Functional Valve disease assessment

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Distribution of Valvular Heart Diseases in the Euro Heart Survey

5001 patients

- **Native Valve Disease** 72%
  - AS 34%
  - AR 10%
  - MS 10%
  - MR 25%
  - Multiple 20%
  - Right 1%
- **Previous Valvular Intervention** 28%
  - Valve Repair 18%
  - Valve Replacement 82%

Iung et al. *Eur Heart J* 2003;24:1244-53

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 & European Journal of Cardio-Thoracic Surgery 2012 - doi:10.1093/ejcts/ezs455).

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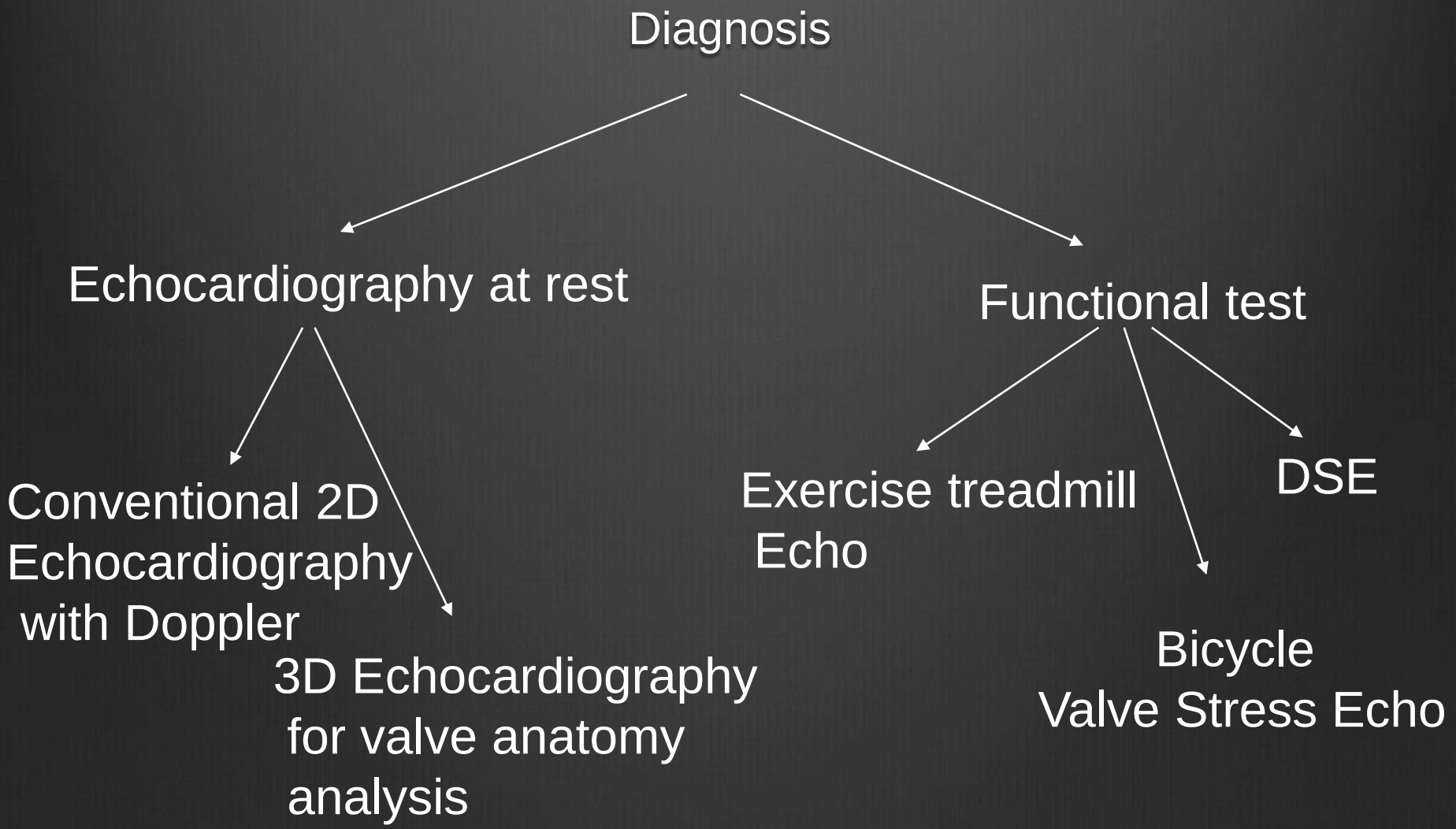
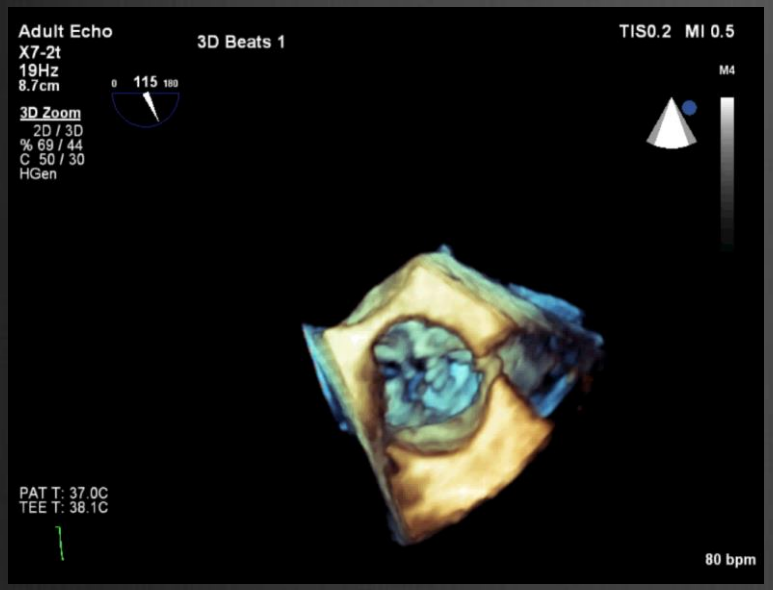
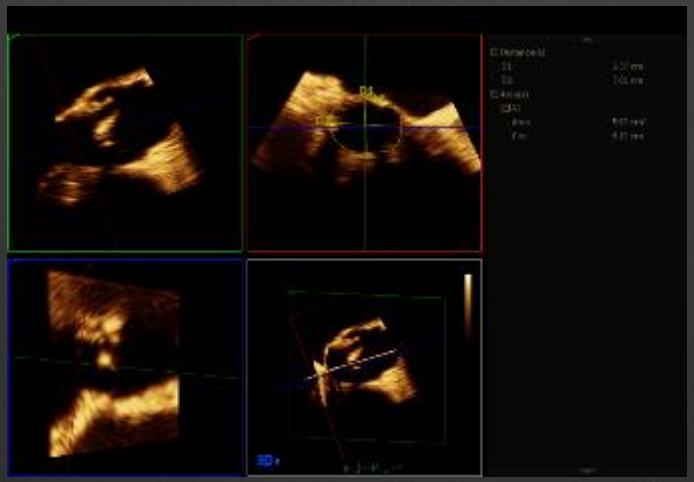
Echocardiography in Valve disease

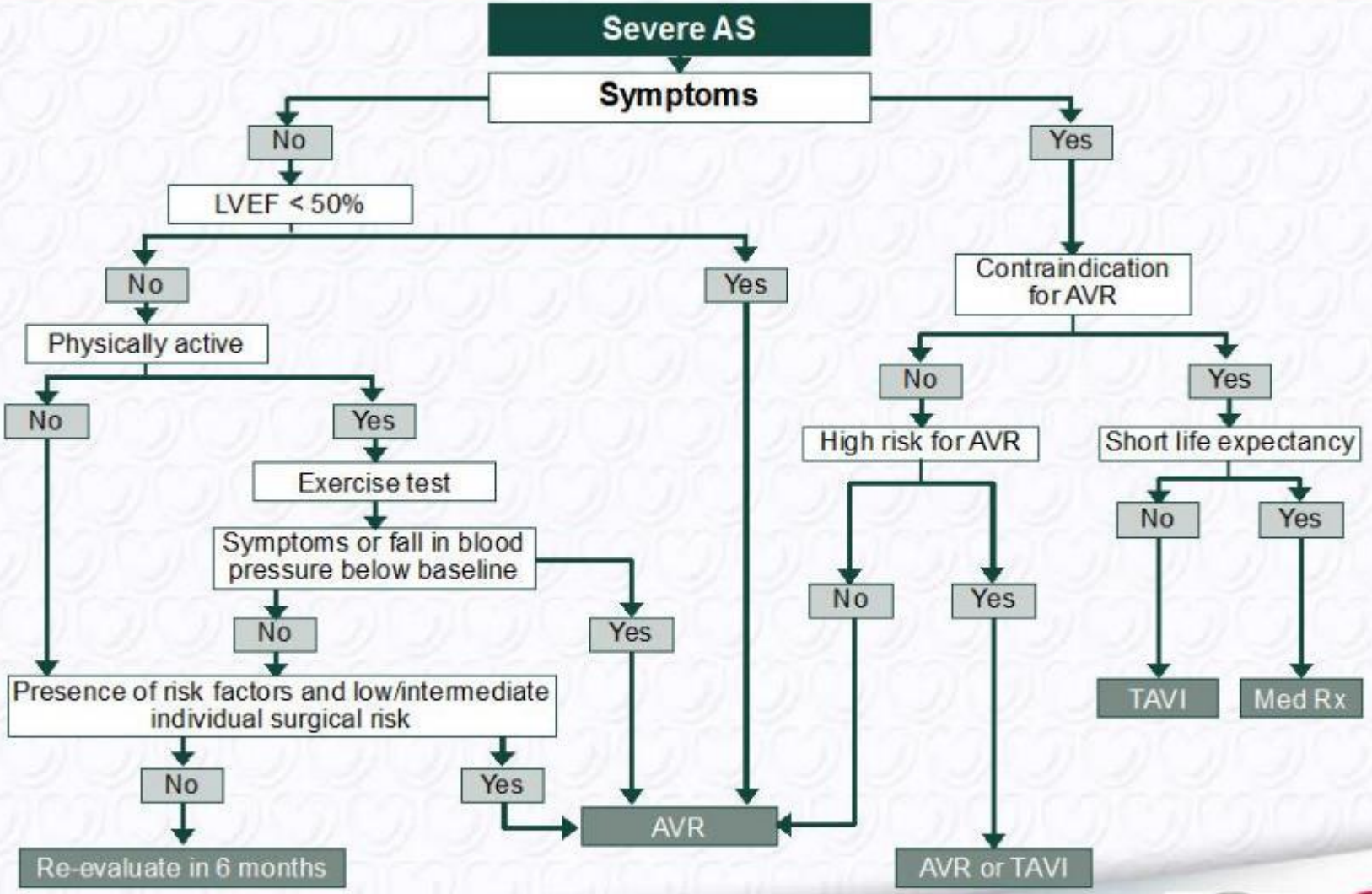


Aortic stenosis





Management of severe aortic stenosis



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Indications for aortic valve replacement in asymptomatic aortic stenosis

	Class	Level
AVR is indicated in asymptomatic patients with severe AS and systolic LV dysfunction (LVEF < 50%) not due to another cause.	I	C
AVR is indicated in asymptomatic patients with severe AS and abnormal exercise test showing symptoms on exercise clearly related to AS.	I	C
AVR should be considered in asymptomatic patients with severe AS and abnormal excercise test showing fall in blood pressure below baseline.	IIa	C
AVR should be considered in asymptomatic patients, with normal EF and none of the above mentioned exercise test abnormalities, if the surgical risk is low, and one or more of the following findings is present: • very severe AS defined by a peak transvalvular velocity > 5.5 m/s, • severe valve calcification and a rate of peak of transvalvular velocity progression ≥ 0.3 m/s per year.	IIa	C
AVR may be considered in asymptomatic patients with severe AS, normal EF and none of the above mentioned exercise test abnormalities, if surgical risk is low, and one or more of the following findings is present: • markedly elevated natriuretic peptide levels confirmed by repeated measurements without other explanations, • increase of mean pressure gradient with exercise by > 20 mmHg, • excessive LV hypertrophy in the absence of hypertension.	IIb	C

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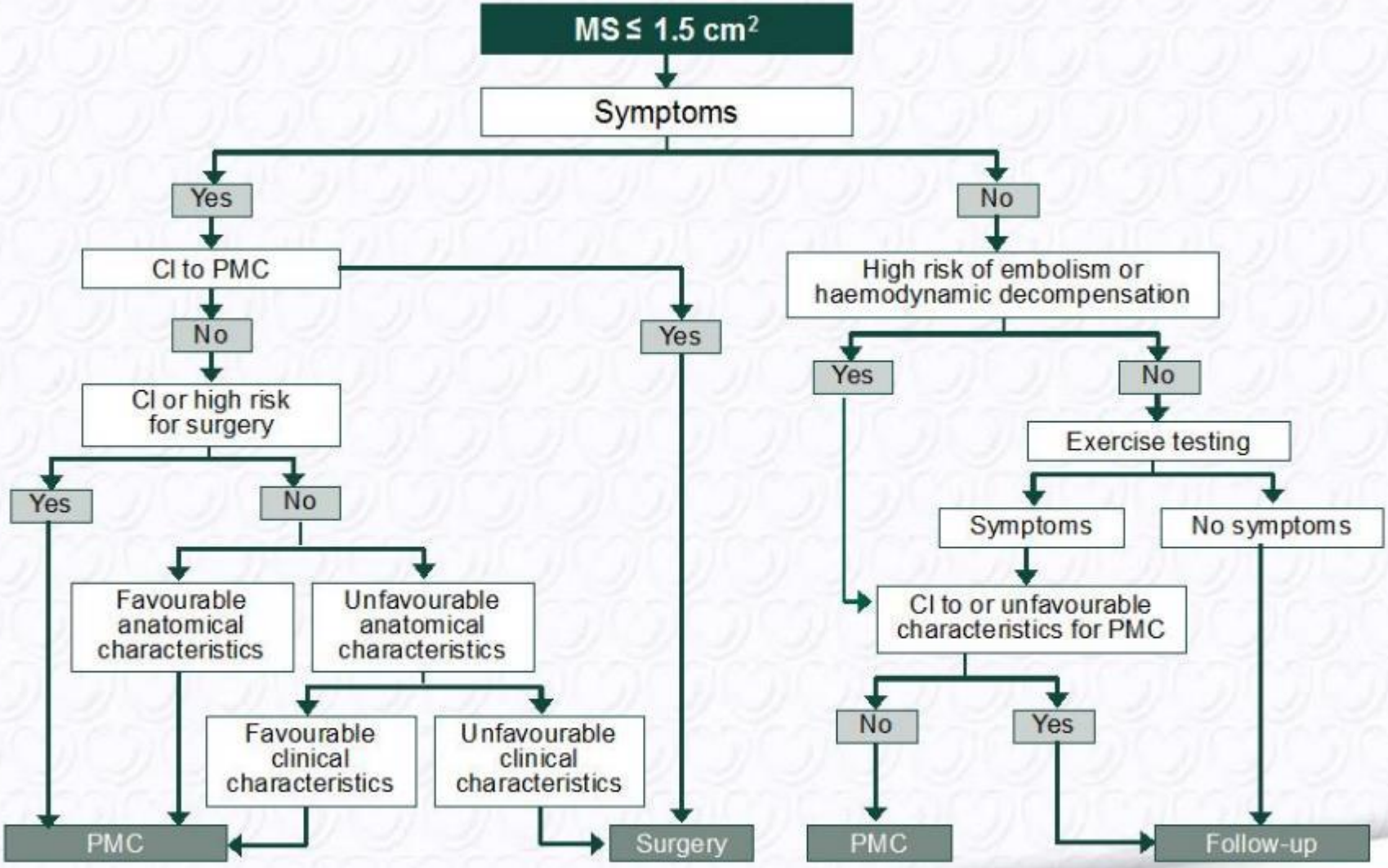
Management of clinically significant mitral stenosis



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Valve disease

STRESS TESTING IN VALVE DISEASE

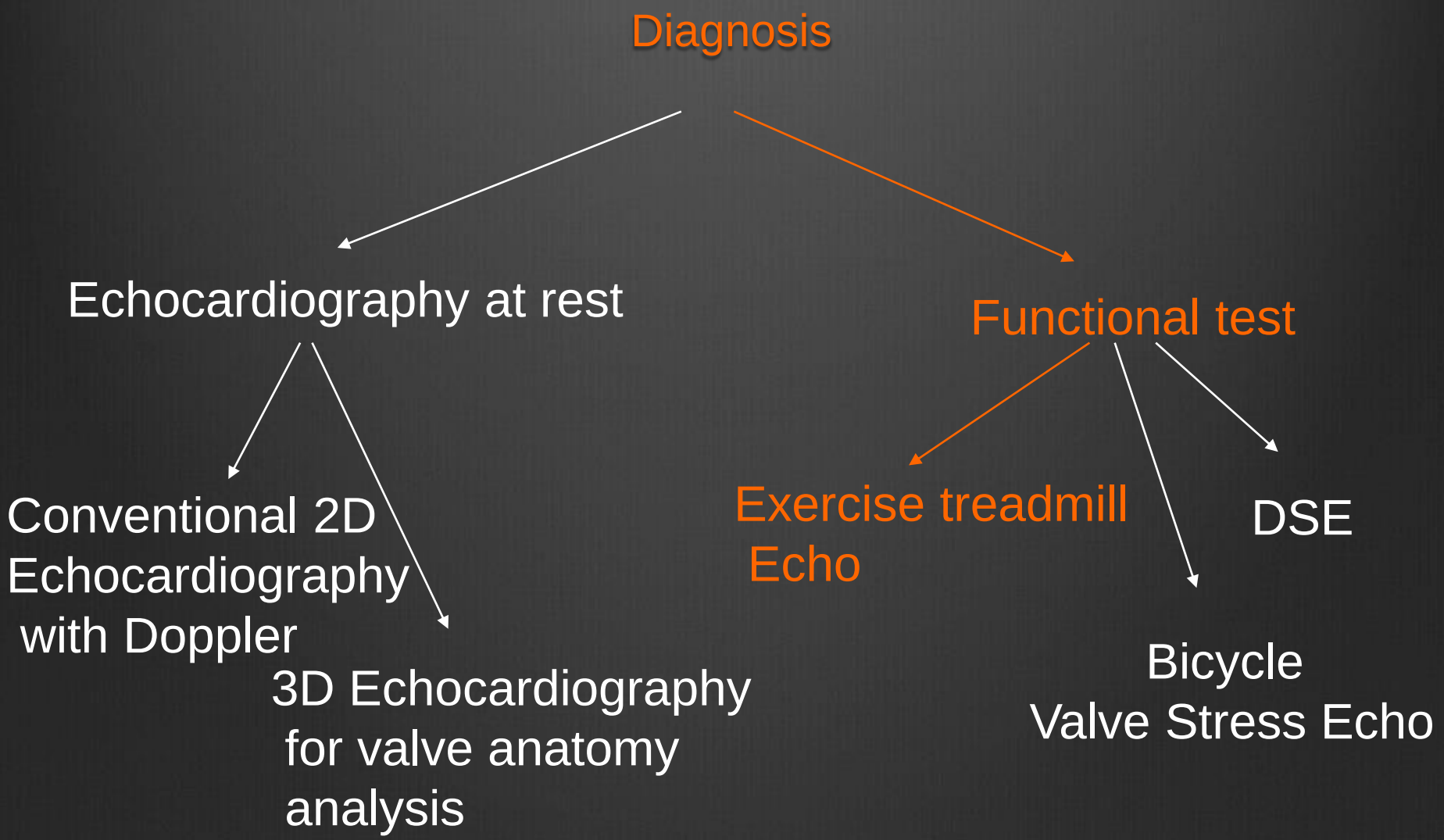
Luc A Piérard, Patrizio Lancellotti

Heart 2007;**93**:766–772. doi: 10.1136/hrt.2005.074815

Take the online multiple choice questions associated with this article (see page 765)

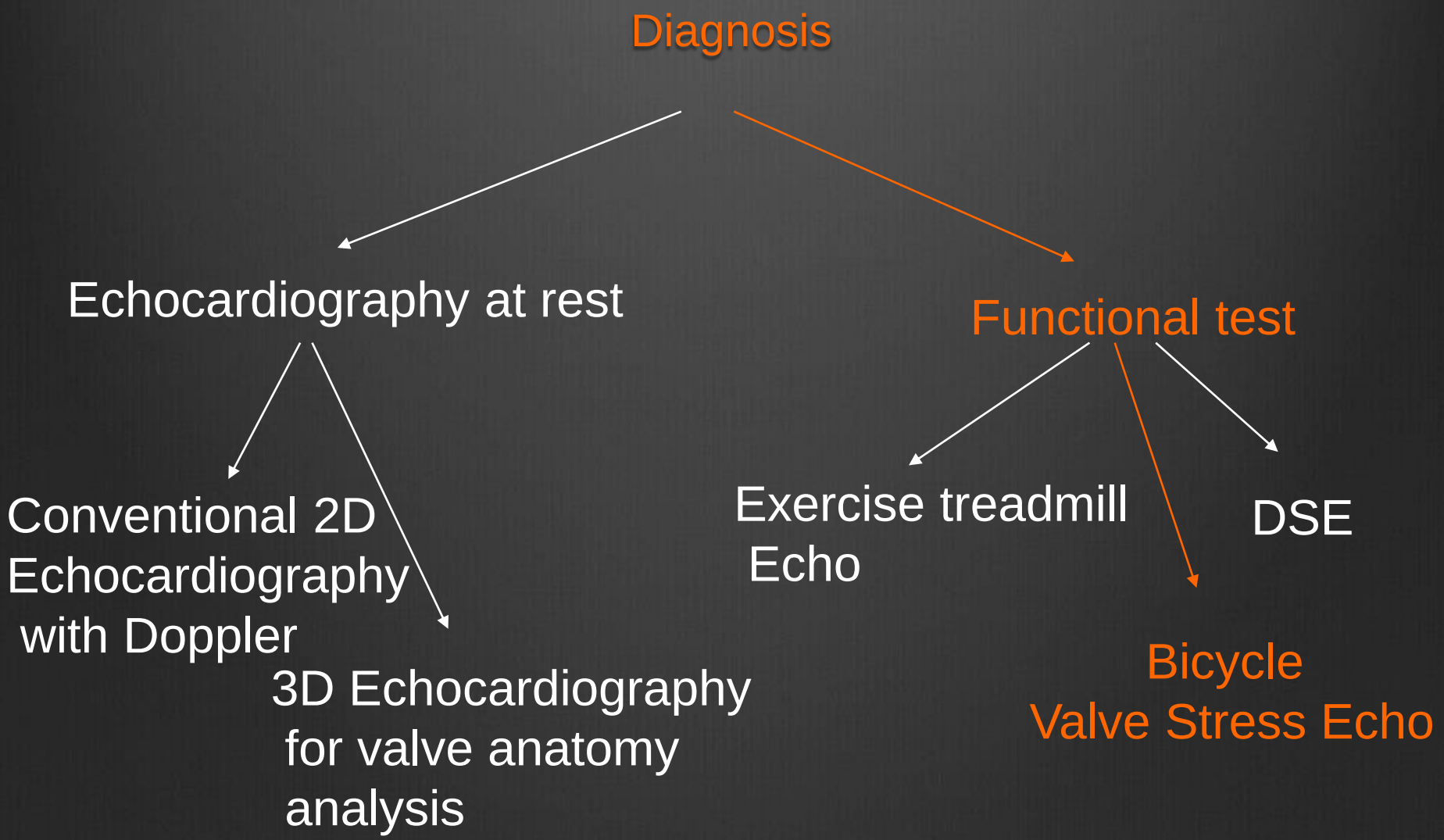
Stress testing is a cornerstone in the evaluation of patients with coronary artery disease and its results are always integrated into any clinical decisions. In contrast, valvular heart disease is usually considered static and its management relies upon resting evaluation only. However, most valve diseases have a dynamic component. Changes in loading conditions and contractility during a patient's life may lead to alterations in the severity of lesions, good or poor ventricular contractile reserve, altered volume-dependent compliance of heart chambers, and ventricular arterial coupling. Thus, there may be a need for stress testing and imaging in this setting. Exercise testing in particular can induce symptoms, reveal the dynamics of the valve and the ventricle, and evaluate the changes in forward output, retrograde flow and pulmonary pressures. The current primary role of stress testing in valve disease is to provide an objective assessment of functional disability which is of the utmost importance in patients who often adapt and reduce their physical activity, thus masking their symptoms. The Euro Heart Survey on valvular disease recently showed that stress testing is underused in Europe, or used for inappropriate purposes.[1]

Echocardiography in Valve disease



Exercise Echo room

Echocardiography in Valve disease



Valve Stress Echo

Valve stress in bicycle

Supine or semi-supine bicycle exercise is preferable because:

I. Reduced risk of haemodynamic collapse in this position.

II. Allows continuous two dimensional and Doppler echocardiographic examination.

III. Cycling allows more isometric exercise than treadmill does

oiLuc A Pie´rard, Patrizio Lancellotti, Heart 2007

VSE Guidlines

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Valve Stress Echocardiography

A Practical Guide for Referral, Procedure, Reporting, and Clinical Implementation of Results From the HAVEC Group

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Madalina Garbi, MD, MA,

Aortic Stenosis

AIM OF THE TEST:

- To assess peak and mean velocities.
- To estimate the AVA
- To assess exercise capacity
- Contractile reserve
- Inducible ischemia
- Symptoms

Aortic Stenosis

Symptomatic Modearte AS :

- Higher velocities and small AVA? (Rest TTE miscalculation)
- Inducible ischemia?
- Truly symptomatic or good exercise capacity?

Asymptomatic Severe AS:

- MPG increase > 18mmHg?
- SAP decrease >20mmHg?
- Poor contractile reserve?
- Poor exercise tolerance (<80%)?
- Significant symptoms (Dyspnoea, angina, syncope)?

Aortic Stenosis

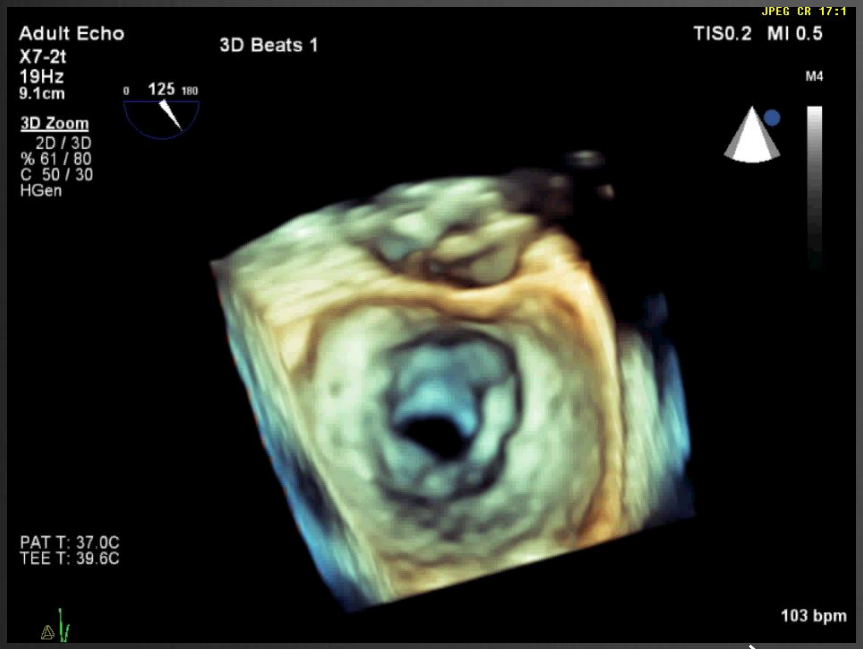
- **Low flow-low gradient AS:**

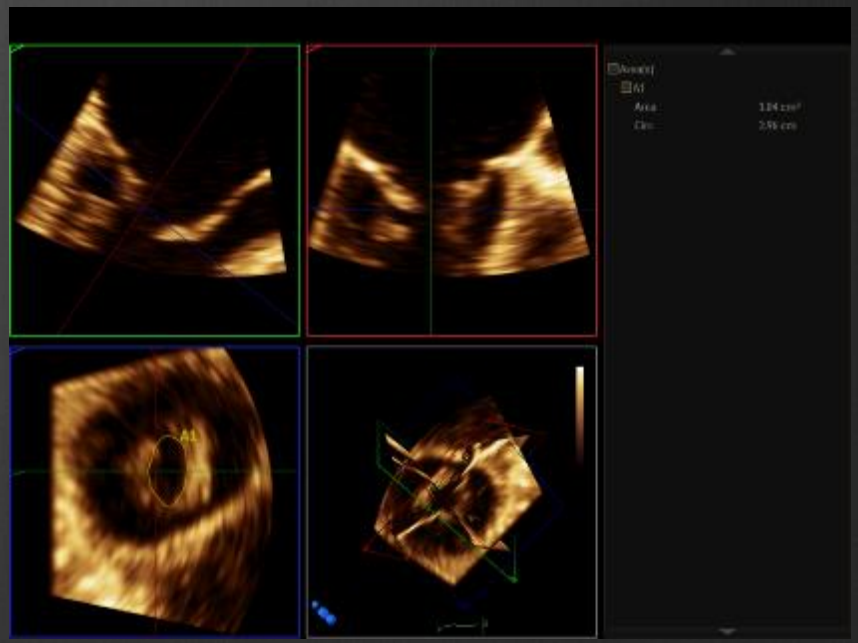
Aim to increase transvalvular flow (contractile reserve), without inducing ischemia

- **True severe or pseudo-severe AS:**

AVA remains the same with increase in the LV function and AV gradients

Mitral stenosis





Mitral stenosis

INDICATIONS:

- Symptomatic mild MS suitable for balloon
- Symptomatic moderate MS unsuitable for balloon.
- Asymptomatic moderate MS suitable for balloon.

AIM OF THE TEST:

- To assess mean gradient (>15mmHg)
- To assess exercise tolerance
- To estimate SPAP (>60mmHg)

VSE Contraindications

- Severe symptomatic aortic stenosis
- Blood pressure :

SAP>180mmHg prior to VSE

DAP>110mmHg prior to VSE

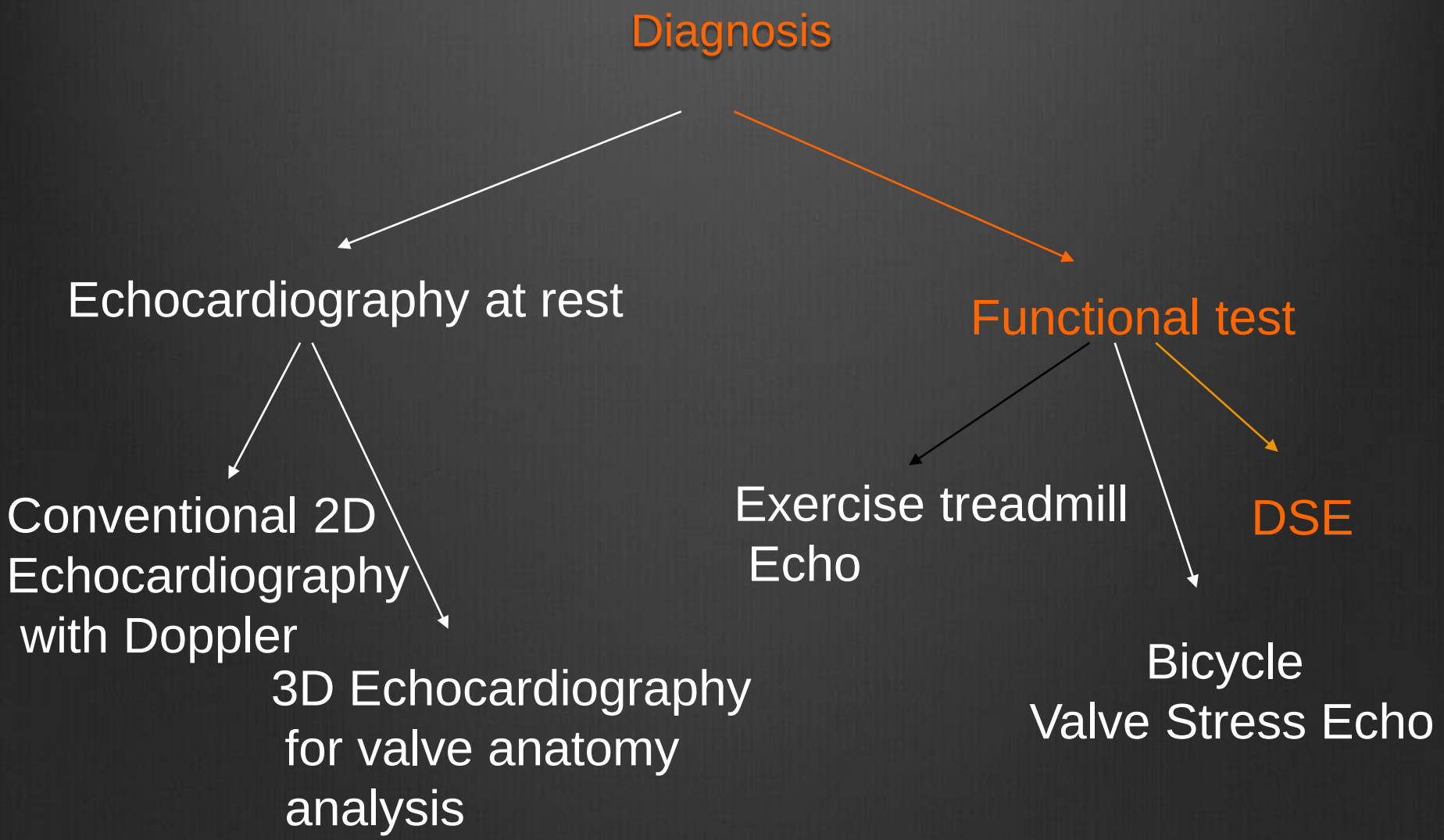
SAP>230mmHg during VSE

Drop in SAP >20mmHg during exercise

VSE Report


Anteroseptal
Septal
Ant
Inf
Lat
Post
seems to be bicuspid. Trivial MR. No TR to calculate SPAP
Ao V2 max: 449.7 cm/sec
Ao max PG: 80.9 mmHg
Ao V2 mean: 302.8 cm/sec
Ao mean PG: 42.2 mmHg
Ao V2 VTI: 96.3 cm
AVA(I,D): 1.1 cm2
AVA(V,D): 0.99 cm2
LV V1 max PG: 5.1 mmHg
LV V1 mean PG: 2.7 mmHg
LV V1 max: 113.3 cm/sec
LV V1 mean: 77.2 cm/sec
LV V1 VTI: 26.6 cm
SV(LVOT): 104.4 ml
AVA (Indexed BSA: cm^2/m^2): 0.54
II
WMSI = 1.06 % Normal = 91
Anteroseptal
Septal
Ant
Inf
Lat
EXERCISE: There was minimal induced hypokinesia of the apical interventricular septum / apical inferior wall. There was increase in transvalvular gradients to 127mmHg peak / 73 mmHg mean and there was no increase in calculated functional aortic valve area
Ao V2 max: 564.5 cm/sec
Ao max PG: 127.5 mmHg
Ao V2 mean: 407.8 cm/sec
Ao mean PG: 73.6 mmHg
Ao V2 VTI: 104.0 cm
AVA(I,D): 1.1 cm2
AVA(V,D): 0.92 cm2
LV V1 max PG: 7.0 mmHg
LV V1 mean PG: 3.8 mmHg
LV V1 max: 132.2 cm/sec

Echocardiography in Valve disease



DSE

- The sole recommendation is for low flow ,low gradient AS
- Symptoms or low exercise tolerance in asymptomatic sedentary patients can limit the exercise induced contractile recruitment, preventing the correct assessment of both stenosis and flow reserve
- Flow reserve: 20% increase in stroke volume (LVOT VTI)

Conclusion

‘Exercise testing can reveal symptoms in up to 1/3 of asymptomatic patients. The 1 year prognosis of patients with a normal exercise test is excellent. In contrast, a positive exercise test predicts the onset of a cardiac event in sizeable proportion of patients’

Pierard et al 2007