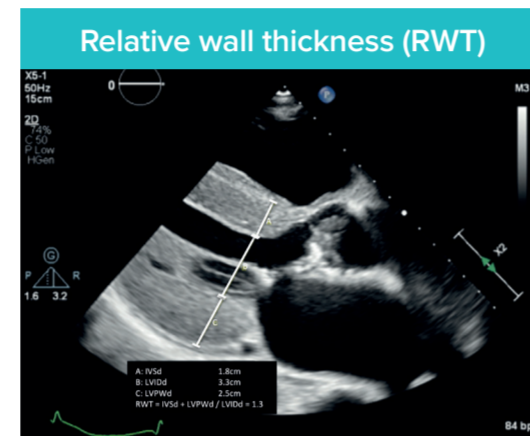


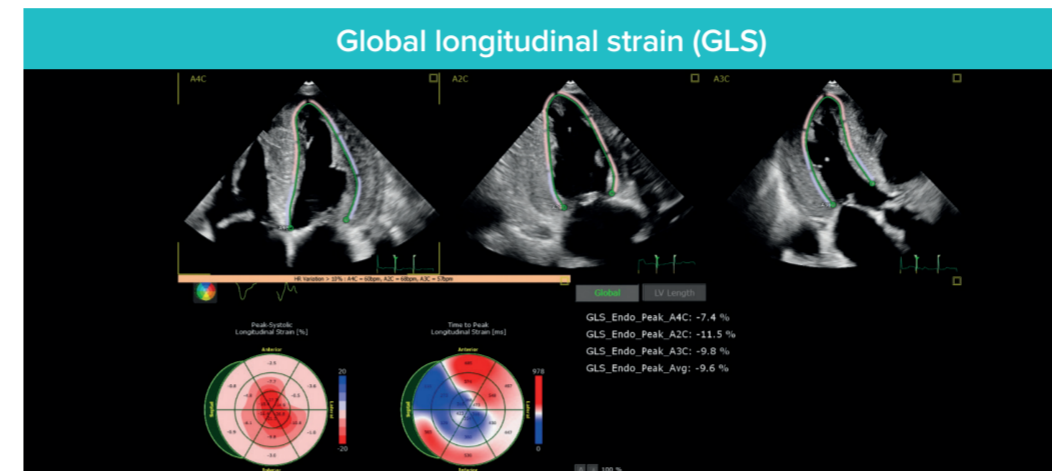
Minimum dataset	
Structure and Function	Measurement
Left ventricular (LV) dimensions, and relative wall thickness	End-diastolic dimension (mm)
	End-systolic dimension (mm)
	Inter-ventricular septal thickness in diastole (mm)
	Left ventricular posterior wall thickness in diastole (mm)
LV wall thickness in short axis view	Septum at basal level, papillary muscle level and apex level (mm)
	Anterior wall at basal level, papillary muscle level and apex level (mm)
	Lateral wall at basal level, papillary muscle level and apex level (mm)
	Inferior wall at basal level, papillary muscle level and apex level (mm)
LV volumes	End-diastolic volume (mL), indexed to body surface area (mL/m <sup>2</sup> )
	End-systolic volume (mL), indexed to body surface area (mL/m <sup>2</sup> )
LV systolic function	Ejection fraction by Simpson's Biplane (%)
	Ejection fraction by visual assessment (%)
	Global longitudinal strain (%)
Tissue Doppler Imaging	Lateral annulus (s', e', a'; cm/s)
	Septal annulus (s', e', a'; cm/s)
LV diastolic function	MV inflow PW Doppler (m/s)
	e' and a' TDI velocities (lateral and septal); E/e' ratio
	LA biplane volume (mL)
LV outflow tract	Resting (mmHg)
	Valsalva (mmHg)
	Stroke volume (mL)
Mitral valve inflow Doppler	E wave (m/s)
	A wave (m/s) and A wave duration (ms)
	Deceleration time (ms)
Pulmonary venous Doppler	Systolic wave (cm/s)
	Diastolic wave (cm/s)
	Ar wave (m/s) and Ar duration (ms)
Mitral regurgitation	Severity of mitral regurgitation
	Mechanism
	Direction of jet
Atria	LA biplane volume indexed to BSA (mL/m <sup>2</sup> )
	RA area indexed to BSA (cm <sup>2</sup> /m <sup>2</sup> )
Right ventricle (RV)	RV cavity size
	RV hypertrophy (mm)
Tricuspid regurgitation and inferior vena cava	RV systolic function (TAPSE mm, TDI S cm/s, FAC %)
	Severity of tricuspid regurgitation
Inter-atrial septum	Probability of pulmonary hypertension
	Inferior vena cava, size and collapse response
Effusions	Degree of thickening (>0.5cm)
	Pericardial – size (cm), location and haemodynamic significance
	Pleural effusion
	Ascites

**Red font** corresponds to the 2 parameters required on top of the standard BSE standard level 2 transthoracic echo dataset.  
**Green font** corresponds to the parameters which have particular prognostic significance in cardiac amyloidosis.

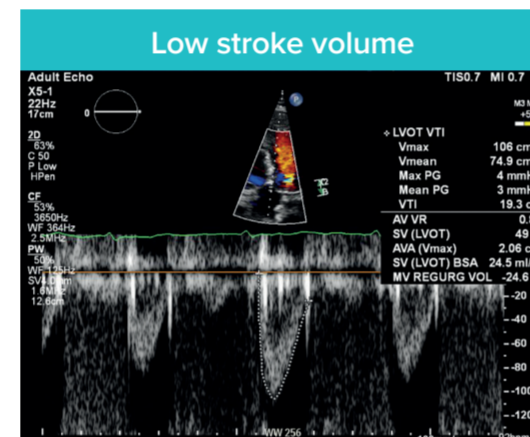
## Echo red flags



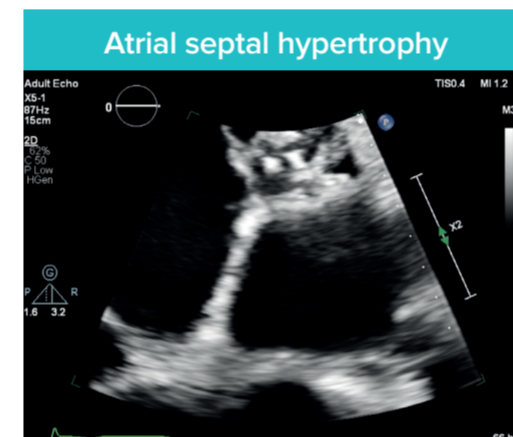
Increased left ventricular wall mass with a RWT > 0.42 defines 'concentric' hypertrophy.



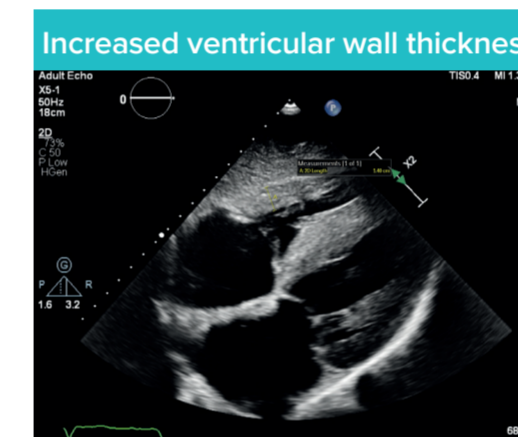
Reduced GLS with an apical sparing pattern on the bullseye plot.



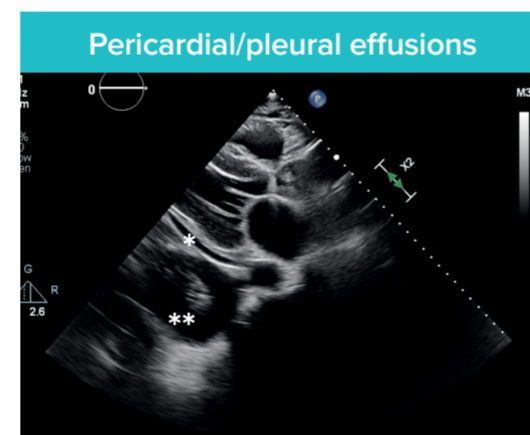
A reduction in LV end-diastolic volume and concomitant mitral regurgitation can lead to a reduced stroke volume despite a normal LV ejection fraction.



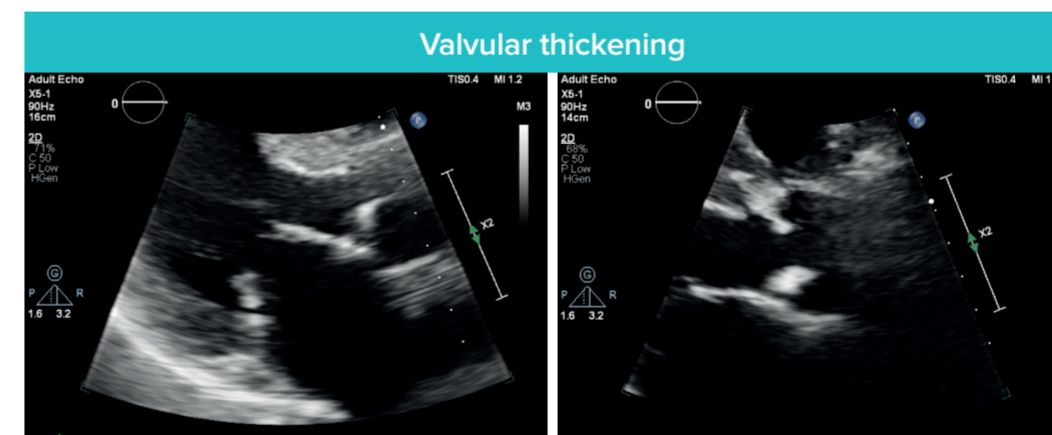
Thickening of the inter-atrial septum (> 0.5cm) can occur as a result of amyloid deposition.



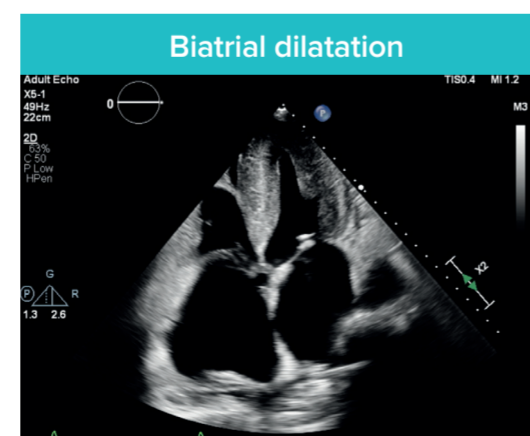
Right and left ventricular hypertrophy strongly suggests an infiltrative cardiomyopathy.



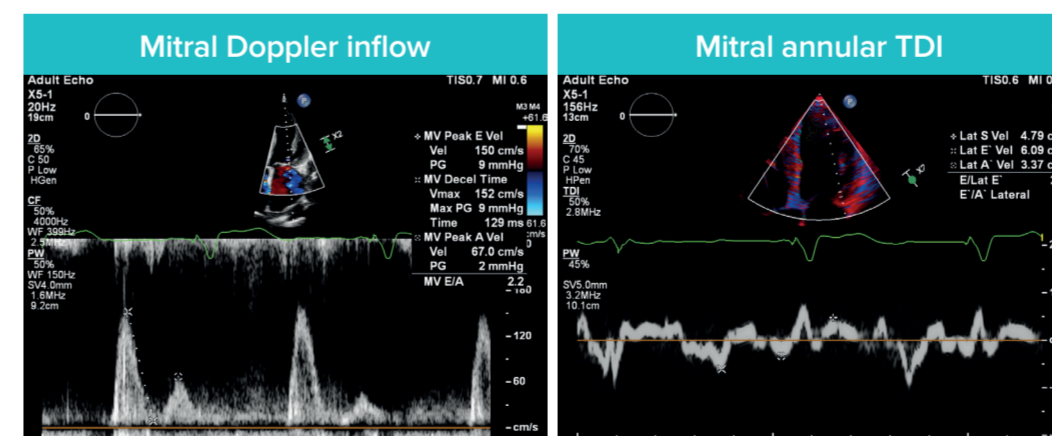
Pericardial (\*) and pleural (\*\*) effusions are often seen in cardiac amyloidosis.



Although not specific to cardiac amyloidosis, thickening of valve leaflets is an accompanying echo feature.



Non-dilated ventricles and biatrial dilatation are typical of restrictive cardiomyopathy, the latter reflecting increased ventricular and atrial filling pressures.



Restrictive left ventricular filling with markedly elevated E wave, reduced A wave, E/A ratio > 2, and elevated E/e' suggestive of increased left sided filling pressures. The TDI tracing shows (s' [systolic], e' [early diastolic], and a' [late (atrial) diastolic] tissue velocities are all reduced, near to fulfilling the "5-5-5" sign which is seen in patients with more advanced cardiac amyloidosis.

## When to suspect the diagnosis?

**LV wall thickness ≥ 12mm**

**and ≥ 1 of**

Abbreviations:  
 AV, atrioventricular;  
 AL, light chain amyloid;  
 ATTR, transthyretin amyloid;  
 LV, left ventricular  
 NT-proBNP,  
 N-terminal pro b-type natriuretic peptide

Heart failure with preserved ejection fraction (ATTR)
History of carpal tunnel syndrome (often bilateral) or biceps tendon rupture (ATTR)
Unexplained heart failure in a patient with monoclonal gammopathy or multiple myeloma (AL)
Heart failure in the presence of autonomic and/or peripheral neuropathy (ATTR/AL)
History of pacemaker, AV conduction disease and/or atrial fibrillation (ATTR/AL)
Disproportionate elevation in NT-proBNP and persistent mild increase in high-sensitivity Troponin (ATTR/AL)
Hypotension when previously hypertensive (ATTR/AL)
Easy skin bruising (AL)
Macroglossia (AL)

## Recommendation on report

**Not suggestive:** Normal LV wall thickness, normal atrial size, septal or lateral tissue Doppler e' velocity > 10cm/s, normal GLS and absence of apical sparing longitudinal strain pattern.

**Equivocal:** Mixed parameters.

**Suggestive:** Increased LV wall thickness, reduced GLS with typical apical sparing longitudinal strain pattern, restrictive Doppler mitral inflow pattern, restrictive mitral annular TDI.

Abbreviations: GLS, global longitudinal strain; LV, left ventricular, TDI, tissue Doppler imaging.

## Key messages

- Echocardiographers have an important role in raising the suspicion of cardiac amyloidosis although a diagnosis cannot be made without confirmatory tests
- Cardiac amyloidosis is relatively common and should enter the differential diagnosis for any patient presenting with increased left ventricular wall thickness
- Performing global longitudinal strain (GLS) is important for the assessment of any patient presenting with increased left ventricular wall thickness
- Amyloid fibrils infiltrate the valves and the atria, as well as the ventricular myocardium
- GLS and E/e' have a high probability of being abnormal in the early stages of cardiac amyloidosis
- Asymmetric wall thickening does not exclude a diagnosis of cardiac amyloidosis
- GLS, stroke volume index and worsening degrees of mitral and tricuspid regurgitation are important predictors of prognosis in cardiac amyloidosis