

NEW GUIDELINES

A Guideline Protocol for the Diagnosis and Assessment of Hypertrophic Cardiomyopathy From the British Society of Echocardiography Education Committee

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1. Introduction

1.1 The BSE Education Committee has previously published a minimum dataset for a standard adult transthoracic echocardiogram, available on-line at www.bsecho.org. This document specifically states that the minimum dataset is usually only sufficient when the echocardiographic study is entirely normal. The aim of the Education Committee is to publish a series of appendices to cover specific pathologies to support this minimum dataset.

1.2 The intended benefits of such supplementary recommendations are to:

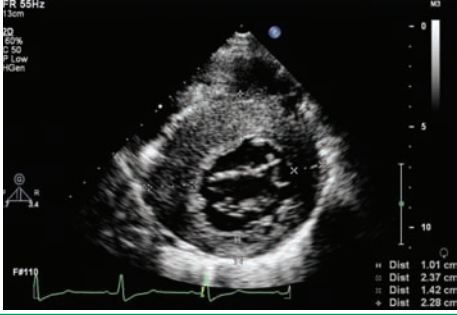
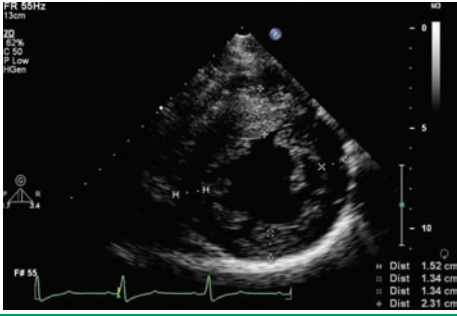
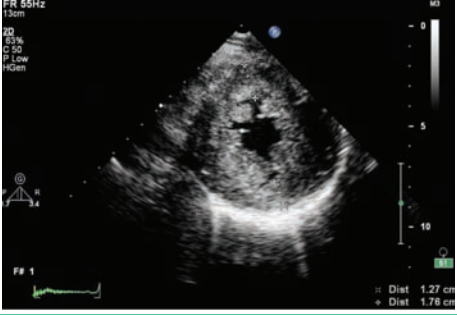

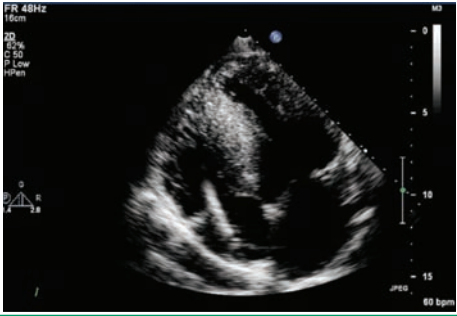
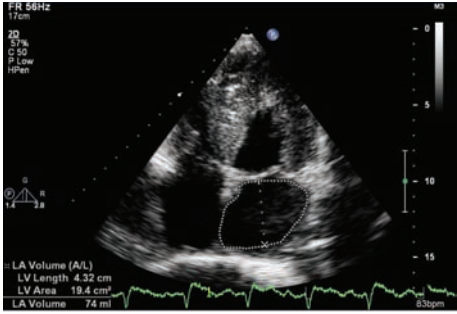
- Support cardiologists and echocardiographers to develop local protocols and quality control programs for adult transthoracic study
- Promote quality by defining a set of descriptive terms and measurements, in conjunction with a systematic approach to performing and reporting a study in specific disease-states
- Facilitate the accurate comparison of serial echocardiograms performed in patients at the same or different sites.

1.3. This document gives recommendations for the image and analysis dataset required in patients either being assessed for or with a known diagnosis of hypertrophic cardiomyopathy. The views and measurements are supplementary to those outlined in the minimum dataset and are given assuming a full study will be performed in all patients.

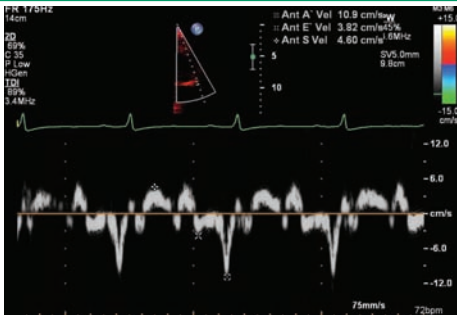
1.4 When the condition or acoustic windows of the patient prevent the acquisition of one or more components of the supplementary Dataset, or when measurements result in misleading information (e.g. off-axis measurements) this should be stated.

1.5 This document is a guideline for echocardiography in hypertrophic cardiomyopathy and will be up-dated in accordance with changes directed by publications or changes in practice.

View	Modality	Measurements	Explanatory Note	Image
PLAX	M Mode	IVS	(i) IVS measure >3cm is a key marker of increased risk* (ii) Demonstrate if ASH is present (ii) Measure RV wall thickness if on axis. Note: Ensure LV on axis for m mode measurements, if not, measure in 2D. Avoid inclusion of papillary muscle/moderator band/trabeculations in measurement	
PLAX	M Mode and Colour Flow Doppler	MV leaflet tips and AoV leaflet tips	(i) Demonstrate if SAM is present on M Mode and for colour flow turbulence within the LVOT. (ii) Demonstrate if early closure of the AoV	

View	Modality	Measurements	Explanatory Note	Image
PSAX MV	2D	Frozen 2D image: obtain wall thickness measurements from level of the basal LV. Measure at 4 points, using clock face as reference (12, 3, 6, 9)	To assess for asymmetric and symmetric segmental LV hypertrophy Segmental hypertrophy $>1.5\text{cm}^*$ with normal or small LV internal cavity dimensions is strongly suggestive of HCM (in absence of other pathologies i.e. HTN).	
PSAX PM	2D	2D frozen image at the mid LV level. Measure at 4 points, using clock face as reference (12, 3, 6, 9)	Avoid off axis measurements, papillary muscle and trabeculations.	
PSAX Apex	2D	Apical level measure at 2 points (12 and 6 O'clock).	Apical hypertrophy may be present if apical/basal lateral ratio >1.5 . Consideration should be given to use of LVO contrast	
Modified PSAX	2D & PW/CW Doppler	RV wall thickness and RVOT forward flow velocities	Modify both the RV inflow and outflow to assess for RVH and RVOT obstruction. RVH present if $>0.5\text{cm}$.	
Modified Apical 4CH	2D	RV wall thickness	If clear measure RVH, otherwise preferred measurement from the PLAX and subcostal views. RVH present if $>0.5\text{cm}$.	
Apical 4CH & Apical 2CH	2D	LA Volume	Index LA volume to BSA**	

View	Modality	Measurements	Explanatory Note	Image
Apical 4CH	Colour Flow Doppler	Aetiology and severity of mitral regurgitation	If SAM present, MR may be eccentric and is usually mid/late systolic	
Apical 4CH	PW Tissue Doppler	Systolic (Sa), early (Ea) and atrial (Aa) relaxation velocities at anterolateral LV annulus.	Reduction in Sa or Ea velocities below normal range for age and sex. *** Assess for elevated LVEDp by measuring E/Em. Average septal and lateral velocities for Em. Abnormal if >10.**	
Apical 4CH	PW Tissue Doppler	Systolic (Sa), early (Ea) and atrial (Aa) relaxation velocities at inferoseptal LV annulus.	Reduction in Sa or Ea velocities below normal range for age and sex. *** Assess for elevated LVEDp by measuring E/Em. Average septal and lateral velocities for Em. Abnormal if >10.**	
Apical 5CH & Apical 3CH	Colour Flow Doppler		Locate turbulent flow both within the LV cavity and the LVOT.	
Apical 5CH & Apical 3CH	PW/HPRF/CW Doppler	Quantify LVOT/LV intracavity dynamic flow gradient	Sample PW Doppler throughout the LV cavity, paying particular attention to areas with turbulent flow. HPRF/CW Doppler may be appropriate if aliasing occurs. Take care not to include MR jet in sample volume! Gradient >30mmHg is a marker of adverse prognosis.*	
Apical 2CH	PW Tissue Doppler	Systolic (Sa), early (Ea) and atrial (Aa) relaxation velocities at inferior LV annulus.	Reduction in Sa or Ea velocities below normal range for age and sex. ***	

View	Modality	Measurements	Explanatory Note	Image
Apical 2CH	PW Tissue Doppler	Systolic (Sa), early (Ea) and atrial (Aa) relaxation velocities at anterior LV annulus.	Reduction in Sa or Ea velocities below normal range for age and sex.***	

*Maron BJ et al J Am Coll Cardiol 2003;42:1687-1713.

**BSE Guidelines for Chamber Quantification www.bsecho.org

***ASE Guidelines for LV Diastolic function JASE 2009;22(2):107-133.