# ARDMS

# AE-Adult-Echocardiography

## AE Adult Echocardiography Examination

# Latest Version: 6.0

## Question: 1

Which of the following is a feature of constrictive pericarditis?

A. Mitral inflow pattern has a large E-wave and a small A-wave without respiratory changes
B. Normal hepatic vein size
C. Dilated inferior vena cava with inspiratory collapse during sniff test
D. Interventricular septal bounce

**Answer: D**

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Constrictive pericarditis is characterized by thickening and fibrosis of the pericardium which restricts diastolic filling of the ventricles. Key echocardiographic features include a characteristic interventricular septal "bounce" or shift during early diastole due to the abrupt cessation of ventricular filling imposed by the rigid pericardium. This septal bounce reflects rapid early diastolic filling followed by a sudden halt as filling pressures equalize, a hallmark of constriction physiology.
Additionally, Doppler studies show marked respiratory variation in mitral and tricuspid inflow velocities (>25%), with an inspiratory increase in tricuspid inflow and a decrease in mitral inflow velocity, reflecting ventricular interdependence caused by the noncompliant pericardium. The mitral inflow typically shows a large E-wave with a small or absent A-wave and a steep deceleration slope, but importantly these velocities vary significantly with respiration, which is not the case in restrictive cardiomyopathy.
Hepatic vein Doppler often reveals a prominent a-wave and a deep y-descent with increased diastolic flow reversal during expiration, indicating elevated right atrial pressures and constrictive physiology.
The inferior vena cava (IVC) is usually dilated and shows no inspiratory collapse (i.e., no normal collapse with sniff test) because of elevated right atrial pressure and impaired venous return.
Therefore:
Option A is incorrect because mitral inflow in constrictive pericarditis shows significant respiratory variation, not absence of it.
Option B is incorrect because the hepatic vein is typically dilated with abnormal flow patterns, not normal size.
Option C is incorrect because the IVC is dilated and does NOT collapse normally with inspiration/sniff in constrictive pericarditis.
Option D is correct because the interventricular septal bounce is a classic feature reflecting ventricular interdependence and constrictive physiology.
These findings are summarized in the "Textbook of Clinical Echocardiography, 6e" (Catherine M. Otto, MD), Chapter 10 (Pericardial Disease), pages 280–285, with key illustrations showing septal bounce, Doppler inflow variations, hepatic vein flow patterns, and IVC findings in constrictive pericarditis. The "Mayo Clinic criteria" for echocardiographic diagnosis also emphasize ventricular septal shift as a critical feature, often combined with tissue Doppler annular velocity patterns and hepatic vein diastolic flow reversal for high diagnostic accuracy.

## Question: 2

Which syndrome is associated with pulmonic stenosis?

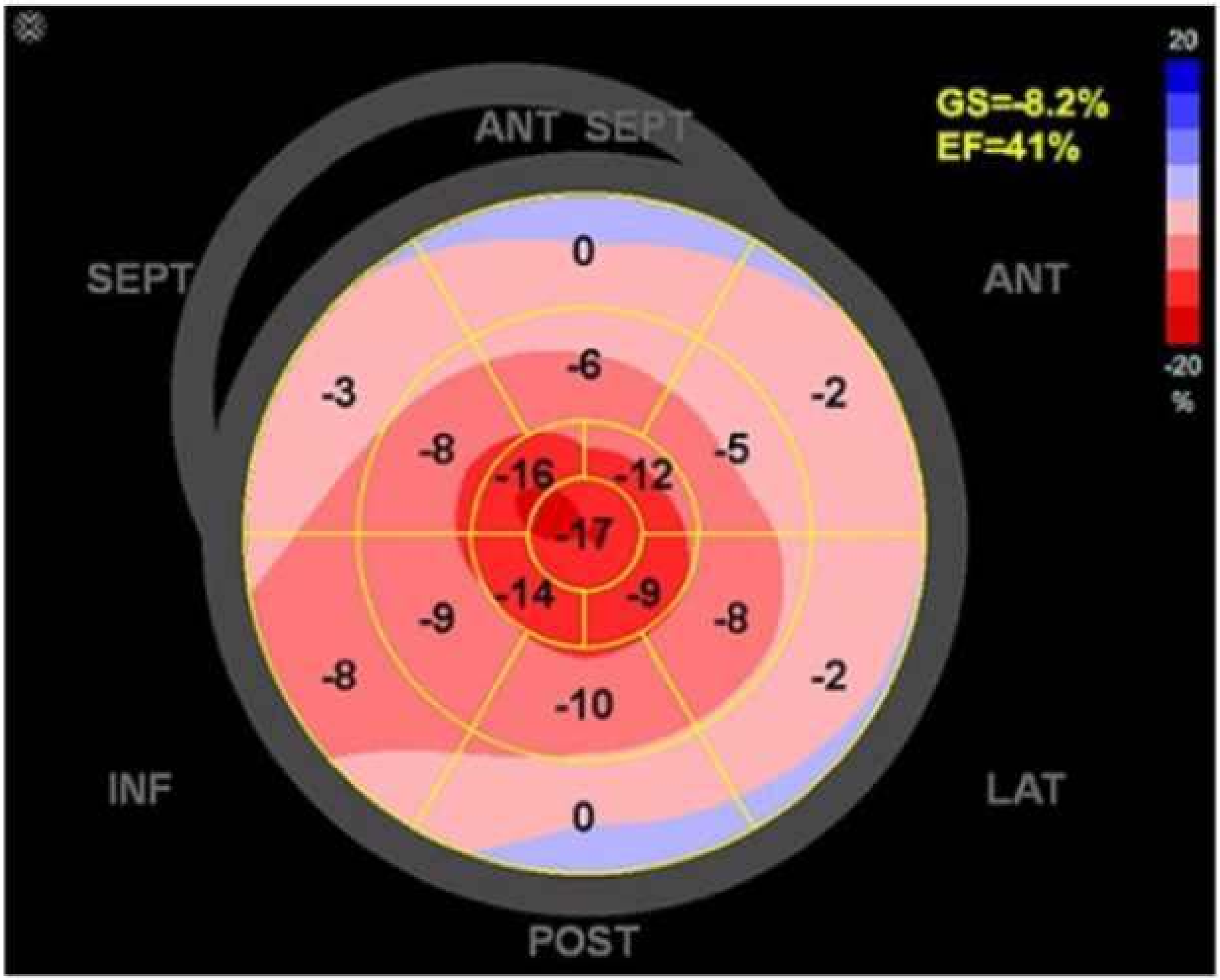
A. Turner
B. Eisenmenger
C. Noonan
D. Marfan

**Answer: C**

Explanation:
Pulmonic stenosis is a congenital valve abnormality often seen in genetic syndromes with cardiac manifestations. Among these, Noonan syndrome is the most frequently associated with pulmonic stenosis. Noonan syndrome is a genetic disorder characterized by distinctive facial features, short stature, and congenital heart defects, with pulmonic valve stenosis being the predominant cardiac lesion. The stenosis is usually valvular and caused by dysplastic pulmonary valve leaflets, leading to obstruction of right ventricular outflow.
Other syndromes listed do not typically present with pulmonic stenosis:
Turner syndrome is more commonly linked with bicuspid aortic valve and coarctation of the aorta, not pulmonic stenosis.
Eisenmenger syndrome refers to the advanced phase of congenital heart defects with significant pulmonary hypertension and is not a genetic syndrome.
Marfan syndrome is predominantly associated with aortic root dilation and mitral valve prolapse, but not with pulmonic stenosis.
This association is well documented in adult echocardiography guidelines and texts, such as the "Textbook of Clinical Echocardiography" by Catherine Otto, which clearly identifies Noonan syndrome as the syndrome most commonly associated with pulmonic stenosis among congenital heart defects【16:Chapter on Congenital Heart Disease†Textbook of Clinical Echocardiography, 6e】.

## Question: 3

Which diagnosis is most consistent with the findings in these images?


GS=-8.2%
EF=41%
20
-20
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ANT SEPT
SEPT
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0
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-14
-9
-9
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0

A. Takotsubo cardiomyopathy
B. Apical hypertrophic cardiomyopathy
C. Hypertrophic obstructive cardiomyopathy
D. Restrictive cardiomyopathy from amyloidosis

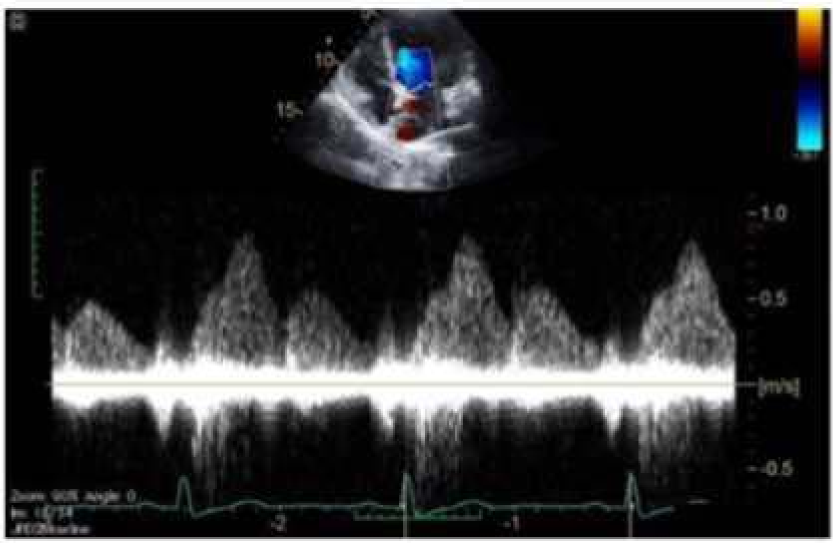
**Answer: A**

Explanation:
The first image shows a bullseye plot of global longitudinal strain (GLS) with marked reduction in strain values (less negative numbers) most prominently in the apical segments (central red zone), with an overall GLS of -8.2% (normal is about -20%) and a reduced ejection fraction of 41%. This pattern is characteristic of Takotsubo cardiomyopathy, which typically demonstrates regional wall motion abnormalities that predominantly involve the apex and mid segments of the left ventricle with basal sparing.
The 2D echocardiographic images show apical ballooning, a hallmark of Takotsubo cardiomyopathy, where the apex is akinetic or dyskinetic and the basal segments contract normally or hypercontract. Doppler images show findings consistent with impaired ventricular function.
In contrast:
Apical hypertrophic cardiomyopathy (HCM) would show increased wall thickness localized to the apex but not apical ballooning or reduced strain in that typical pattern.
Hypertrophic obstructive cardiomyopathy (HOCM) involves basal septal hypertrophy with outflow obstruction, not apical akinesis or ballooning.
Restrictive cardiomyopathy from amyloidosis involves diffuse infiltration and generally a different strain

pattern with more uniform reduction and “apical sparing” rather than apical involvement.
This interpretation aligns with the diagnostic criteria and echocardiographic features described in the adult echocardiography literature, including the "Textbook of Clinical Echocardiography" (Chapter on Cardiomyopathies) and ASE guidelines, which highlight apical ballooning and regional strain abnormalities as diagnostic features of Takotsubo cardiomyopathy【16:Cardiomyopathy Chapter†Textbook of Clinical Echocardiography, 6e】【12:ASE Guidelines on Strain Imaging†p.130-135】.

## Question: 4

Which of the following does this Image represent?




A. Mitral valve inflow
B. Tricuspid valve inflow
C. Hepatic vein Doppler
D. Pulmonary vein Doppler

**Answer: C**

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
The image shows a pulsed-wave Doppler waveform with respiratory phasicity and distinct forward and reversed flow components characteristic of hepatic vein flow patterns. Hepatic vein Doppler typically displays a biphasic waveform with systolic (S) and diastolic (D) forward flow toward the heart and brief reversed flow during atrial contraction (A wave reversal), reflecting right atrial pressure changes.
Mitral and tricuspid inflow Doppler patterns show distinct E and A waves representing early and late diastolic ventricular filling but do not have the same flow reversal pattern. Pulmonary vein Doppler waveforms also differ, showing systolic and diastolic forward flows into the left atrium without the prominent reversed flow seen here.
The hepatic vein Doppler is commonly used in echocardiography to assess right atrial pressure and

compliance, especially in conditions like constrictive pericarditis and right heart failure, where characteristic flow reversals and expiratory changes are observed.
This pattern and its clinical significance are detailed in adult echocardiography references, including the "Textbook of Clinical Echocardiography" and ASE guidelines on Doppler imaging【16:Hepatic Vein Doppler†Textbook of Clinical Echocardiography, 6e】【12:ASE Doppler Guidelines†p.95-100】.

## Question: 5

Which view is most appropriate for measuring right ventricular dimensions?

A. Subcostal four-chamber
B. Parasternal short axis at the base
C. Apical lateral right ventricular-focused
D. Parasternal long axis

**Answer: C**

Explanation:
The most appropriate echocardiographic view to measure right ventricular (RV) dimensions is the apical four-chamber view with a right ventricular-focused modification. This RV-focused apical four-chamber view is optimized by shifting the transducer laterally and slightly anteriorly to better visualize the entire right ventricle in a single plane. This approach allows for accurate assessment of RV basal and mid cavity diameters, RV longitudinal dimension, and RV area measurements.
The standard apical four-chamber view often underestimates RV size because of its complex geometry and position in the chest. The subcostal four-chamber view may give some information on RV size but is limited by image quality and angle. Parasternal short axis views at the base focus more on the left ventricle and may not capture the entire RV adequately. Parasternal long axis views primarily visualize the left heart structures and do not adequately show the RV.
Adult echocardiography guidelines, including the American Society of Echocardiography (ASE) chamber quantification recommendations, endorse the RV-focused apical four-chamber view as the standard for RV linear measurements and volume assessment due to its accuracy and reproducibility【12:ASE Chamber Quantification Guidelines†p.80-85】【16:Textbook of Clinical Echocardiography, 6e†Chapter on RV Assessment】.