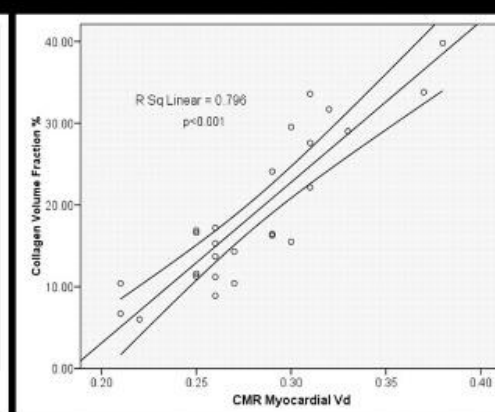
Fibrose diffuse



Aortic Stenosis

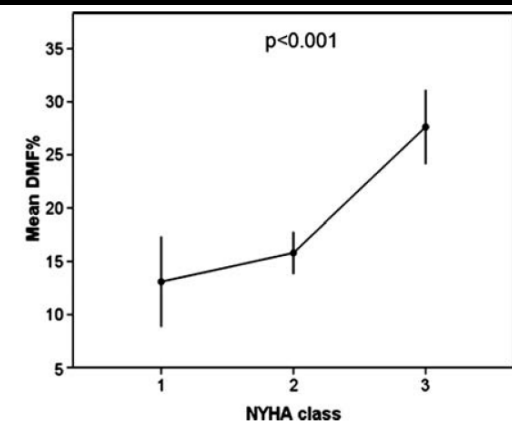
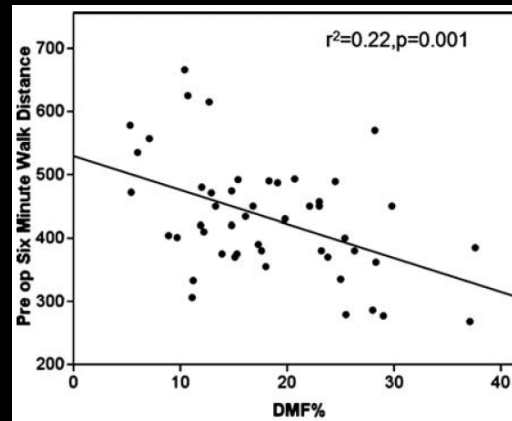
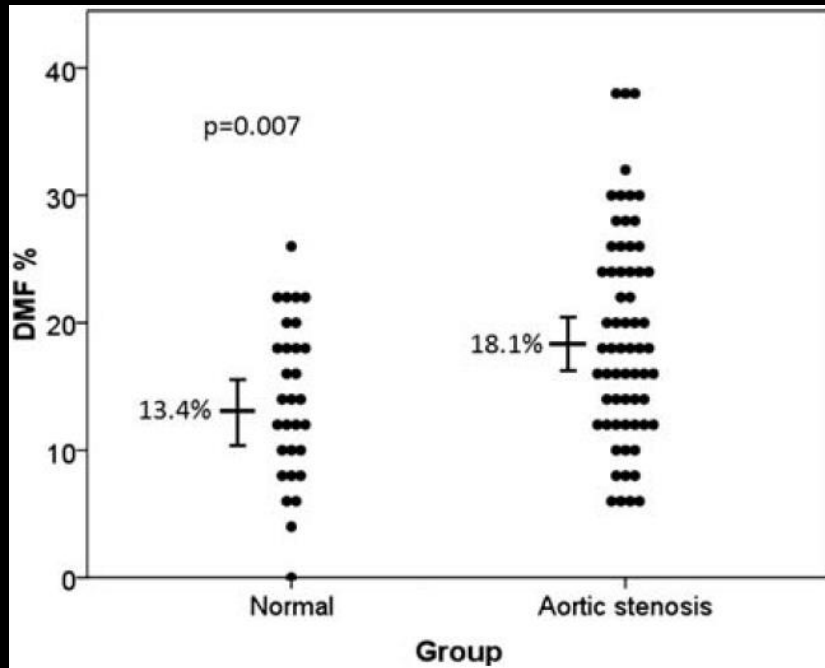


Hypertrophic Cardiomyopathy



Combined

Fibrose diffuse



Correlates with:

- Functional status
- Longitudinal strain

Does not seem to improve after surgery

TAVI

TAVI

Procédure idéale

Procédure simple et réussie

Sans complication

Résultat hémodynamique correct

Pas de fuite péri-prothétique



Importance du screening

Rôle de
IMAGERIE

TAVI

- Contre-indications générales

- Anneau aortique: < 18 ou > 27 mm (Edwards),
< 18 ou > 27 mm (CoreValve)
- Calcifications importantes pouvant occlure un ostium coronaire lors de la pose
- Thrombus VG

TAVI

Contre-indications voie fémorale

- Artères iliaques tortueuses, calcifiées et de petit diamètre
- Pontage aorto fémoral
- Aorte très angulée, très athéromateuse, coarctation,

Contre-indications voie apicale

- ATCD de chirurgie du VG (x: intervention de Dor)
- Calcifications du péricarde
- Insuffisance respiratoire sévère, pointe VG non accessible

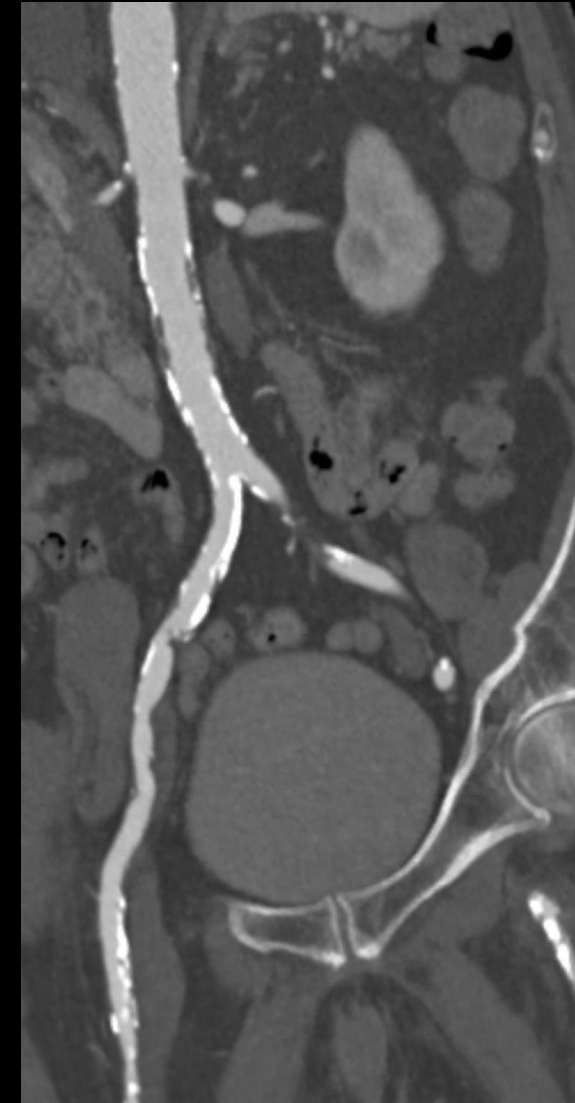
TAVI

**Sélection
de la voie
d'abord**

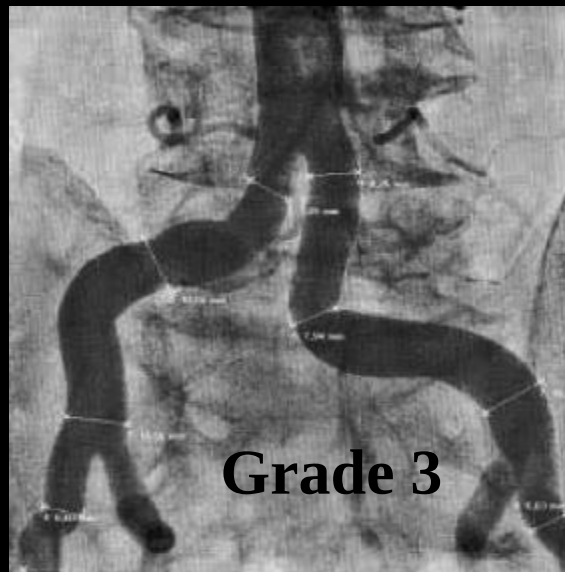
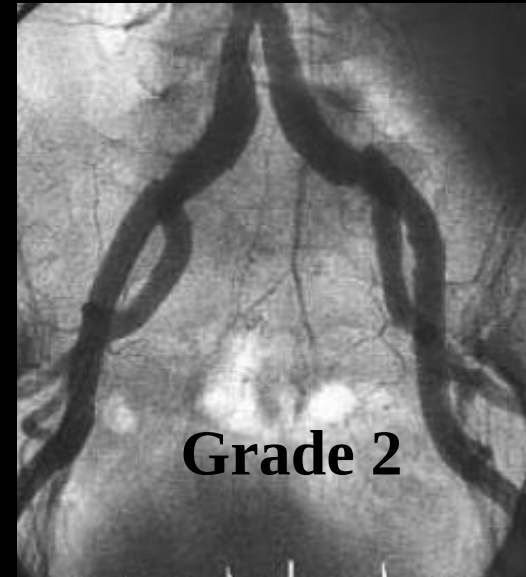
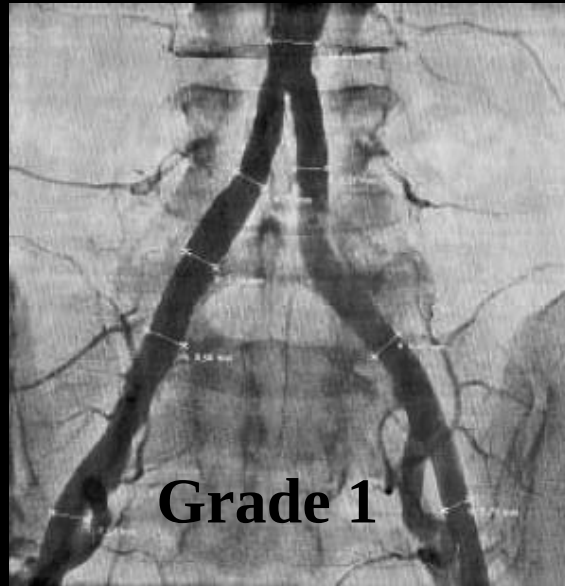
TAVI

Evaluation de l'axe ilio-fémoral

	Internal ⊗	External ⊗	Vessel ⊗
E Sheat (Edwards)	16F	6.6 mm	6.0 mm
	18F	7.2 mm	6.5 mm
	19F	7.5 mm	7.0 mm
	20F	8.0 mm	7.0 mm
	22F	8.8 mm	
CoreValve (Medtronic)	16F	6.6 mm	6.0 mm

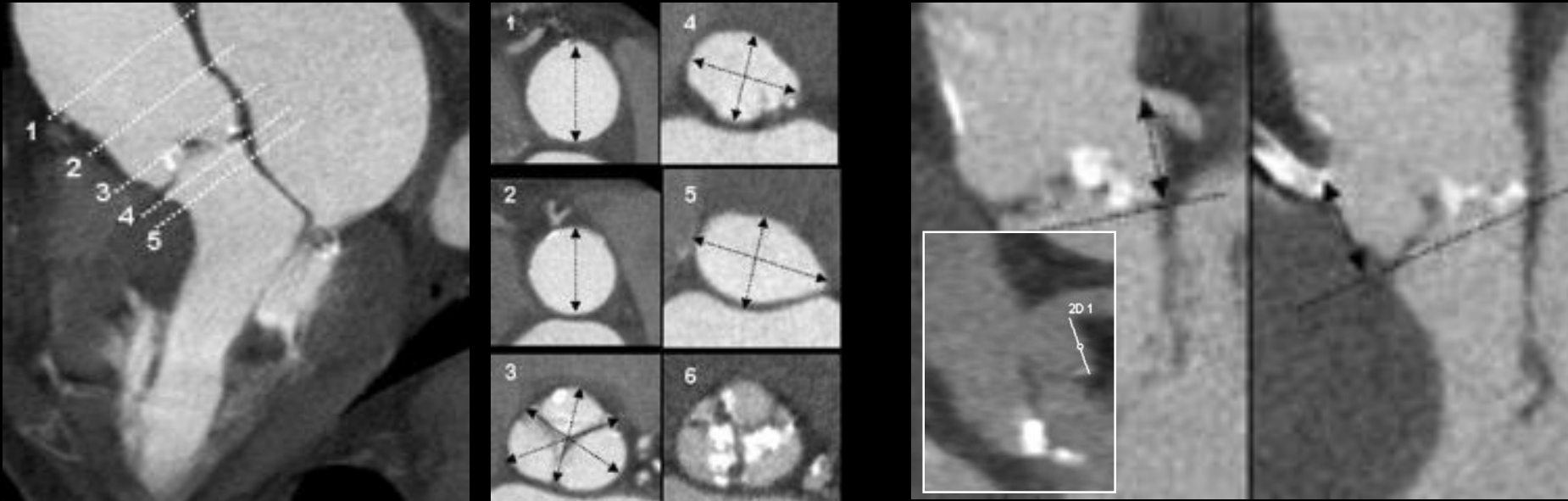


Angiographie



TAVI

- **Aorte ascendante:**
 - Mesures à 5 niveaux:
 - Position des artères coronaires par rapport à l'anneau aortique
 - Appréciation des calcifications, d'une bicuspidie

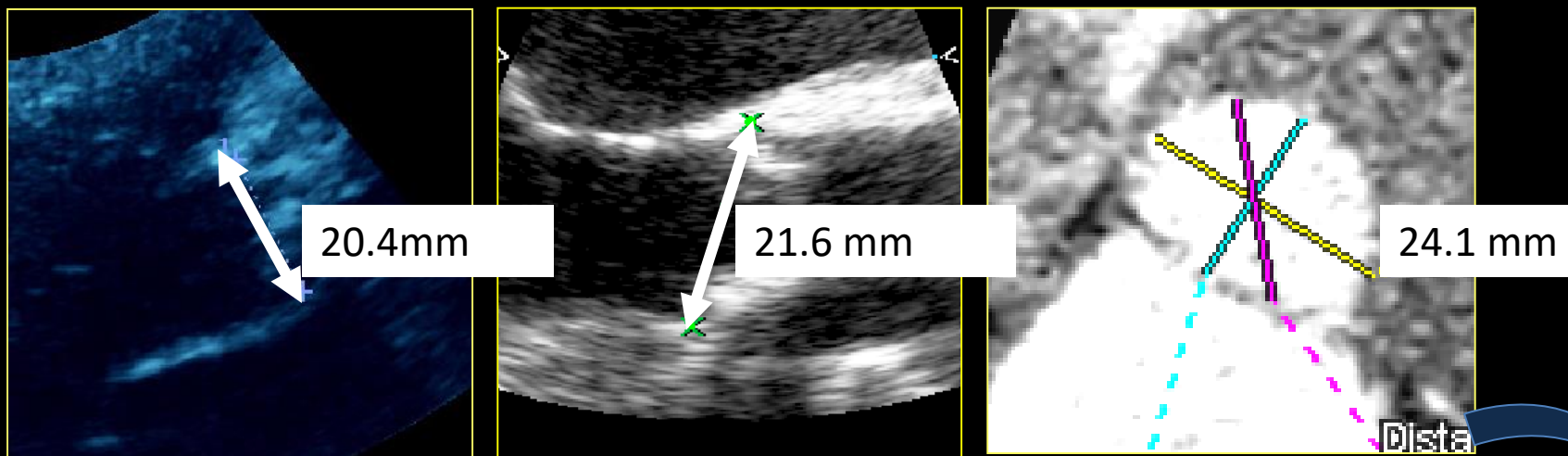


TAVI

**Choix de la taille
de la valve**

TAVI

Mesure de l'anneau



ETT > 1mm

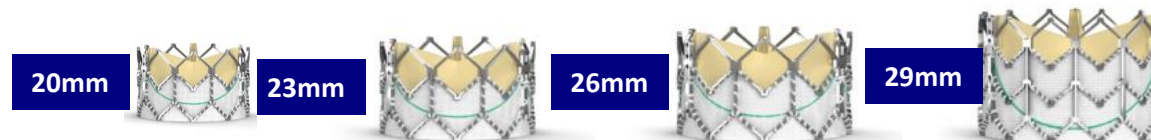
ETO > 2-4mm

Scanner

Diamètre anneau



SAPIEN



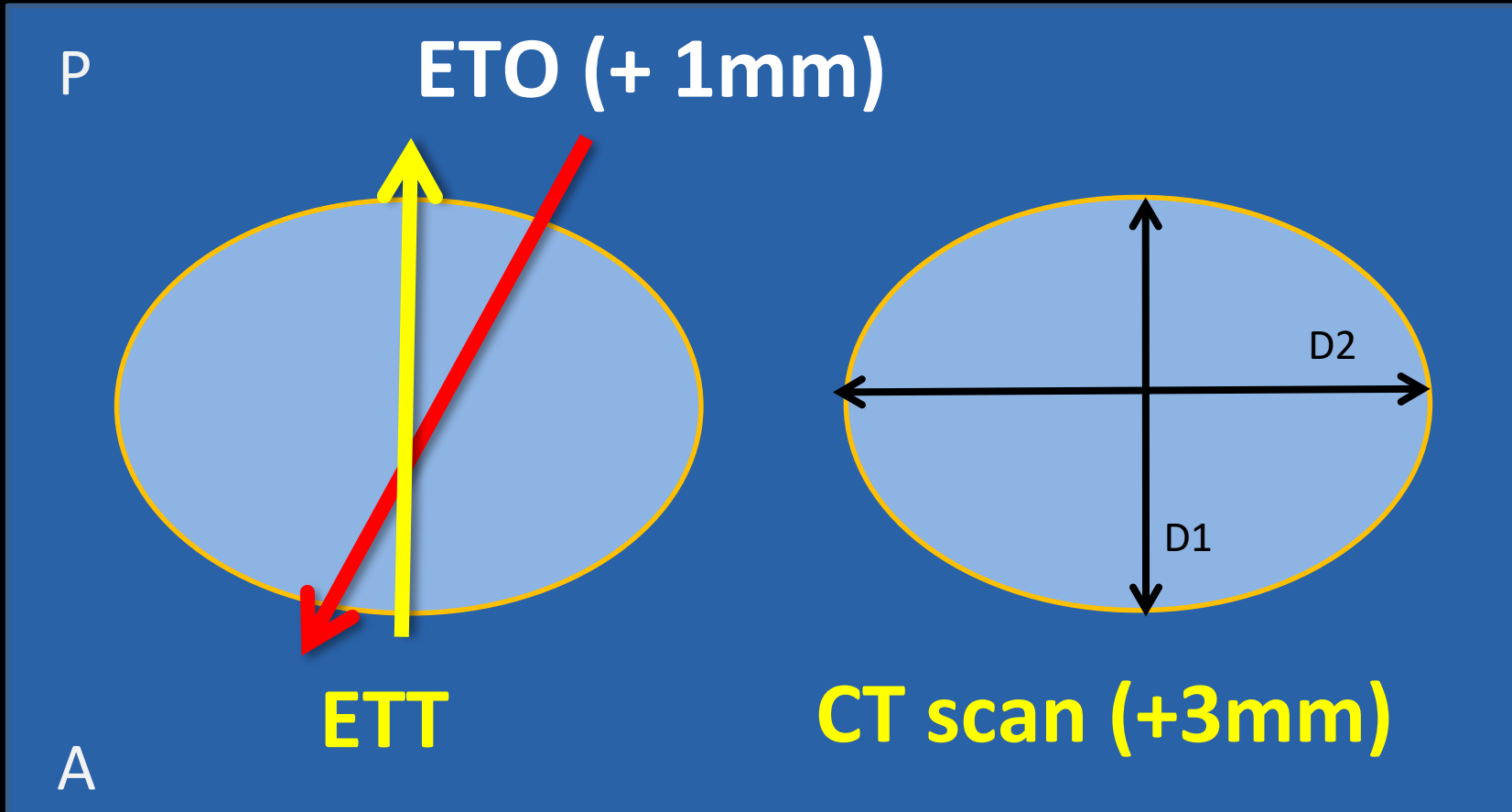
CoreValve



Quelle
taille
?

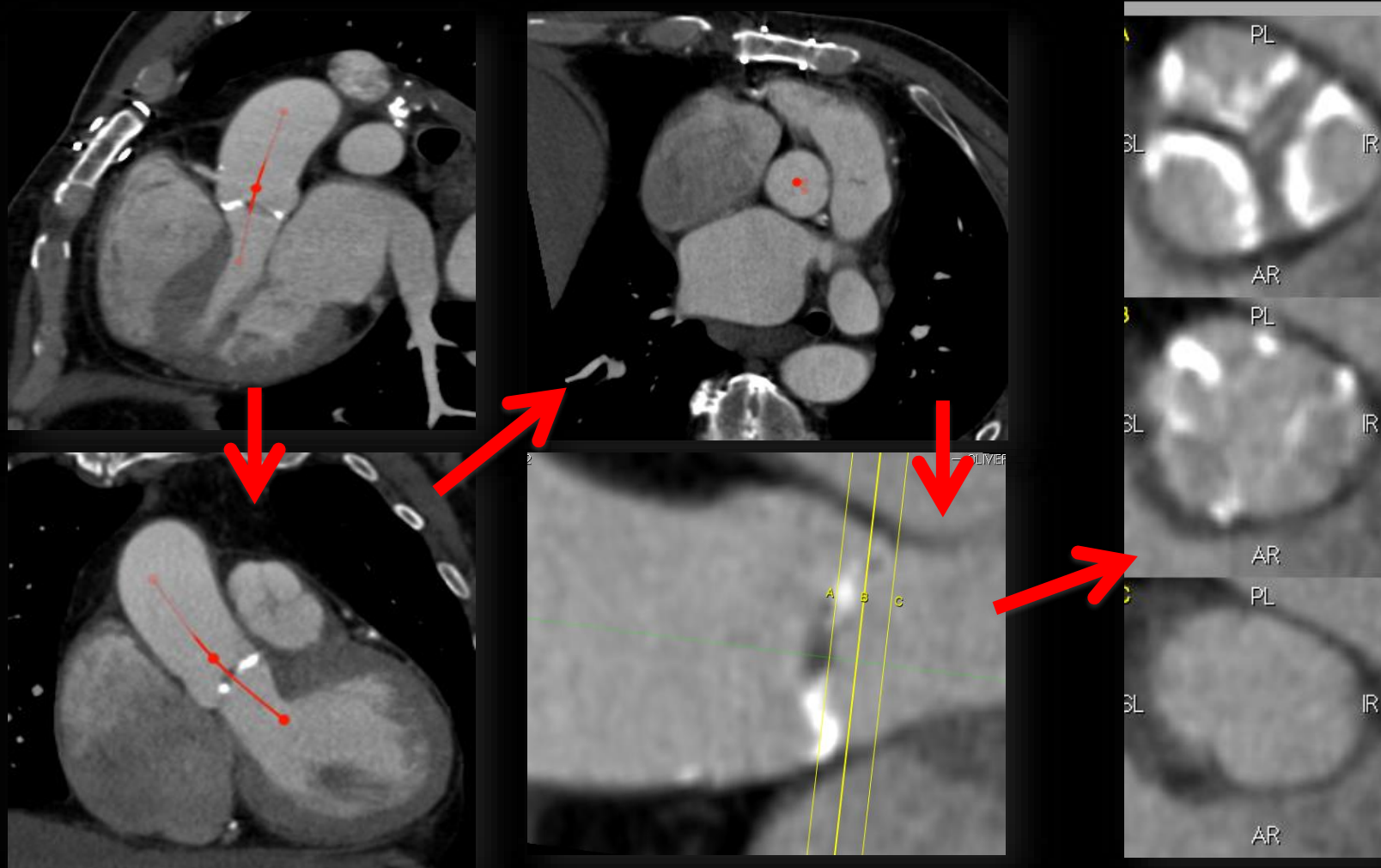
TAVI

Mesure de l'anneau



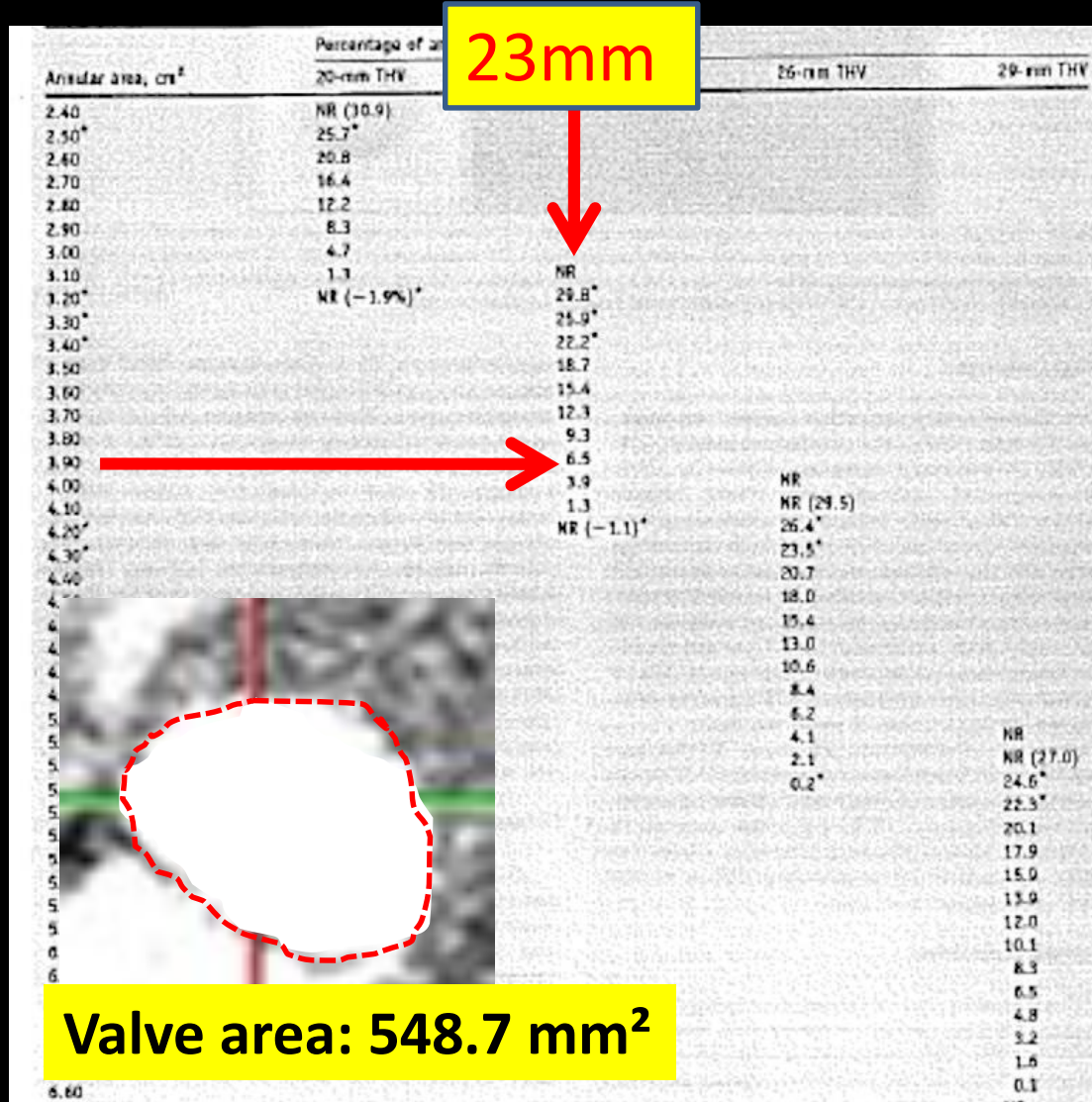
TAVI

Mesure de l'anneau



TAVI

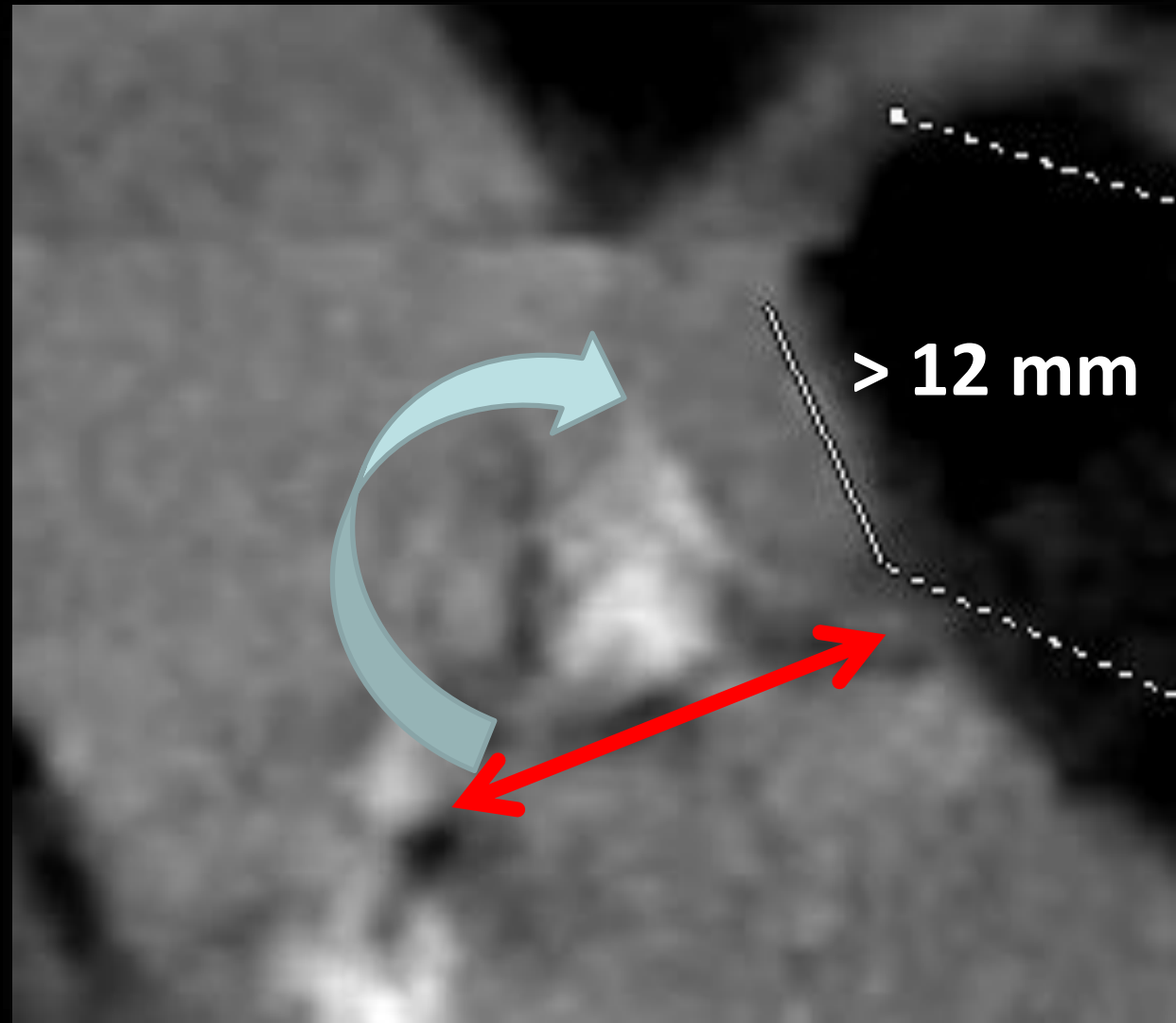
Mesure de l'anneau



La classification
de Vancouver

TAVI

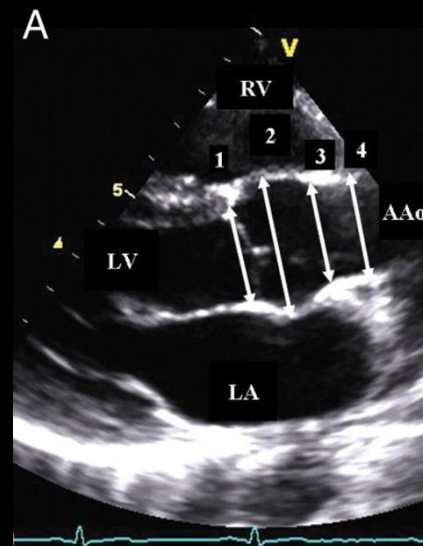
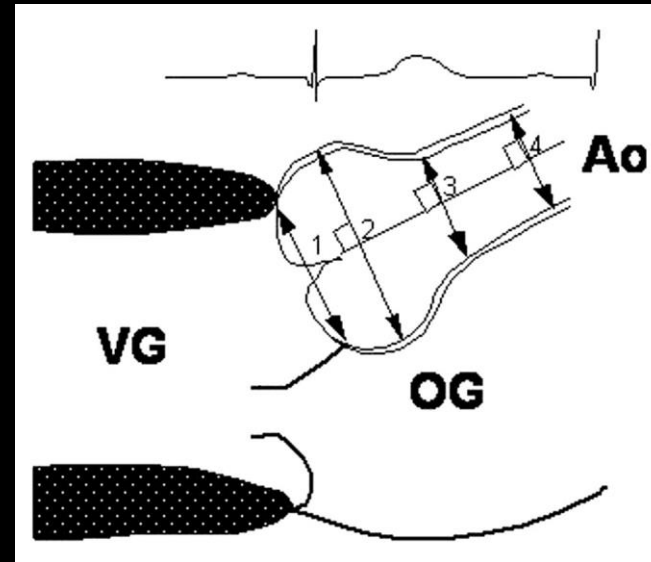
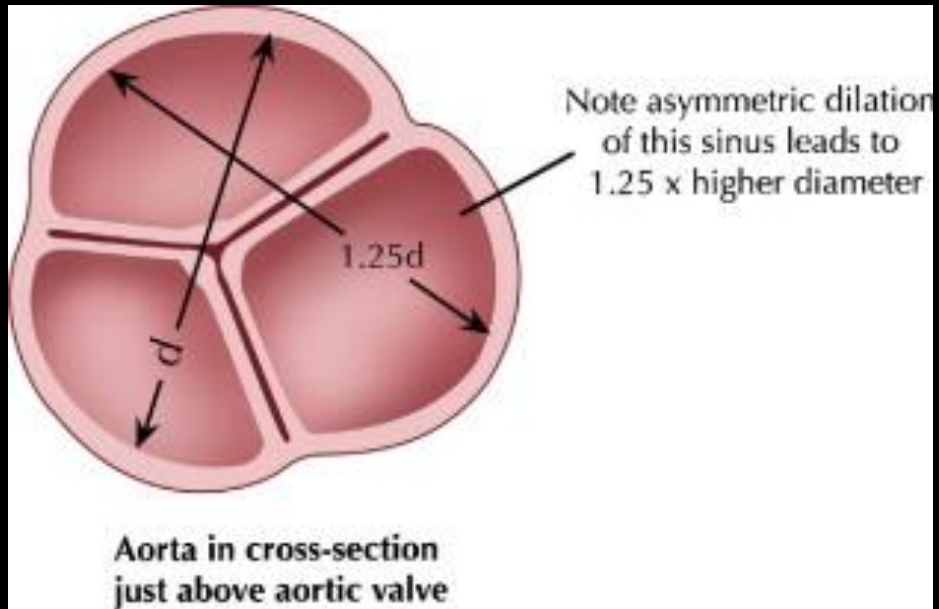
TAVI: distance des coronaires



APPLICATIONS:

IA

Vaisseaux

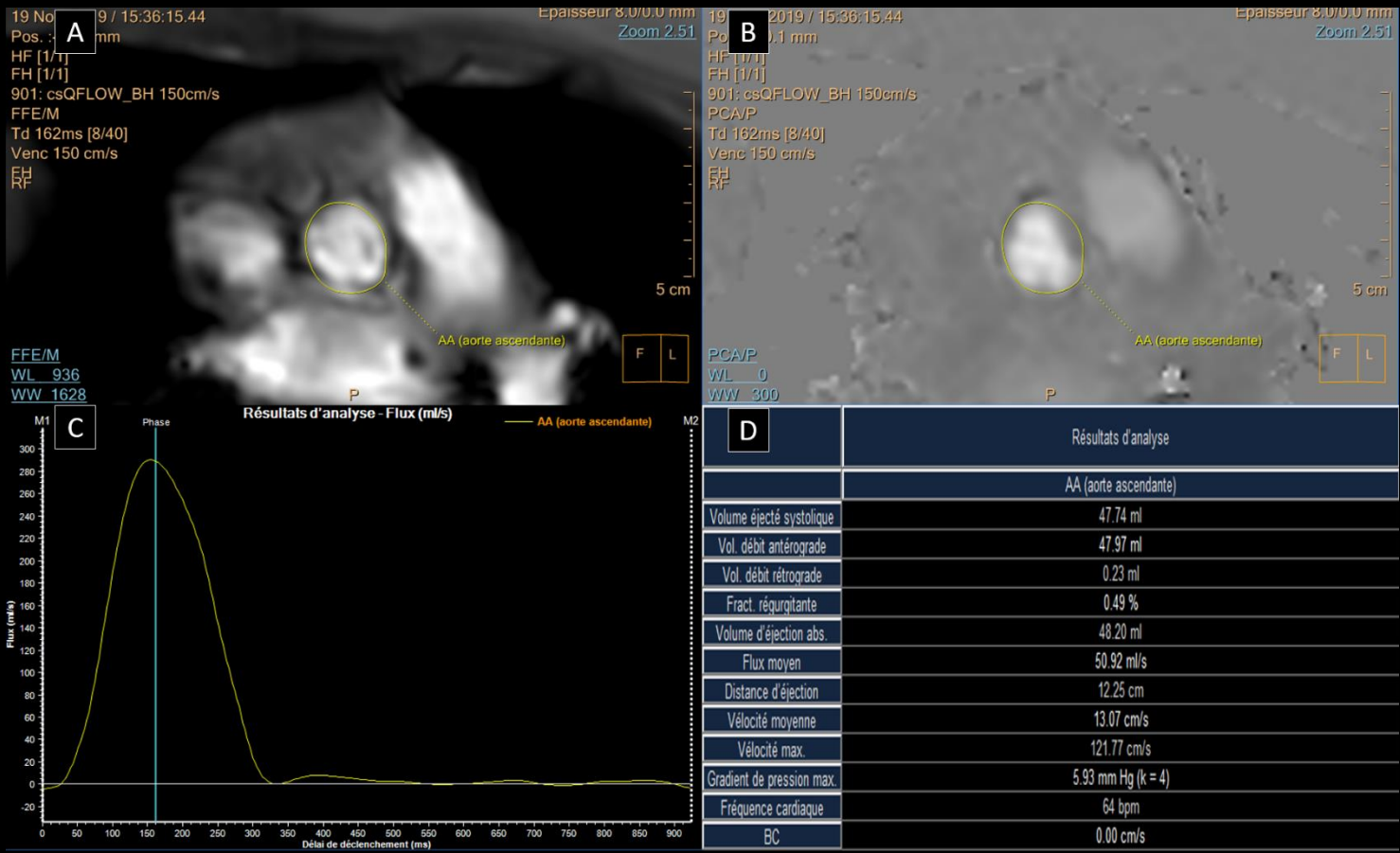
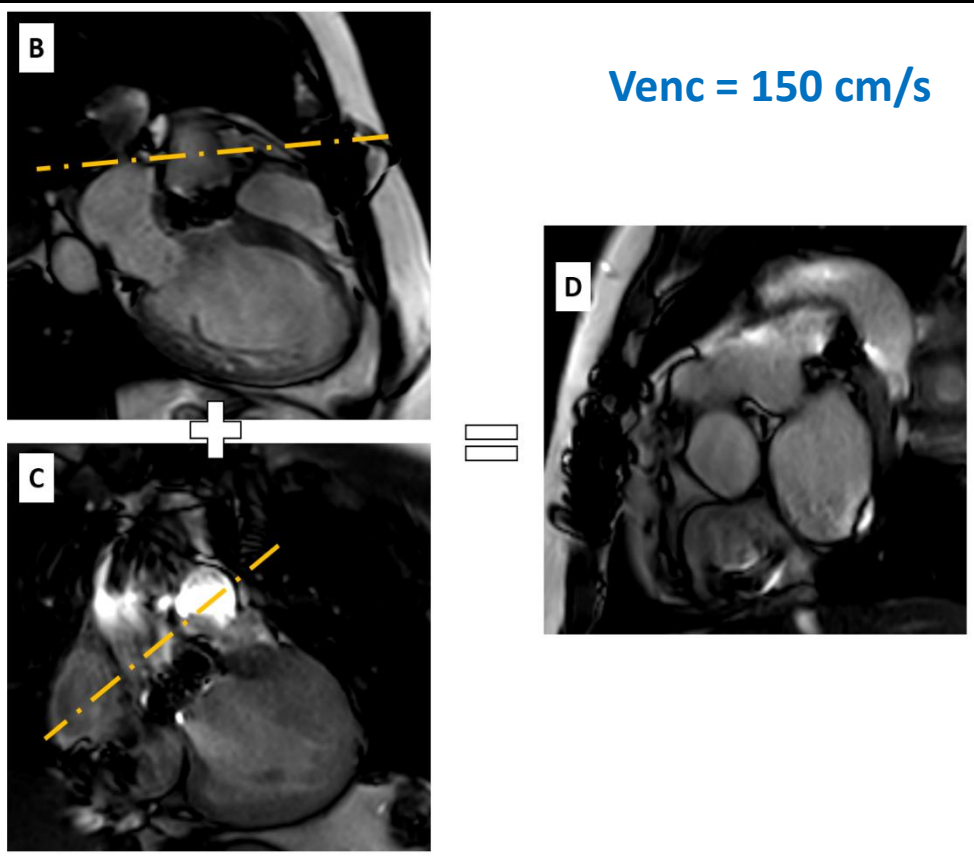


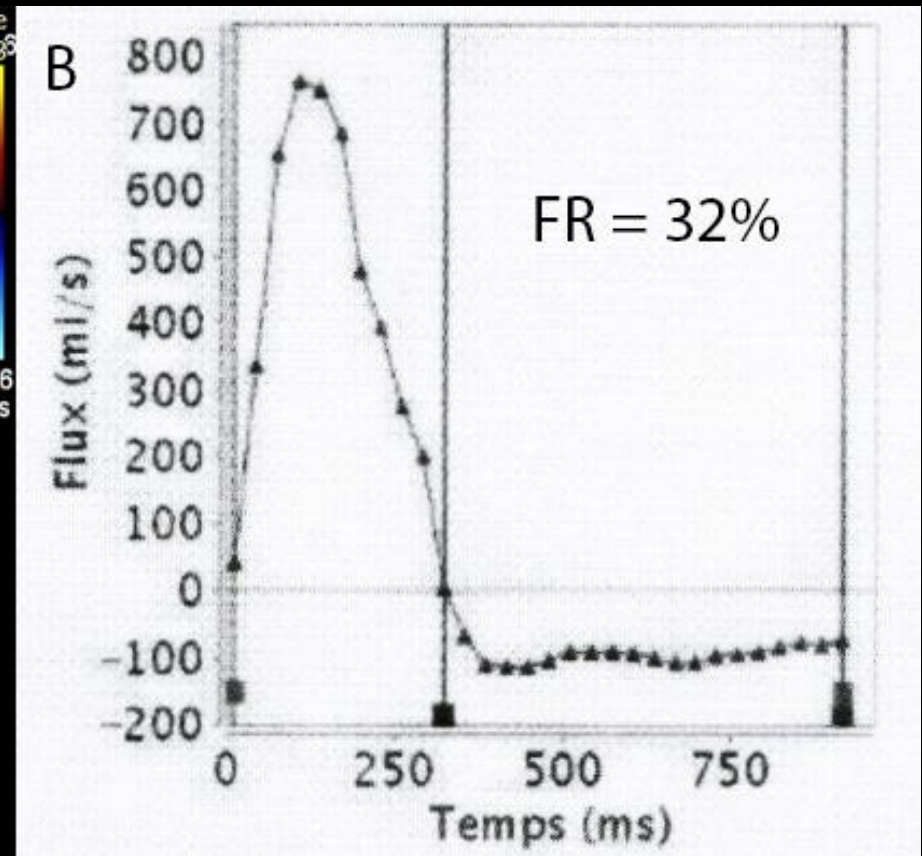
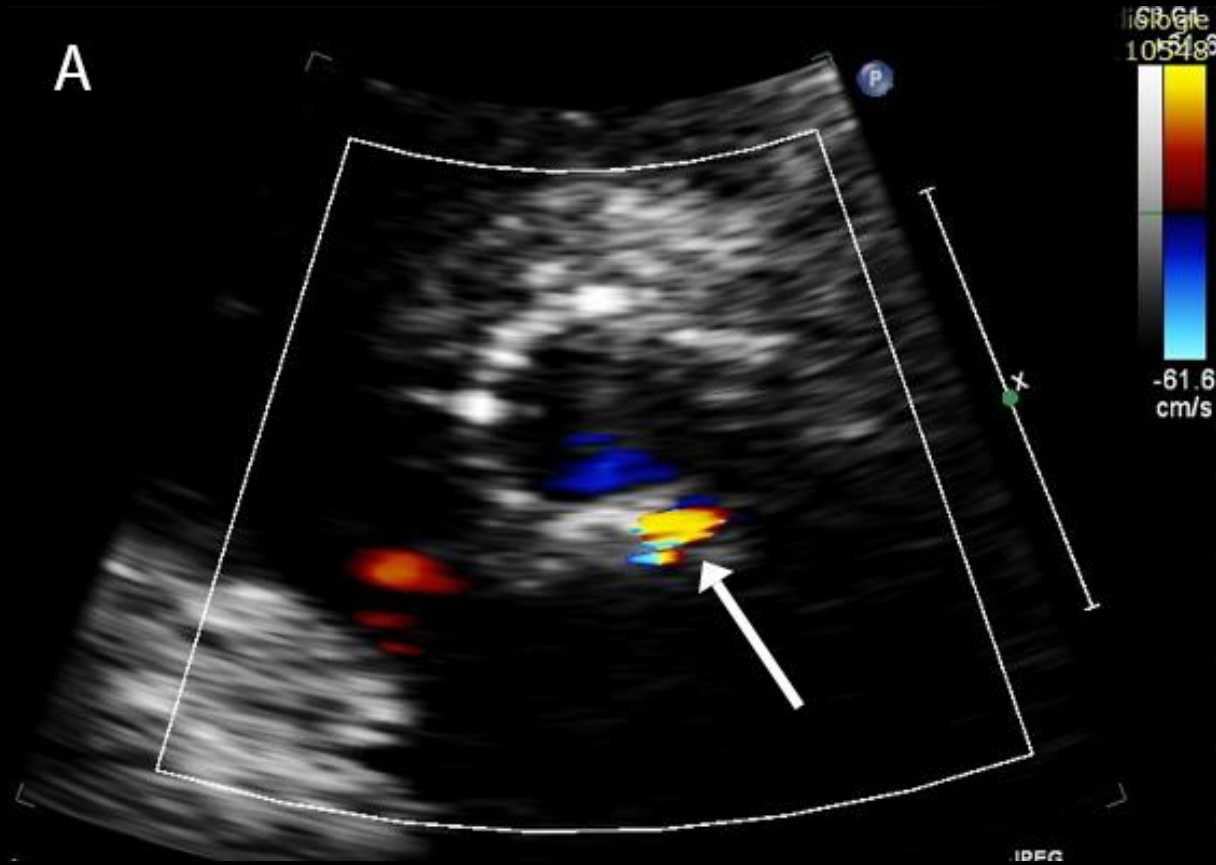
Calcul de la fraction de régurgitation:

- Directe par fluxométrie
- Hybride volumétrie/fluxométrie
- Volumétrique (VD/VG)

Quantification

Contraste de phase





Les valeurs ne sont pas comparables directement avec l'écho. Mais reproductibilité excellente

Insuffisance aortique

Seuils?

Gelfand et al:

- Légère $\leq 15\%$
- Moyenne $15\% < AR \leq 27\%$
- Sévère $> 27\%$

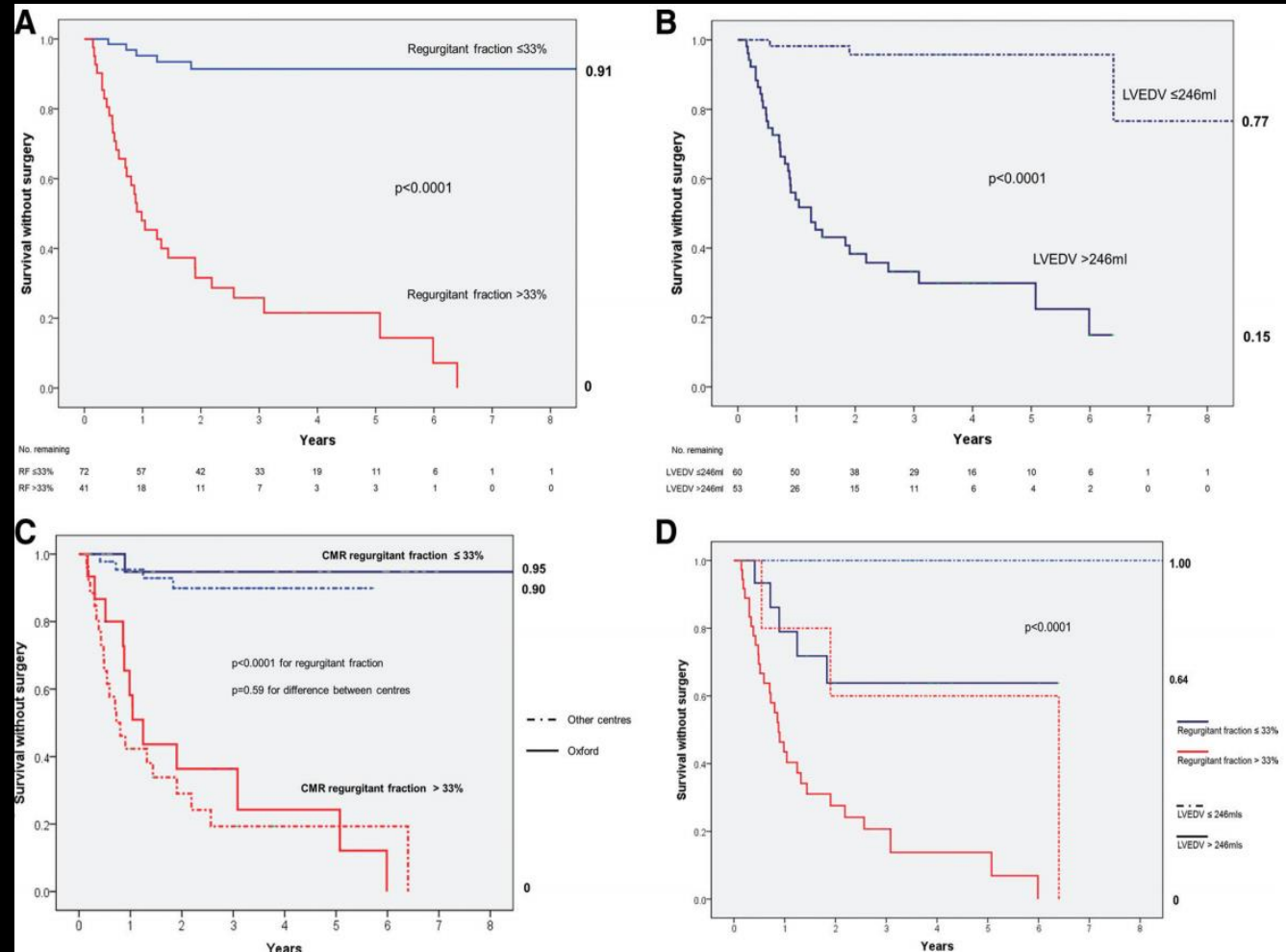
Myerson et al: chirurgie dans 2.6 ans:

- FR $> 33\%$
- VoIR > 42 ml

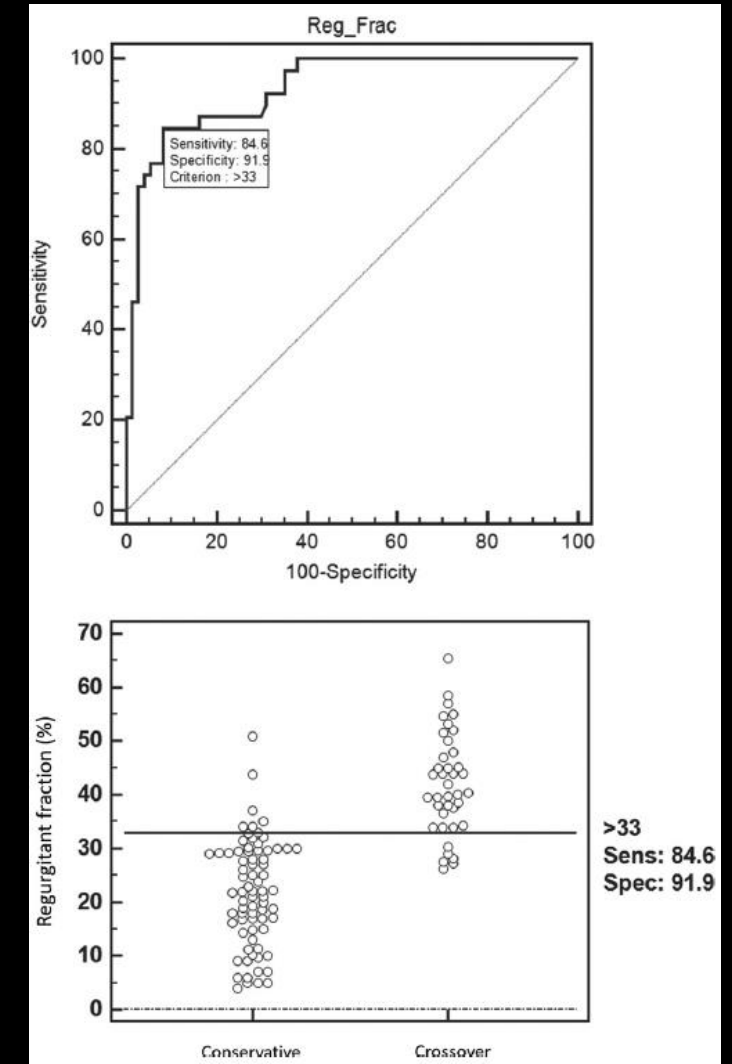
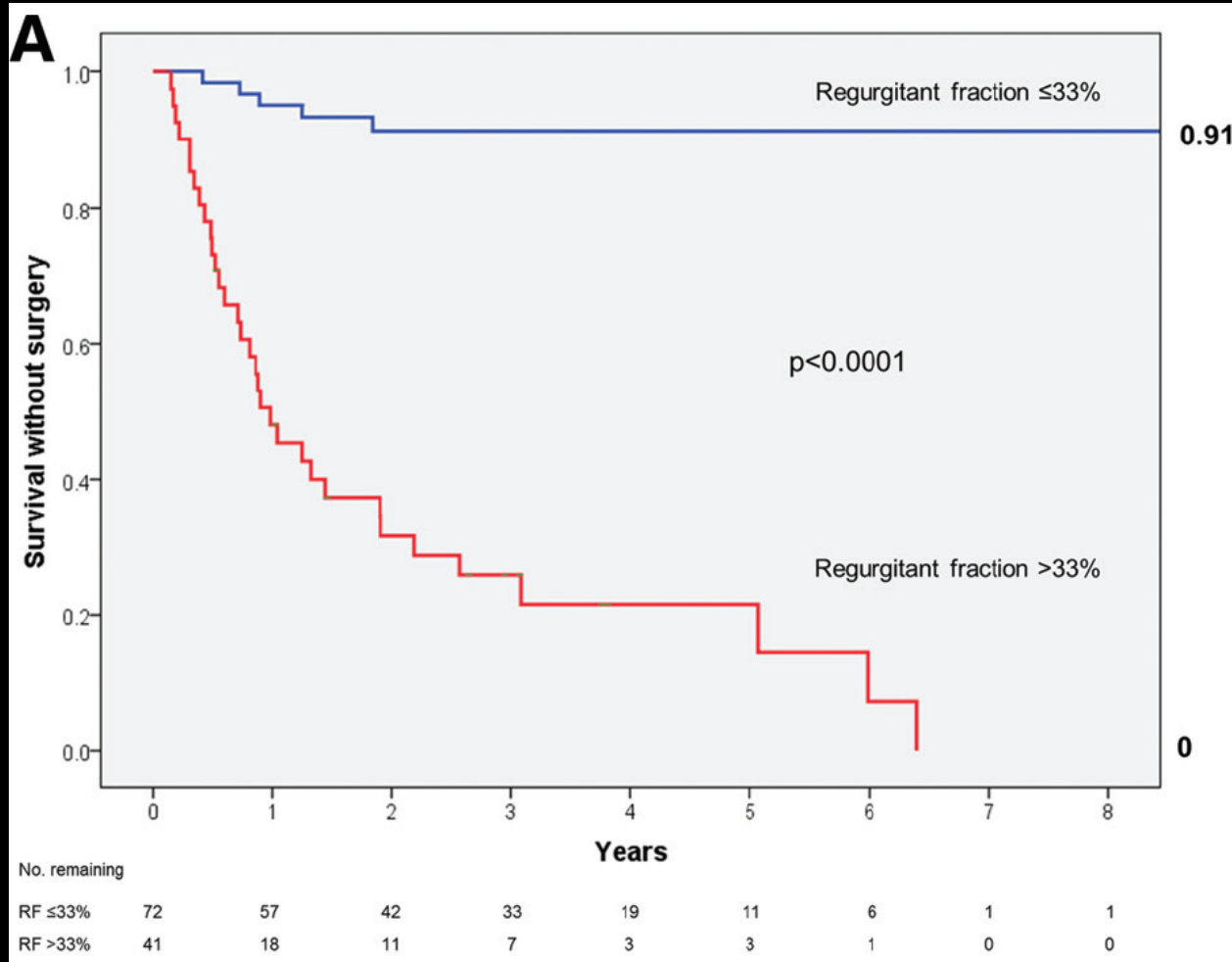


Echo:

- FR $> 50\%$
- VoIR > 60 ml



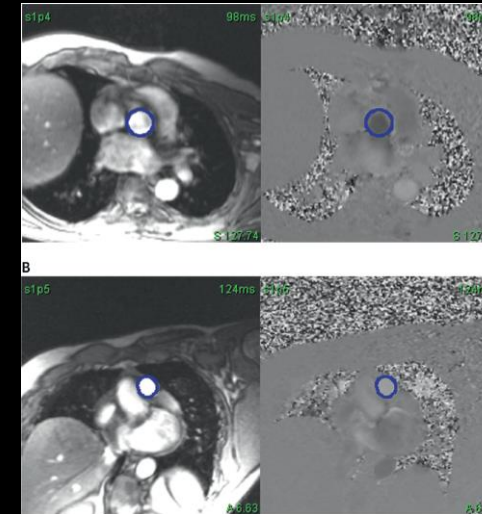
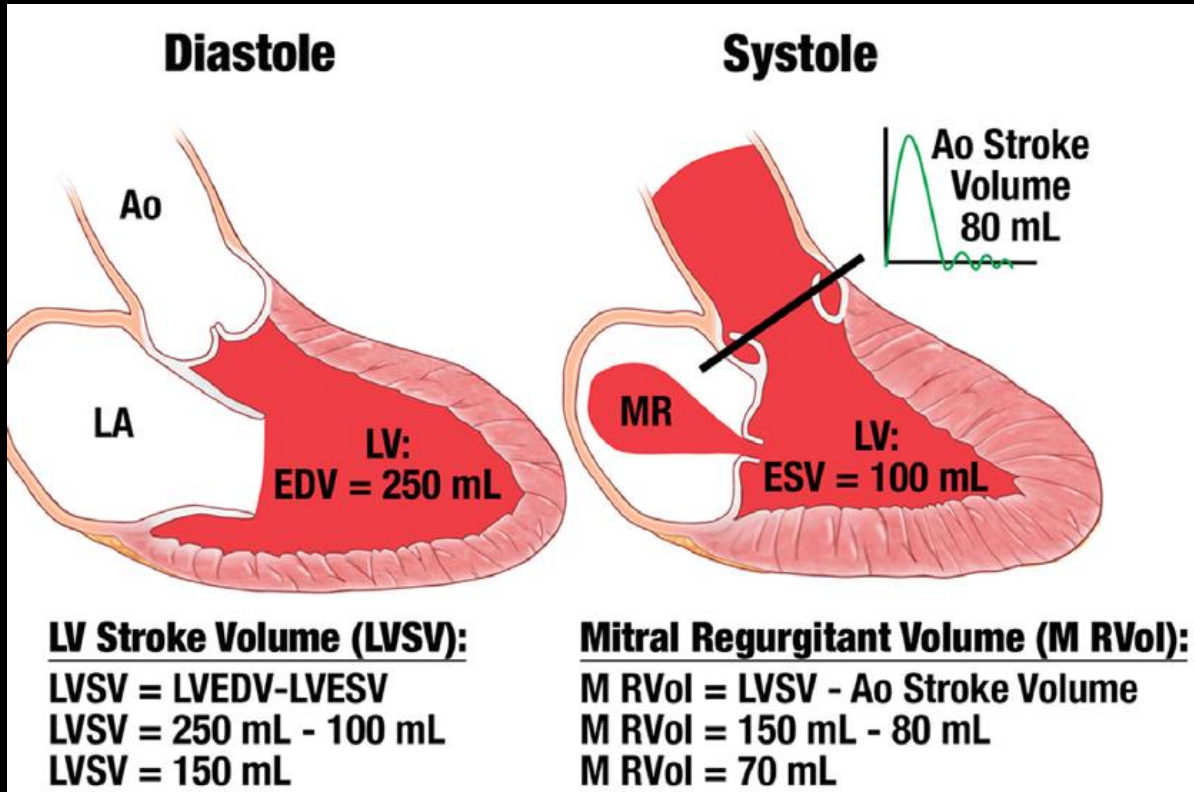
Pronostic



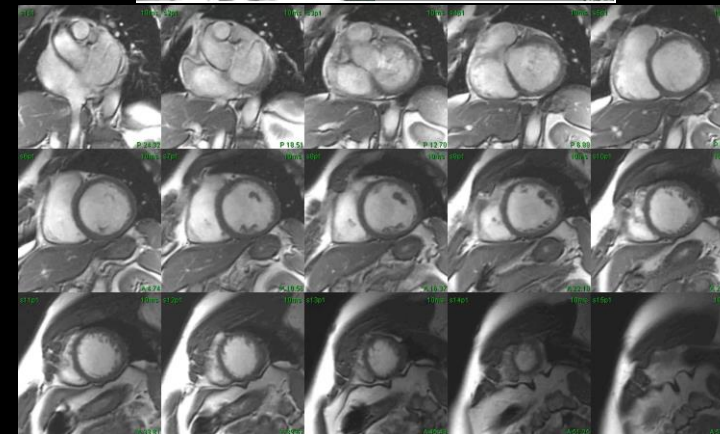
APPLICATIONS:

IM

Quantification



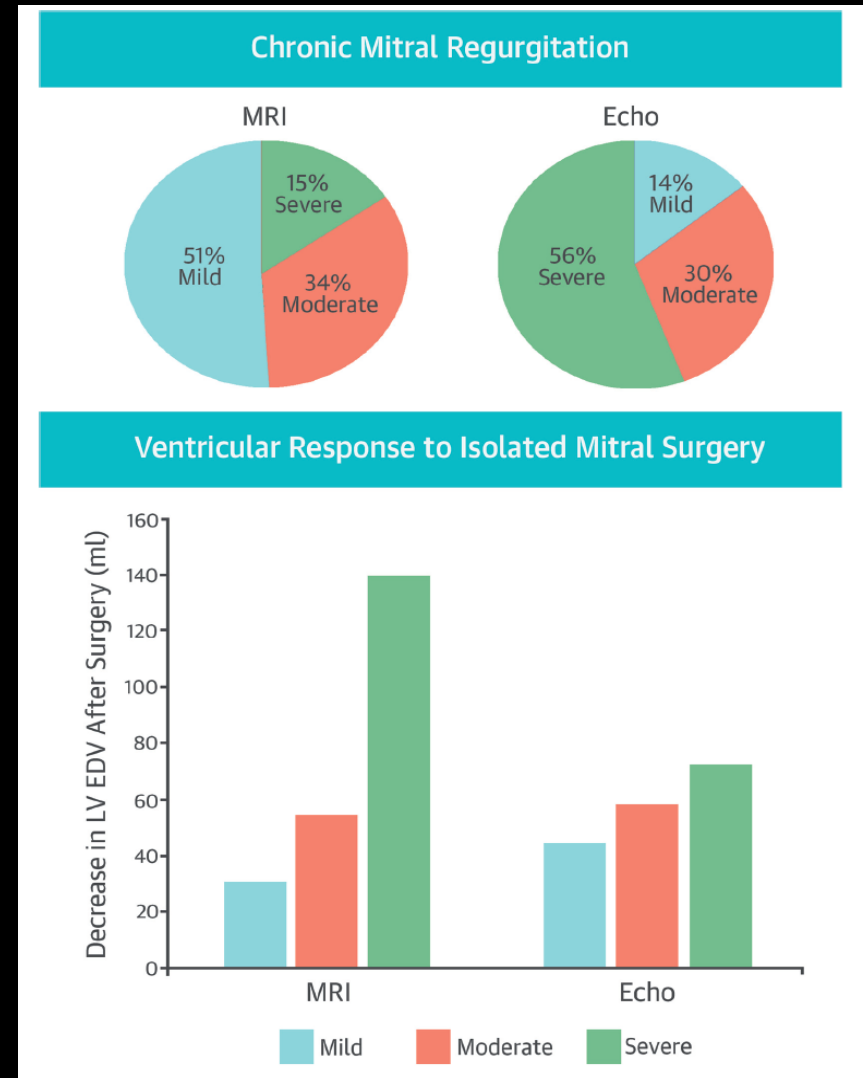
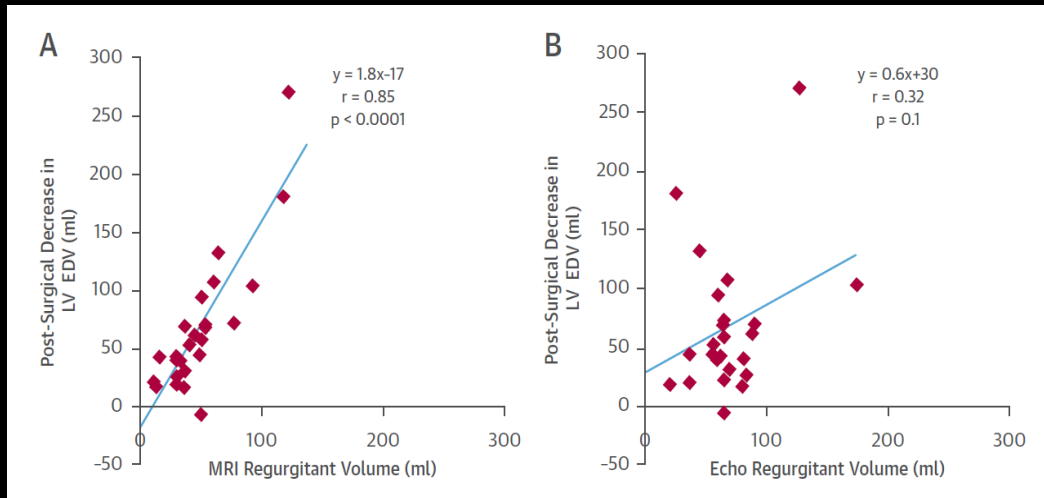
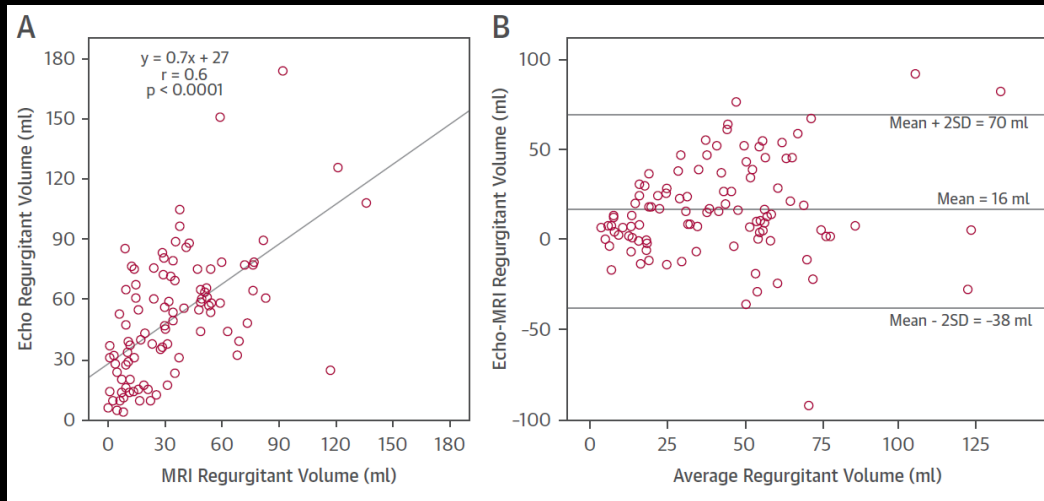
Phase Contrast
Velocimetry



SSFP Volumes

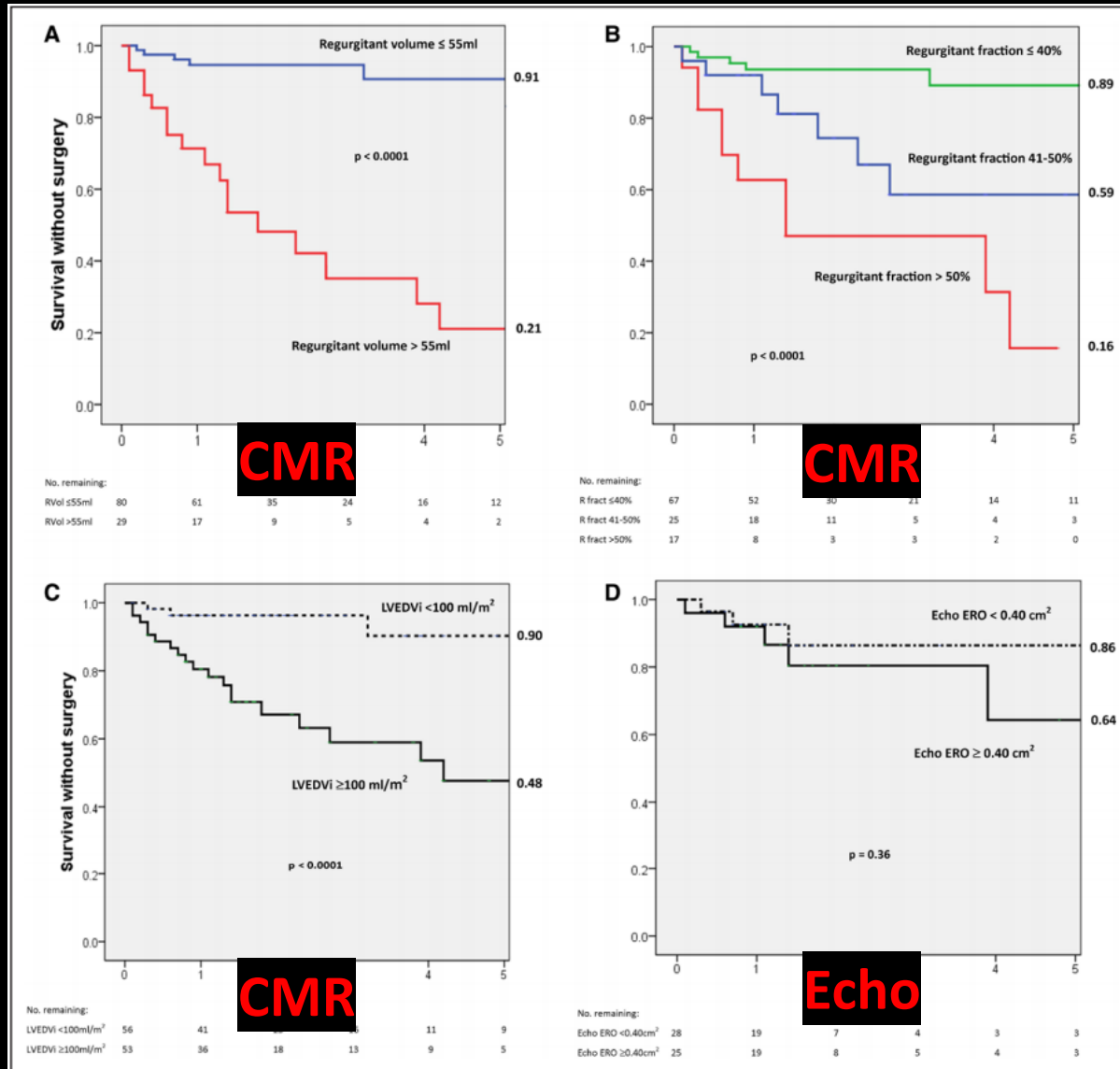
Possible even with other valvular dysfunctions

Mitral Regurgitation



CMR = better reproducibility and correlation with decrease in LVED after surgery

Mitral Regurgitation



N=109 asymptomatic primary MR

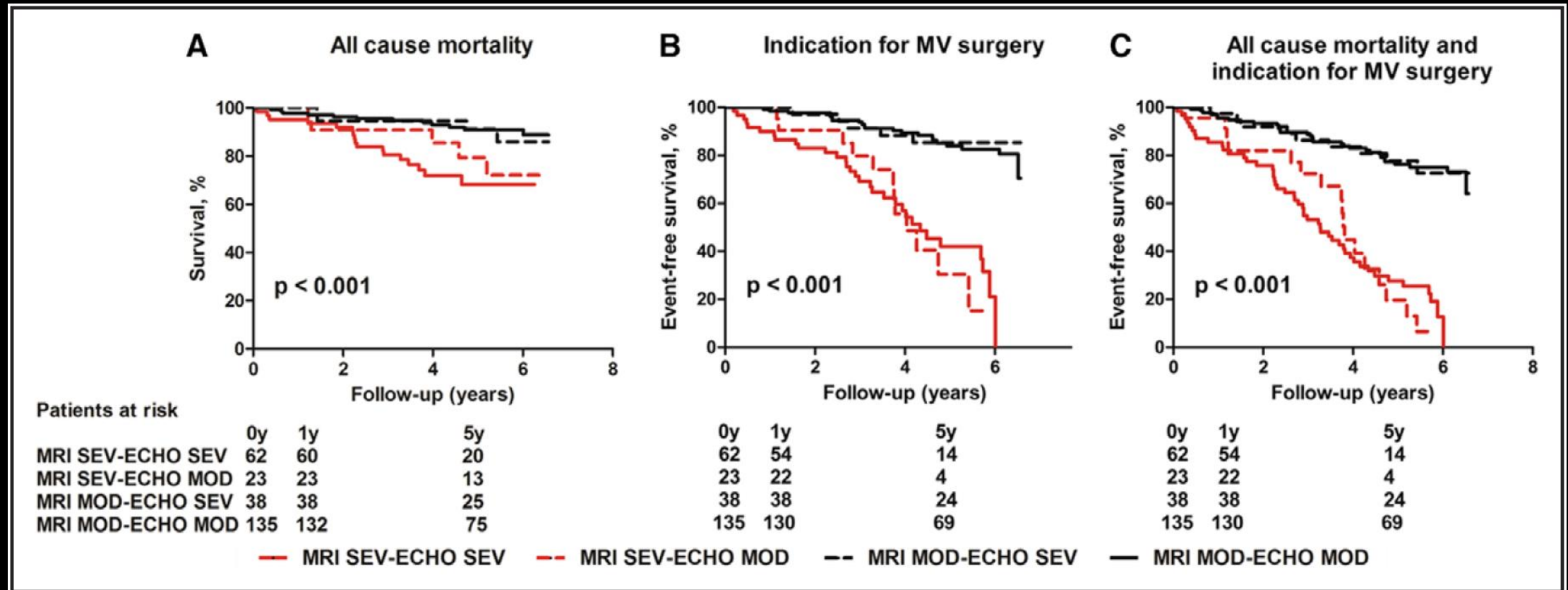
Rvol > 55ml

RF > 40%

Strong association with **indication for surgery within 5y**

Mitral Regurgitation

N=258 asymptomatic patients, moderate or severe organic MR



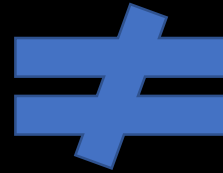
24% discordant severity between Echo and MRI

Cut Points ?

ECHO:

Rvol $\geq$ 60 ml

RF $\geq$ 50%



CMR:

Myerson et al

Rvol $\geq$ 55 ml

RF $\geq$ 40 %

	All-Cause Mortality		Mitral Valve Surgery		Mortality and Indication for Mitral Valve Surgery	
	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
Regurgitant volume, mL						
≥ 45	84 (69–94)	50 (44–57)	88 (77–95)	55 (48–62)	85 (77–91)	66 (58–74)
≥ 50	82 (66–92)	61 (55–68)	78 (65–88)	65 (58–71)	77 (68–85)	78 (70–84)
≥ 55	66 (49–80)	65 (59–72)	73 (60–84)	71 (64–77)	69 (59–78)	82 (75–87)
≥ 60	66 (49–80)	69 (62–75)	73 (60–84)	74 (68–80)	67 (57–76)	85 (78–90)

Penicka et al

Rvol $\geq$ 50 ml

RF $\geq$ 40 %

Merci pour votre attention!