LA DIAGNOSI DI STENOSI VALVOLARE AORTICA SEVERA

Quando è necessario aggiungere alle informazioni dell'ecocardiografia la RM e la TC

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OSPEDALE SAN PAOLO - Milano

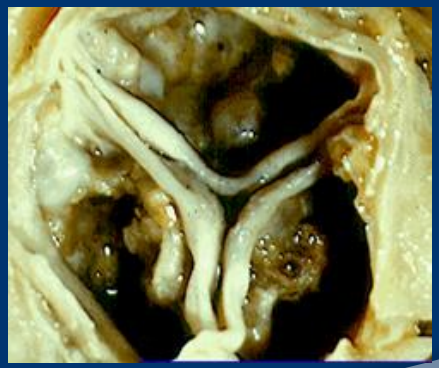
VALUTAZIONE DI SEVERITA' DELLA STENOSI AORTICA

Aspetto della valvola

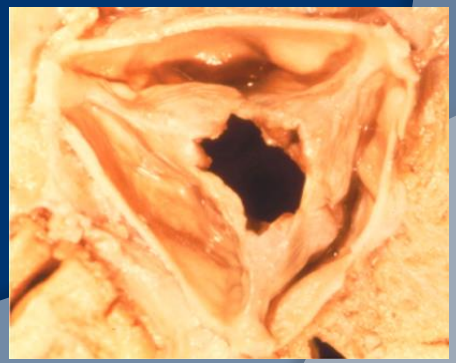
- cuspidi molto ispessite
- estese calcificazioni
- cuspidi immobili

Suggeriscono stenosi aortica severa

BICUSPIDE



STENOSI DEGENERATIVA

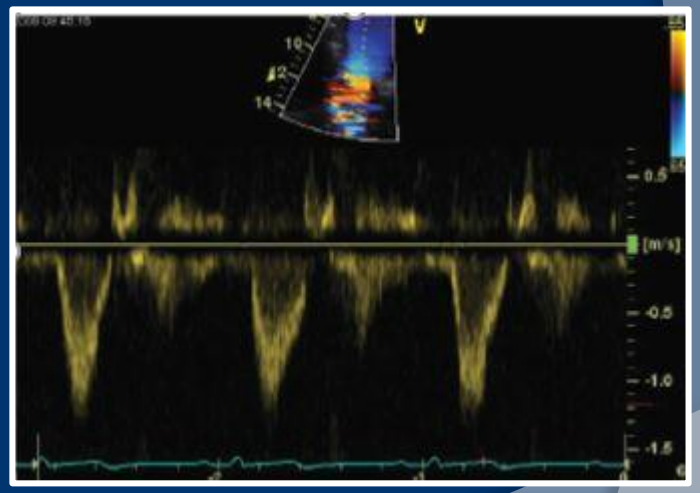


STENOSI REUMATICA

VALUTAZIONE DI SEVERITA' DELLA STENOSI AORTICA

L'area valvolare aortica si deriva con l'equazione di continuità: importante perché relativamente indipendente dal flusso

$$AVA = 3.14 \times (D/2)^2 \times VTI_{TEVS} / VTI_{AO}$$



ILTEVS si misura a valvola aperta

Media di almeno 3 misurazioni -
5 misurazioni se in corso di fibrillazione atriale

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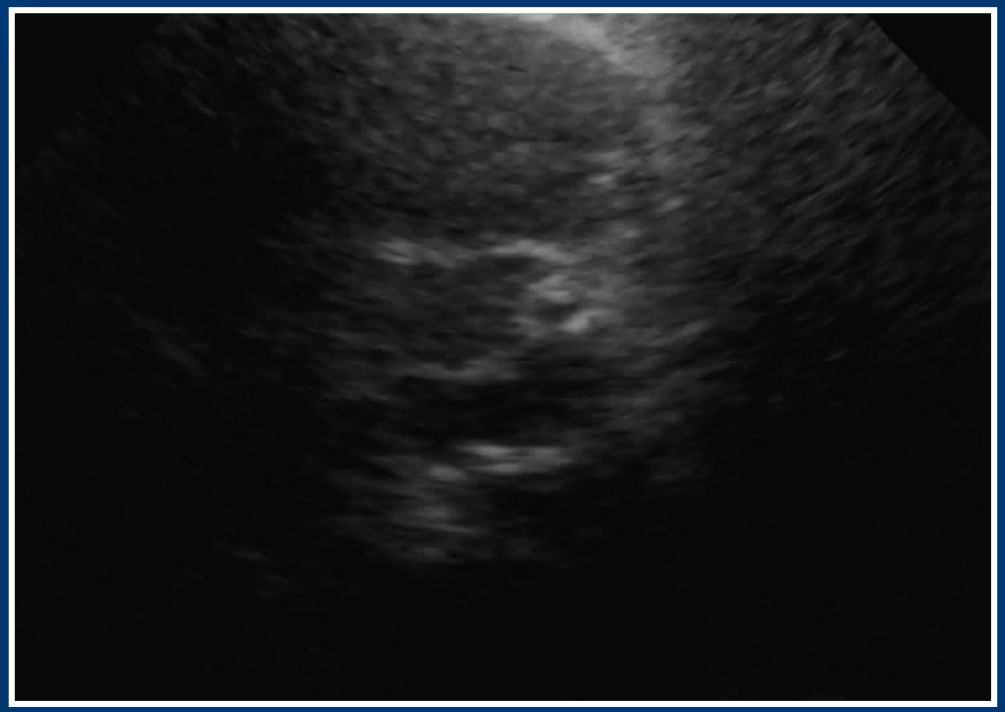
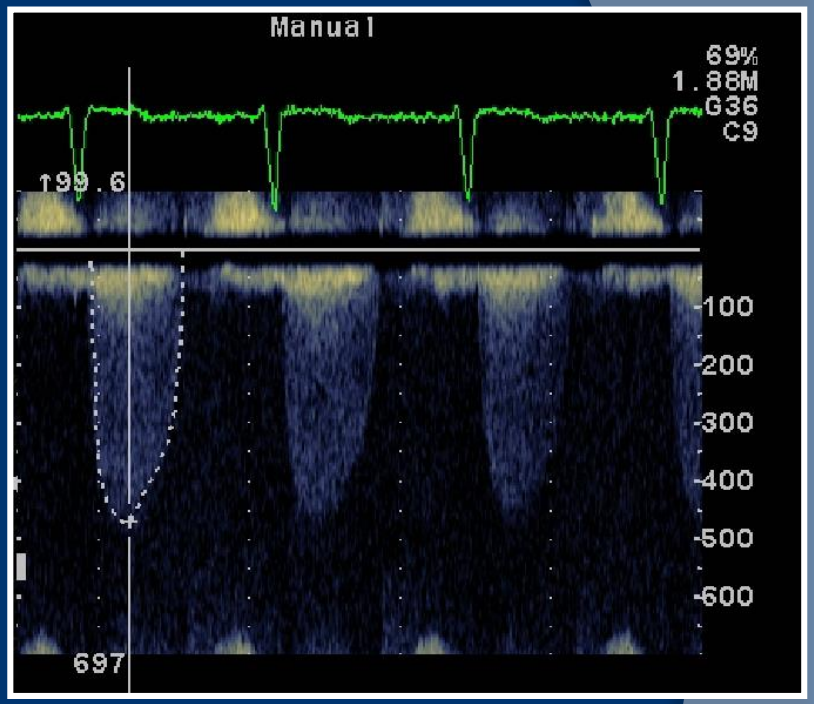
STENOSI AORTICA SEVERA HIGH GRADIENT





Area valvolare < 1 cm2
(< 0,6 cm2/m2)

Gradiente medio > 40 mmHg

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DISCORDANZA AREA/GRADIENTE

Grad medio < 40 mmHg – AVA ≤ 1 cm2

CLASSICAL LOW FLOW – LOW GRADIENT
(FE < 50%)

PARADOXICAL LOW FLOW /LOW GRADIENT AS
(FE≥ 50% - SVi < 35 ml/m2)

NORMAL FLOW – LOW GRADIENT
(FE≥ 50% - SVi > 35 ml/m2)

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Svi > 35 ml/m2)

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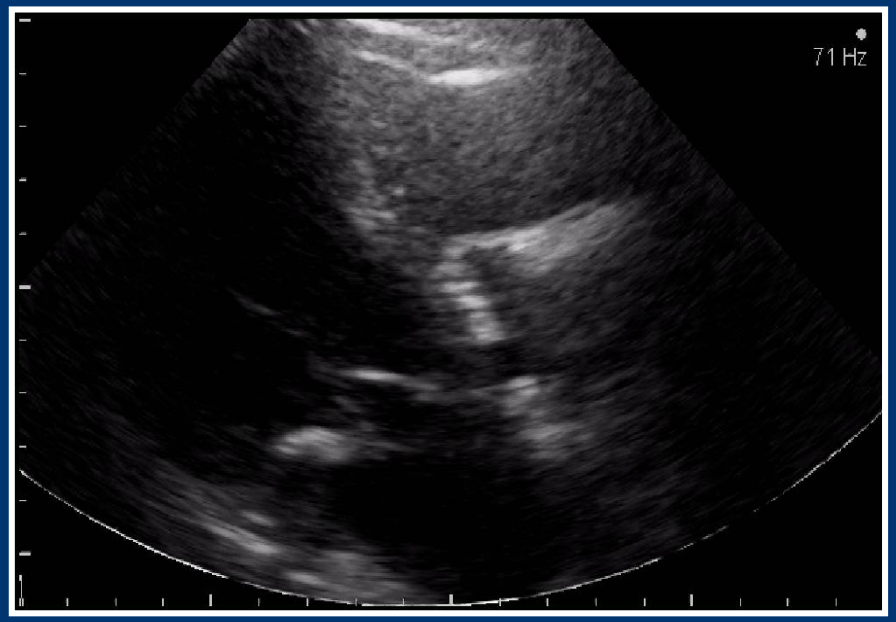
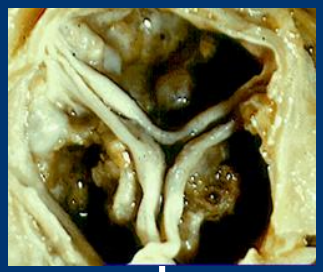
LOW FLOW - LOW GRADIENT AORTIC STENOSIS (FE < 50%)

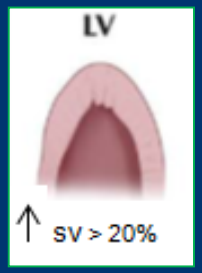
La stenosi è ispettivamente severa ma i gradienti transvalvolari non sono critici e la funzione sistolica globale del ventricolo sinistro è compromessa (FE < 50%)



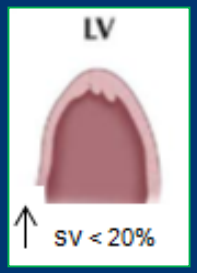
LA VALVOLA E' STENOTICA O SI APRE POCO PERCHE' E' RIDOTTA LA FUNZIONE SISTOLICA GLOBALE?
COME MI ORIENTO?

LOW FLOW - LOW GRADIENT AORTIC STENOSIS (FE < 50%)





STRESS DOBUTAMINA
5 -10- 20 Y / kg / min



SI riserva contrattile

NO riserva contrattile

AVA ≤ 1 cm2/
Gradiente medio ≥
40 mmHg

Stenosi aortica severa vera

AVA > 1 cm2/
Gradiente medio
< 40 mmHg

Stenosi aortica pseudosevera

?

Indeterminata

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

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DISCORDANZA AREA/GRADIENTE

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(FE≥ 50% - Svi < 35 ml/m2)

NORMAL FLOW – LOW GRADIENT
(FE≥ 50% - Svi > 35 ml/m2)

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NORMAL FLOW – LOW GRADIENT
PERCHE'?

PITFALLS

INCONGRUENZA DELLE LINEE GUIDA

INCONGRUENZA DELLE LINEE GUIDA

La valvola appare severamente stenotica ma i gradienti non sono critici in presenza di conservata FE (> 50%).
Stroke volume index > 35 ml/m2

un paziente con SV normale e AVA 0.8 -1 cm2 sviluppa un gradiente medio di 30 – 35 mmHg.
AVA < 0.8 cm2 → gradiente medio > 40 mmHg

DISCORDANZA AREA/GRADIENTE

Grad medio < 40 mmHg – AVA ≤ 1 cm2

CLASSICAL LOW FLOW – LOW GRADIENT
(FE < 50%)

PARADOXICAL LOW FLOW /LOW GRADIENT AS
(FE≥ 50% -
Svi < 35 ml/m2)

NORMAL FLOW – LOW GRADIENT
(FE≥ 50% -
Svi > 35 ml/m2)

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PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS (FE > 50%)

La valvola appare severamente stenotica ma i gradienti non sono critici in presenza di conservata FE (> 50%)

-AVA $\leq$ 1.0 cm2/ Indexed AVA $\leq$ 0.6 cm2/m2

- Aortic Vmax <4 m/s or mean DP <40 mm Hg

-**Stroke volume index <35 mL/m2**, measured when patient is normotensive (systolic BP < 140 mmHg)

PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS

D: Symptomatic severe AS

D1	Symptomatic severe high-gradient AS	• Severe leaflet calcification or congenital stenosis with severely reduced leaflet	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically <1.0 cm^2	• LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension may be present	• Exertional dyspnea or decreased exercise tolerance • Exertional angina • Exertional syncope or presyncope
D2				• LV diastolic dysfunction • LV hypertrophy • LVEF <50%	• HF • Angina • Syncope or presyncope
D3			• Stroke volume index <35 mL/m² • Measured when patient is normotensive (systolic BP <140 mm Hg)	• Increased LV relative wall thickness • Small LV chamber with low stroke volume • Restrictive diastolic filling • LVEF ≥50%	• HF • Angina • Syncope or presyncope

D3 Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS

AR indicates aortic regurgitation; AS, aortic stenosis; AVA, aortic valve area; AVAi, aortic valve area indexed to body surface area; BP, blood pressure; HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction; ΔP, pressure gradient; and V_{max}, maximum aortic velocity.

PRACTICE GUIDELINE - 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

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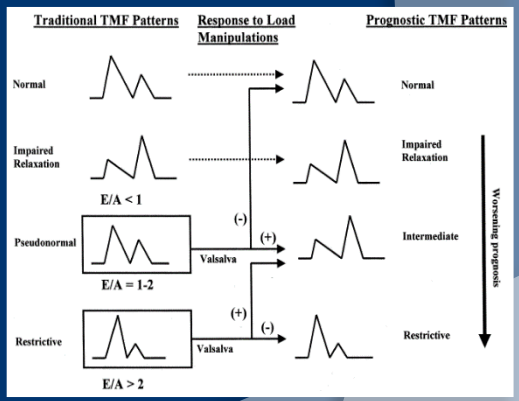
PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS

CARATTERISTICHE

- ✓donne anziane ipertese
- ✓ventricolo sinistro di piccole dimensioni
- ✓rimodellamento concentrico del VS
- ✓ disfunzione diastolica moderato-severa
- ✓fibrosi subendocardica diffusa
- ✓disfunzione sistolica latente (global longitudinal strain)
- ✓Incremento dei valori di valvulo-arterial impedance (> 4.5 mmHg/ml m2)



IL RIDOTTO GRADIENTE E' SECONDARIO ALLA RIDUZIONE DI STROKE VOLUME!

→ stroke volume index **< 35ml/m²**

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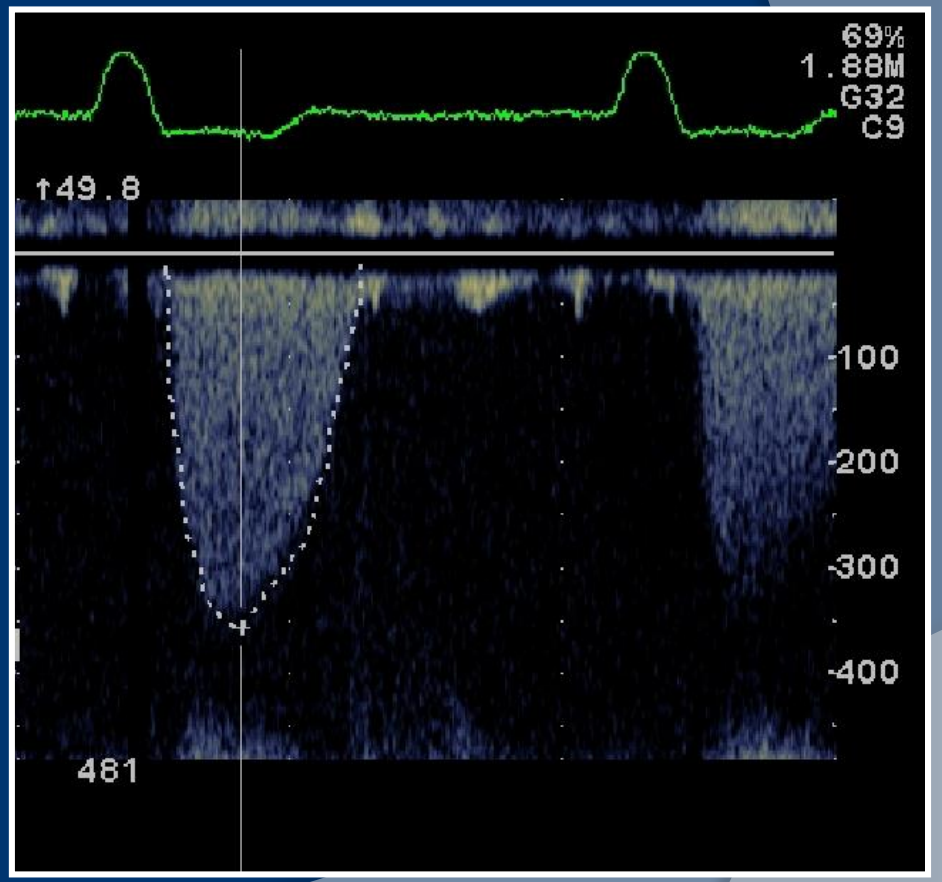
PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS



AVA 0.4 cm2/m2

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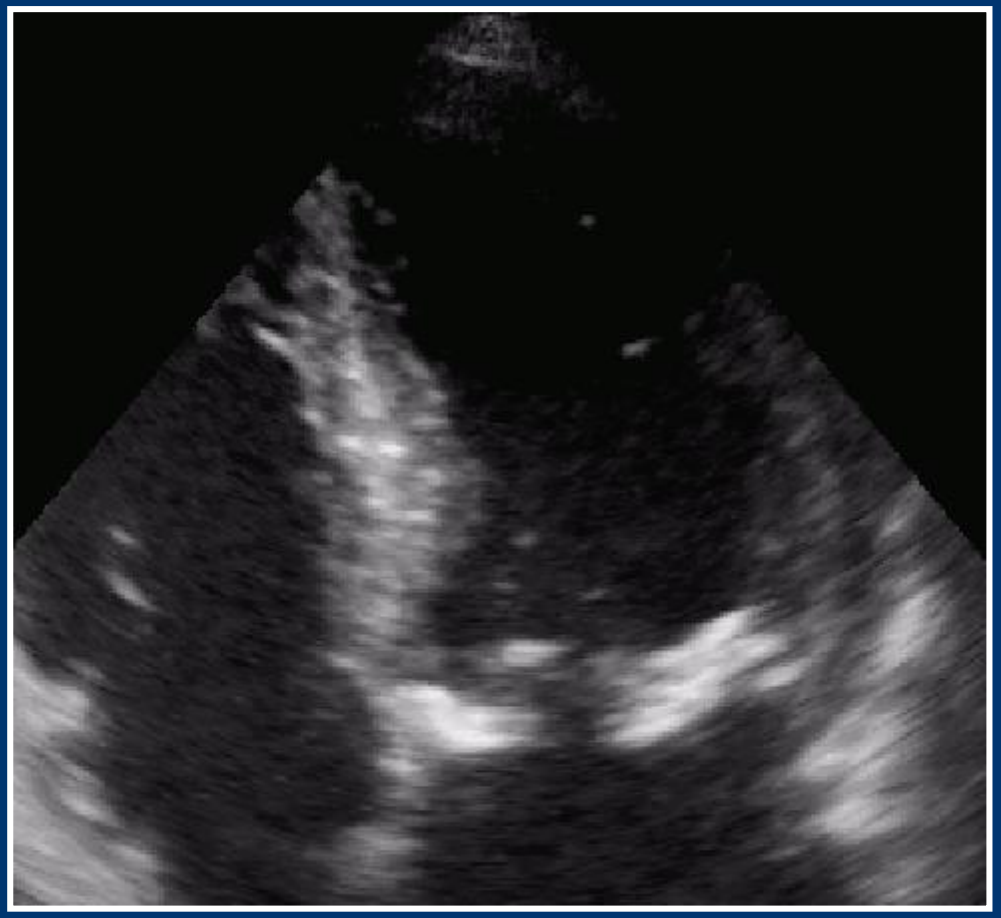
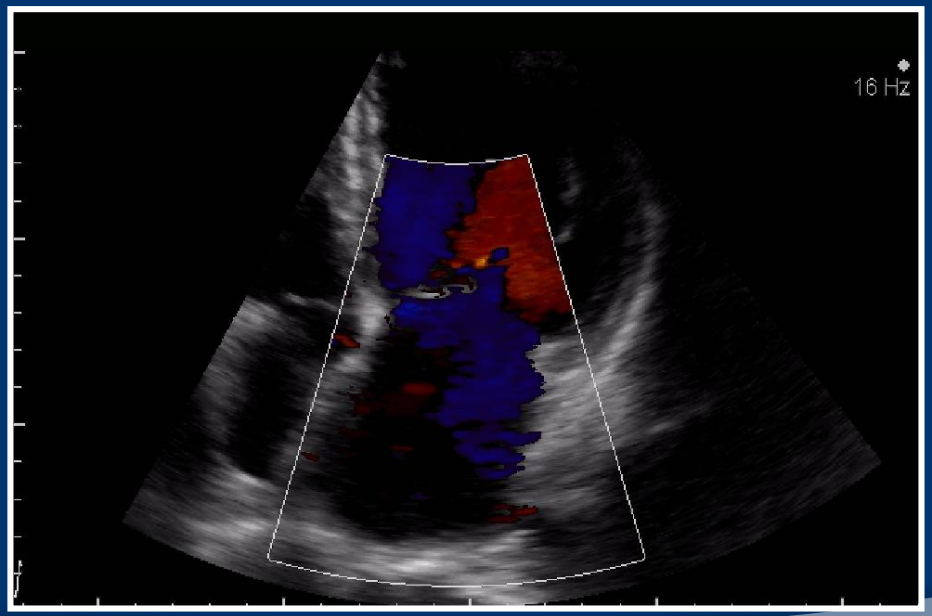
PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS

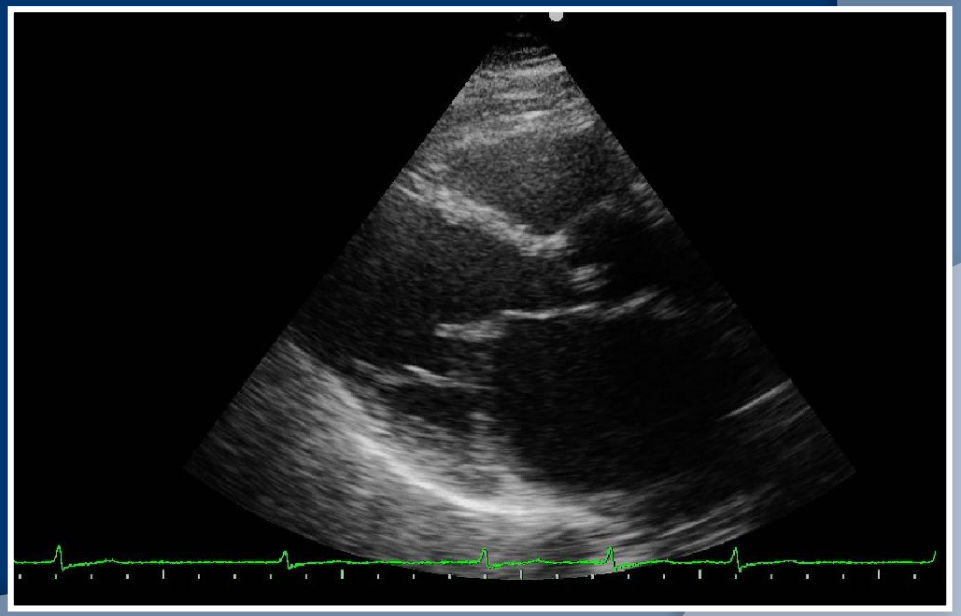


SVi 27 ml/m2
DVI 0.16

PERCHE' LO SV E' RIDOTTO?

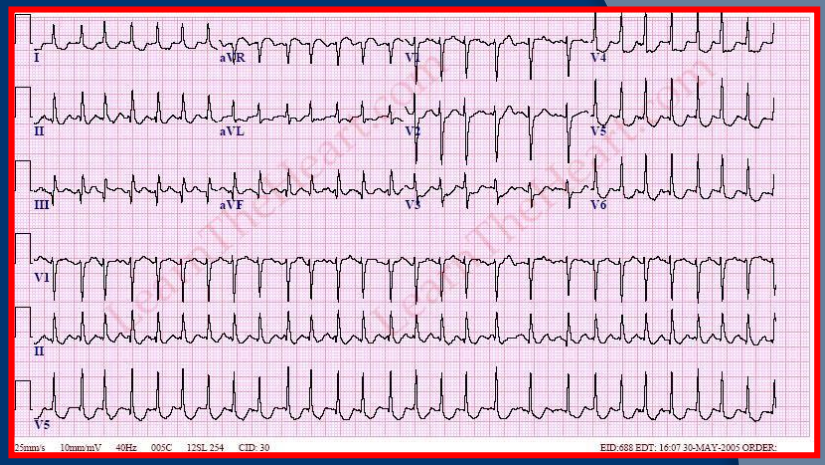
- ✓IPERTENSIONE ARTERIOSA NON CONTROLLATA
- ✓STENOSI MITRALICA
- ✓INSUFFICIENZA MITRALICA

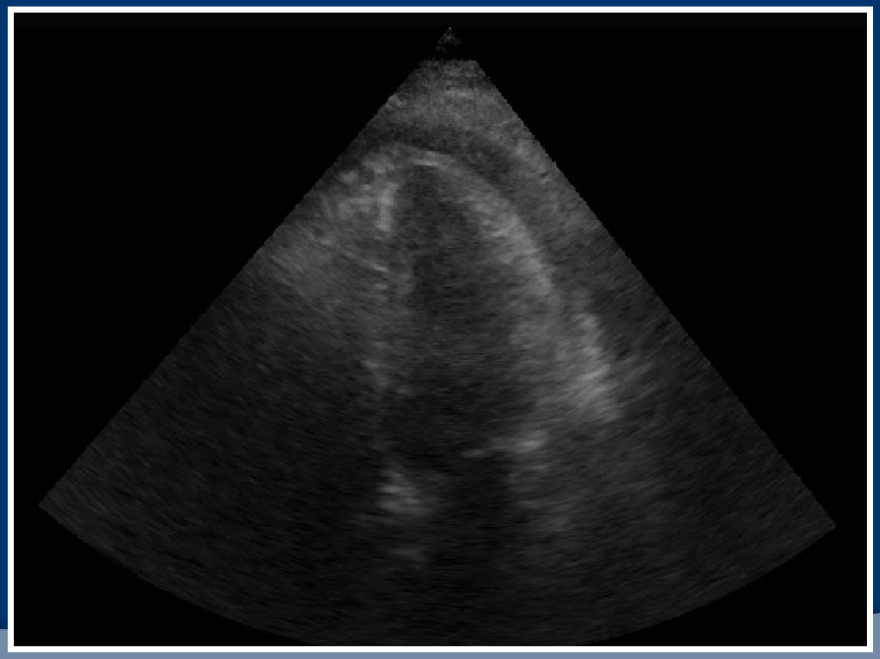


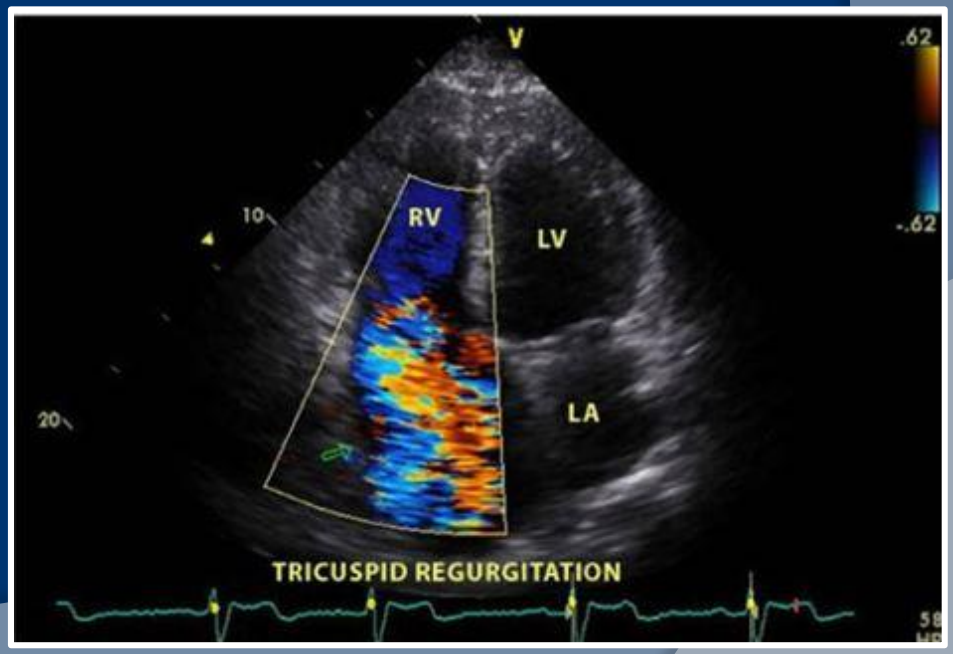


PERCHE' LO SV E' RIDOTTO?

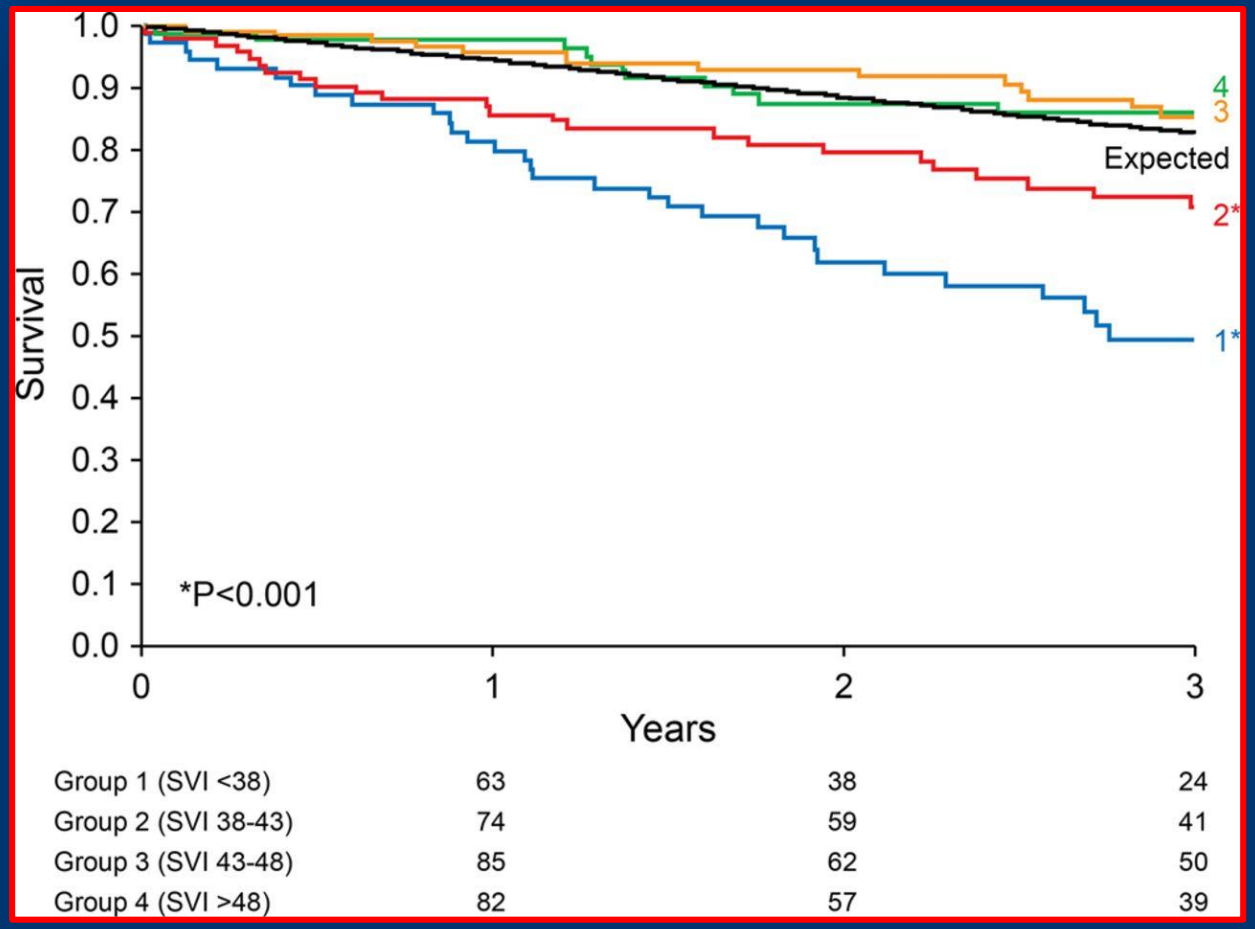
- ✓FIBRILLAZIONE ATRIALE
- ✓PERICARDITE COSTRITTIVA
- ✓INSUFFICIENZA TRICUSPIDALE
- ✓DISFUNZIONE VD







CAMBIAMO I NOSTRI REFERTI…



Group 1 (SVI <38)	63	38	24
Group 2 (SVI 38-43)	74	59	41
Group 3 (SVI 43-48)	85	62	50
Group 4 (SVI >48)	82	57	39

SVi!

Stroke volume index (SVI) quartiles and adjusted survival.

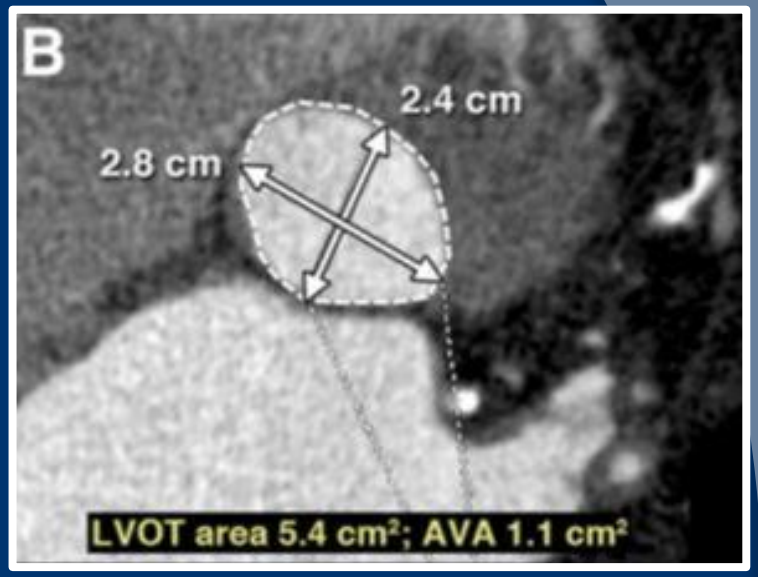
NON E' SOLO UNA MALATTIA DELLA VALVOLA…

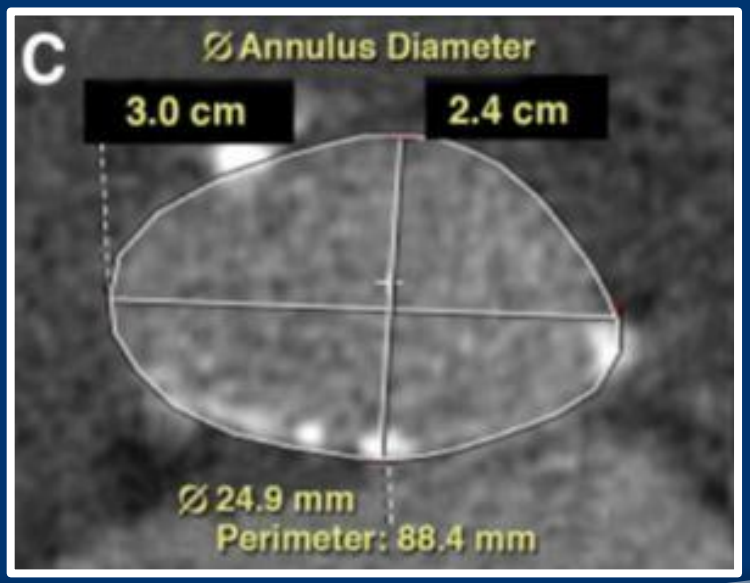
Mackram F Eleid et al. Heart 2015;101:23-29

DISCORDANZA AREA/GRADIENTE

PITFALLS

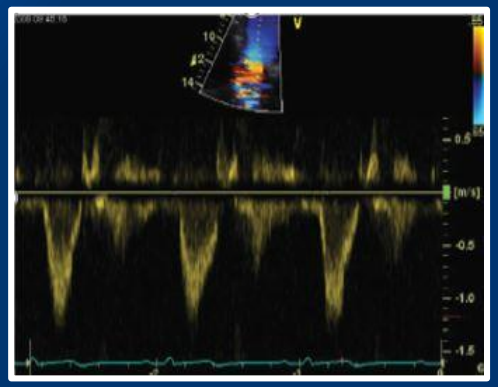
DISCORDANZA AREA/GRADIENTE

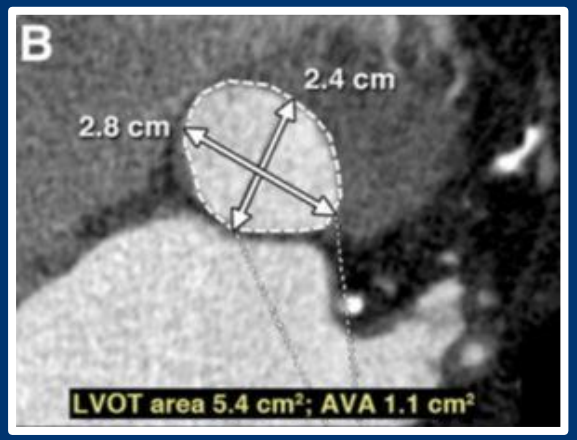




LaBounty TM et al. J Am Coll Cardiol Img 2014;7:1065-6

DISCORDANZA AREA/GRADIENTE





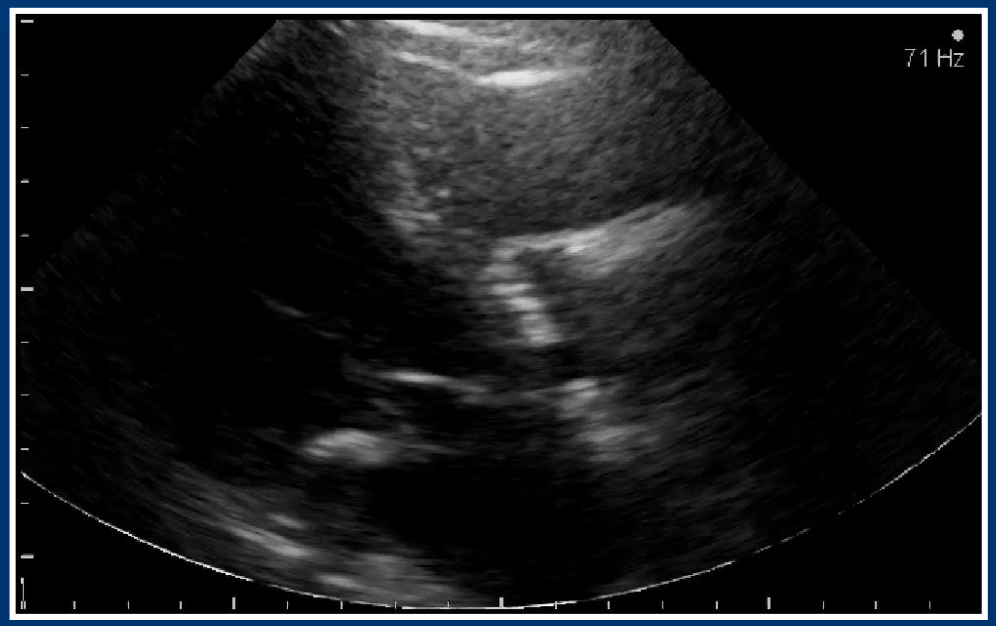
PUO' ESSERE UTILE UN 'APPROCCIO IBRIDO'?

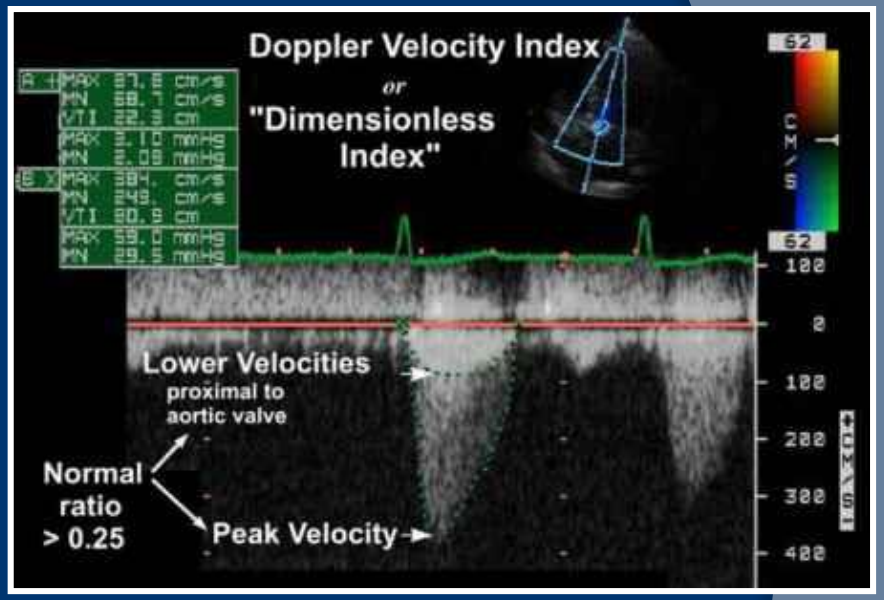
AVA calcolata con approccio ibrido (TC/ECO) non è risultata superiore a quella calcolata con metodo classico

CUT OFF 1.2 cm2

Clavel et al. J Am Coll Cardiol Img 2015;8:248-57

DISCORDANZA AREA/GRADIENTE - COSA CI PUO' AIUTARE?





DOPPLER VELOCITY INDEX < 0,25

AVA < 1 cm2 con DVI > 0.30 → VEROSIMILE ERRORE di misurazione

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DISCORDANZA AREA/GRADIENTE - COSA CI PUO' AIUTARE?

INDICIZZARE L'AREA VALVOLARE PER BSA NEI PAZIENTI DI RIDOTTE DIMENSIONI CORPOREE

UTILIZZARE UN CUT OFF INFERIORE NEI PAZIENTI OBESI (< 0.5 cm2/m2)

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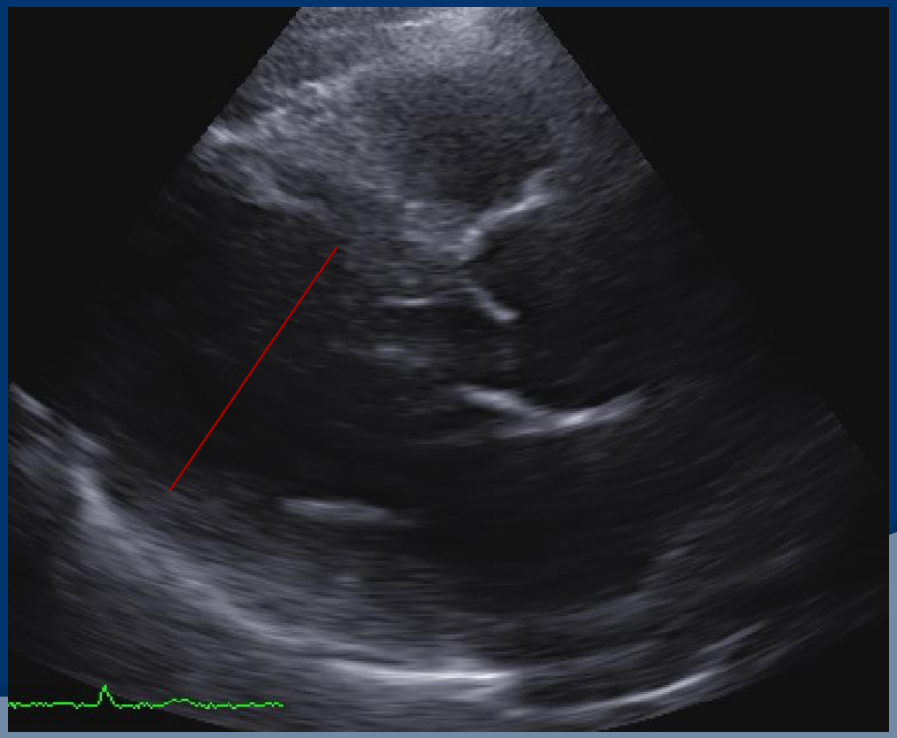
Kappetein et al. Eur J Cardiothorac Surg 2012;42:S45-60

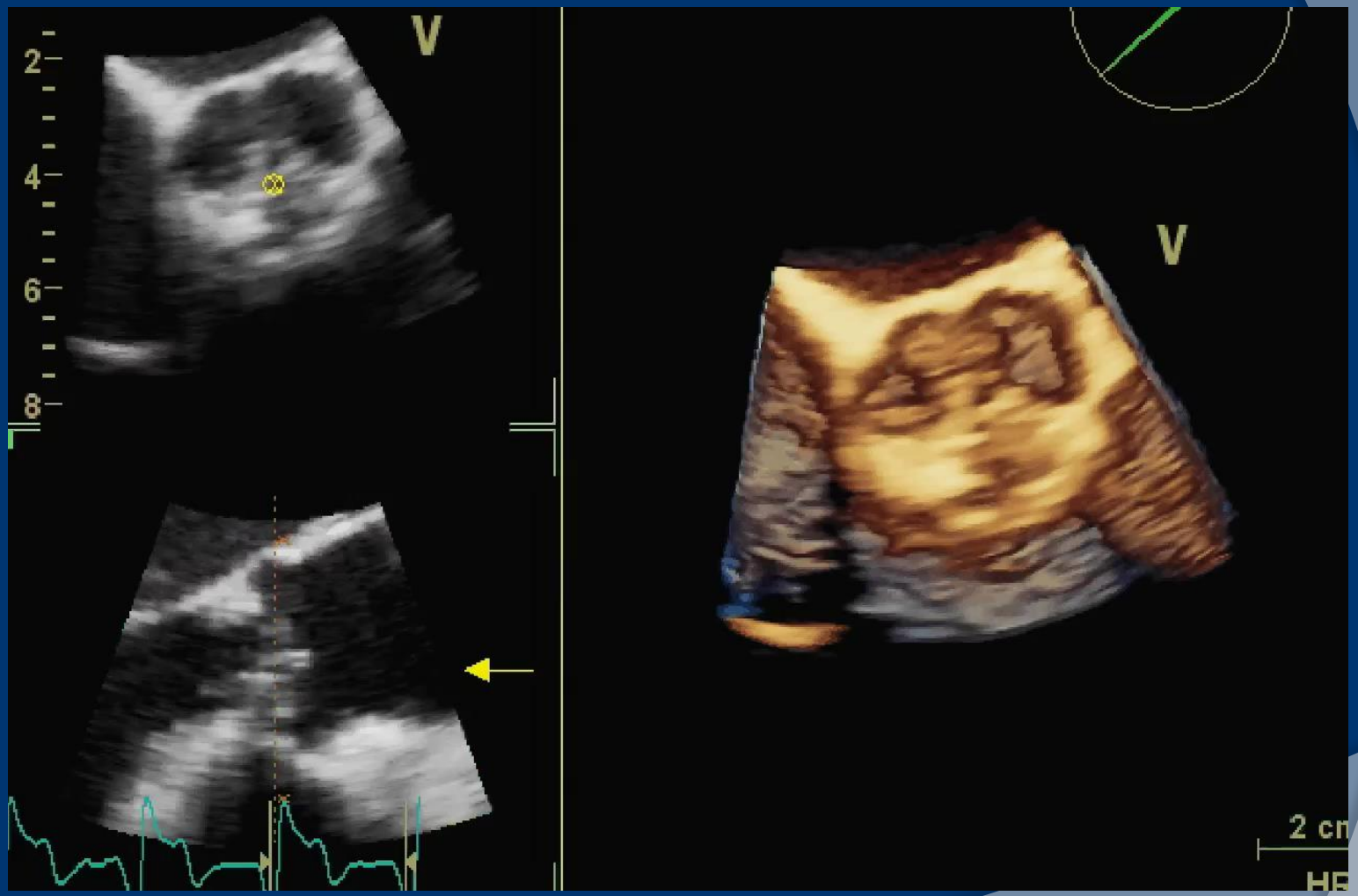
DISCORDANZA AREA/GRADIENTE - COSA CI PUO' AIUTARE?

VERIFICARE LA MISURA DELLO STROKE VOLUME

METODO TEICHHOLZ MODIFICATO
EDV (Teichholz) x FEVS (Simpson) = SV

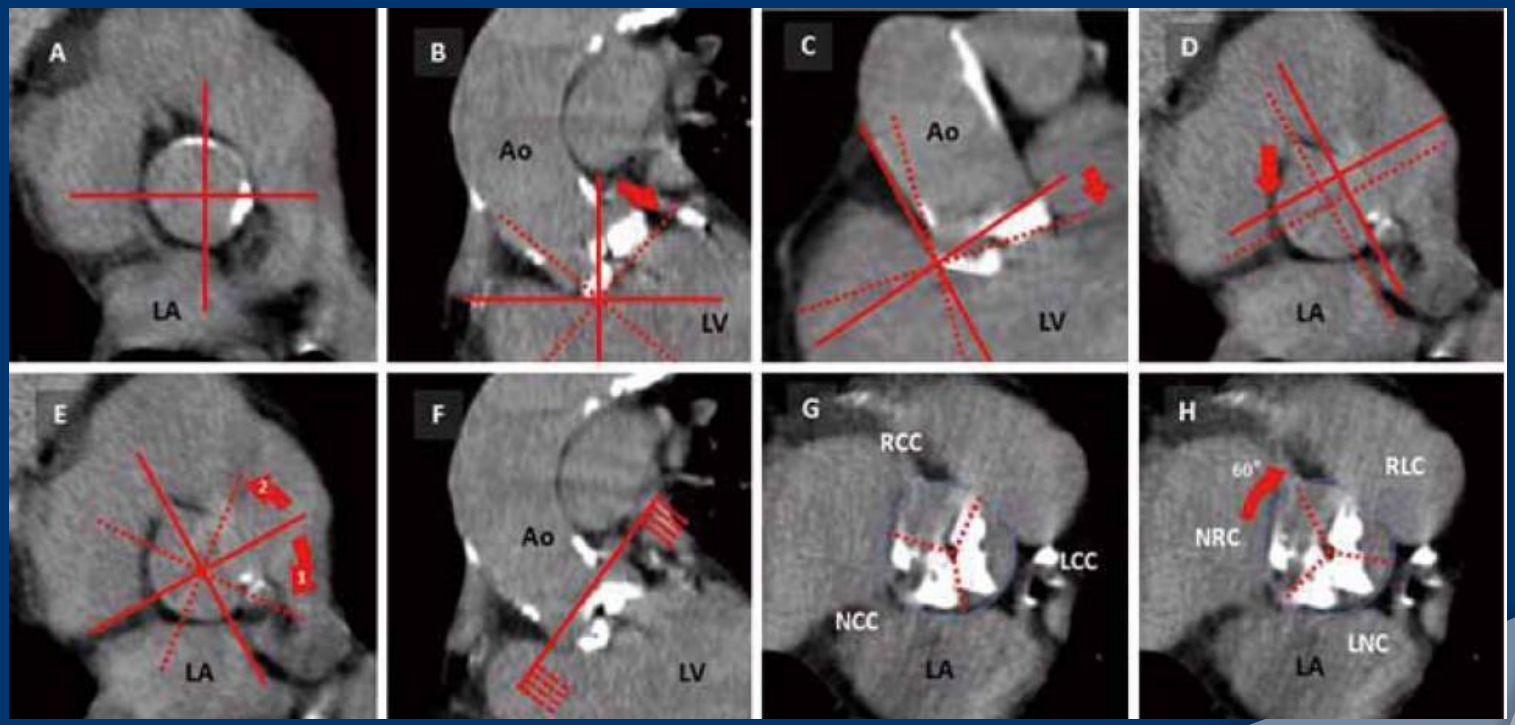


DISCORDANZA AREA/GRADIENTE
- COSA CI PUO' AIUTARE?



E SE FOSSE UNA PSEUDO SEVERA? (30%!)

MULTISLICE CT
(AVC – aortic valve calcification)



Clavel et al, JACC 2013; 62: 2329-38

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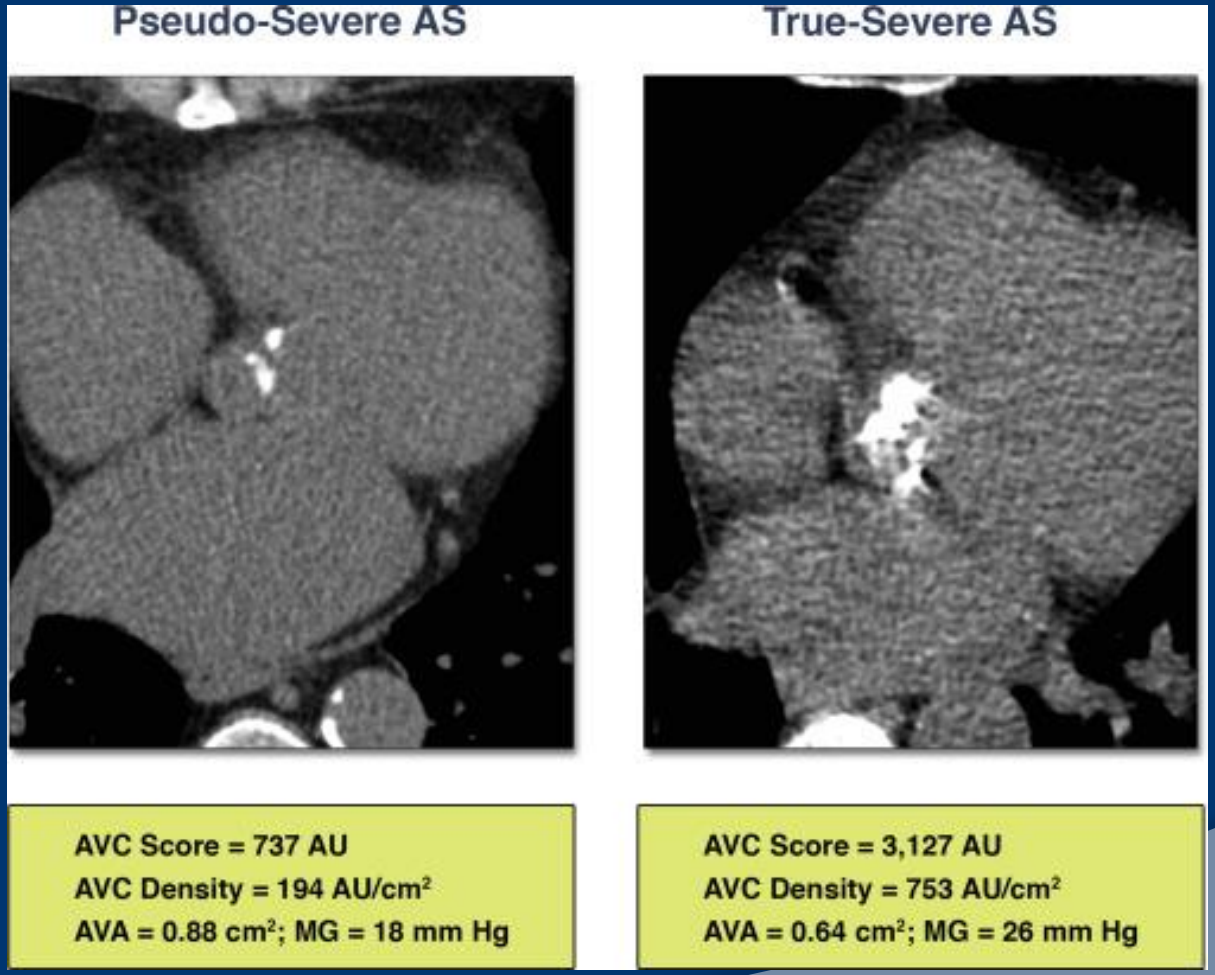

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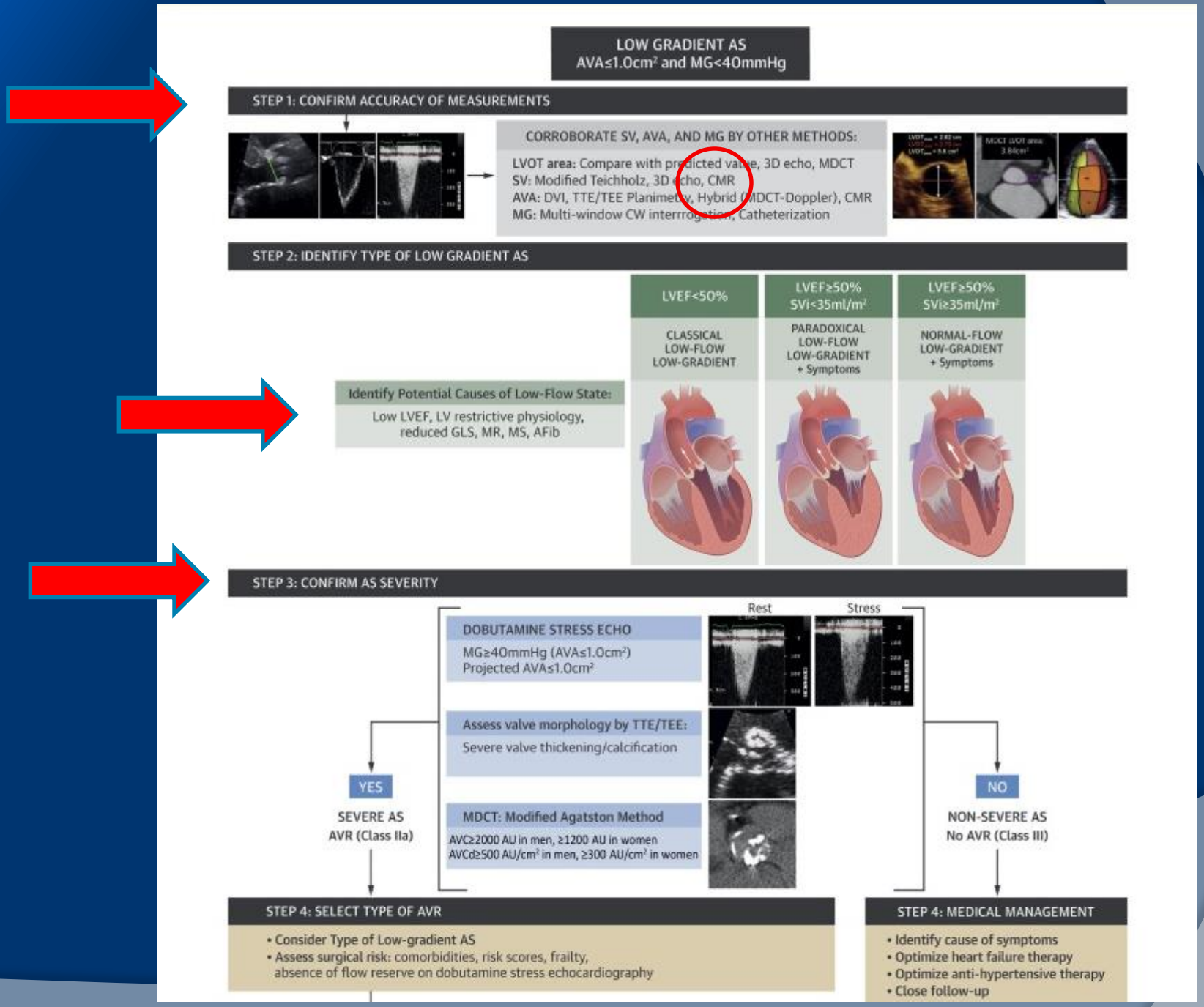

Clavel et al. JACC Cardiovasc Imaging 2017;2:185-202

PARADOXICAL LOW GRADIENT SEVERE AORTIC STENOSIS

DIAGNOSI IMPROBABILE SE:

- **V max < 3 m/sec**
- **GRADIENTE MEDIO < 20 mmHg**
- **DOPPLER VELOCITY INDEX > 0,30**

LE LINEE GUIDA

AVR is reasonable in symptomatic patients with low-flow/low- gradient severe AS (stage D3) with an LVEF 50% or greater, a calcified aortic valve with significantly reduced leaflet motion, and a valve area 1.0 cm2 or less only if clinical, hemodynamic, and anatomic data support valve obstruction as the most likely cause of symptoms and **data recorded when the patient is normotensive (systolic BP <140 mm Hg)**

GRAZIE PER L’ATTENZIONE!