

ADULT ECHOCARDIOGRAPHY EXAMINATION PROTOCOL

PURPOSE:

To evaluate the structure and function of the cardiovascular system.

COMMON INDICATIONS:

- Murmur
- Chest Pain
- Dyspnea
- Syncope
- Weakness
- Abnormal ECG

PUBLISHED INDICATIONS:

- Murmurs and Valvular Heart Disease
 - Murmurs
 - Native Valvular Stenosis
 - Native Valvular Regurgitation
 - Rheumatic Disease of the Heart Disease
 - Infective Endocarditis
 - Mitral Valve Prolapse
 - Aortic Valve Stenosis
 - Aortic Regurgitation
 - Prosthetic Valves
 - Prosthetic Valve Dysfunction and Endocarditis
- Chest Pain
- Ischemic Heart Disease
 - Acute Ischemic Syndromes
 - Chronic Ischemic Heart Disease
 - Coronary Artery Disease
 - Myocardial Infarction
 - Left Ventricular Dysfunction
 - Assessment of Ejection Fraction
 - Edema and Dyspnea
 - Regional Left Ventricular Function
 - Ventricular Dysfunction
 - Dilated Cardiomyopathy
 - Hypertrophic Cardiomyopathy
 - Restrictive Cardiomyopathy
 - Pericardial Disease
 - Myocardial Non-Viable Tissue
 - Assessment of the Right Ventricle
- Pericardial Disease
 - Pericardial Effusion
 - Cardiac Tamponade
 - Increased Pericardial Thickness
 - Pericardial Calcification
 - Pericardial Constrictive Disease
 - Pericarditis
 - Pericardial Disease of the Pericardium and Pericardial Disease After Open-Heart Surgery
- Cardiac Masses and Tumors
- Diseases of the Great Vessels

SAMPLE ONLY

Aortic Dissection

Aortic Aneurysm

Aortic Regurgitation, Aortic Stenosis, Mitral Regurgitation

Tricuspid Regurgitation

Valvular Disease from Rheumatoid Arthritis

- Systemic Hypertension
- Neurological Disease and Other Cardioembolic Disease
- Arrhythmias and Palpitation

SAMPLE ONLY

Cardioversion of Patients With Atrial Fibrillation

Stroke

Stroke

Cardiovascular Malformation

Genetic Cardiovascular Disease

AACVPM Guidelines for the Clinical Application of Echocardiography; A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Clinical Application of Echocardiography) Developed in Collaboration With the American Society of Echocardiography; Circulation. 1997;92:1666-761.

SAMPLE ONLY

PATIENT COMMUNICATION AND POSITIONING:

Appropriate patient communication is essential. The patient should be made comfortable and relaxed. The patient should be positioned supine with the head of the bed elevated 30 degrees. The patient should be positioned in a way which allows for maximum access to the vessels to be examined. In some cases, due to limitations of the patient, the sonographer may elect to examine the patient sitting erect.

SAMPLE ONLY

PATIENT ASSESSMENT:

Patient assessment must be completed before examination is performed. The sonographer should assess the patient's vital signs (blood pressure, heart rate, respiratory rate, oxygen saturation) and obtain a history of onset and duration of symptoms. The sonographer should also assess for any contraindications to the examination. The sonographer should also assess for any contraindications to the examination.

SAMPLE ONLY

EXAMINATION GUIDELINES:

- The ECG should be selected and optimized (presses on the **ECG** button) and the ECG trace should be visualized on the screen and included in clips and images obtained throughout the exam.
- ECG electrodes are placed on the patient's chest in the correct position to obtain an adequate physiological ECG trace. ECG trace must be visualized on the screen and included in clips and images obtained throughout the exam.
- Ultrasonic coupling gel is applied on the patient's chest at the parasternal view position.
- The sonographer should include the following structures in the exam: aortic valve, mitral valve, tricuspid valve, pulmonary valve, and all surrounding structures. Limited exams are not performed for this testing category. The heart is imaged in both clip and still framed images, beginning with

the parasternal long axis view. The following views are then obtained:

Parasternal Short Axis: Four Chamber Apical, Five Chamber Apical, Two Chamber Apical, Three Chamber Apical, Subcostal Long Axis, Four Chamber, Subcostal Long Axis. Views indicated in the image protocol to evaluate the mitral, aortic, and pulmonary valves, and the left ventricle.

W. Protocol: Evaluation includes 2D imaging with real-time image clips, Color Doppler evaluation of all cardiac valves at each view and Pulsed/Continuous Wave Doppler interrogation of each cardiac valve at multiple views, as best obtainable. The sonographer must be capable of determining the appropriate use of additional imaging methods and views, including the following:

• **Color Doppler** images must be documented, as listed in the image protocol. Color Doppler images will be utilized to characterize plaque formations and to evaluate for valvular insufficiencies as well as to rule out the presence of regurgitation. Color Doppler will also be utilized to assess for stenosis. The location of the regurgitant jet and the location of the stenotic jet will be documented. Color Doppler waveforms must be obtained from representative locations at the cardiac valves, as indicated in the image protocol. Doppler waveform spectral analysis is performed and will be utilized to assess for the presence of abnormal pressure gradients and valvular stenosis, as well as variations in hemodynamics.

• **Flow System Velocities**: PSV measurements and/or Time Velocity Integral (TVI) measurements will be needed at locations as indicated in the image protocol.

• **Flow System Velocities**: PSV measurements and/or Time Velocity Integral (TVI) measurements will be needed at locations as indicated in the image protocol. The location of the regurgitant jet and the location of the stenotic jet will be documented. Color Doppler waveforms must be obtained from representative locations at the cardiac valves, as indicated in the image protocol. Doppler waveform spectral analysis is performed and will be utilized to assess for the presence of abnormal pressure gradients and valvular stenosis, as well as variations in hemodynamics.

• **Flow System Velocities**: PSV measurements and/or Time Velocity Integral (TVI) measurements will be needed at locations as indicated in the image protocol. The location of the regurgitant jet and the location of the stenotic jet will be documented. Color Doppler waveforms must be obtained from representative locations at the cardiac valves, as indicated in the image protocol. Doppler waveform spectral analysis is performed and will be utilized to assess for the presence of abnormal pressure gradients and valvular stenosis, as well as variations in hemodynamics.

• **Flow System Velocities**: PSV measurements and/or Time Velocity Integral (TVI) measurements will be needed at locations as indicated in the image protocol. The location of the regurgitant jet and the location of the stenotic jet will be documented. Color Doppler waveforms must be obtained from representative locations at the cardiac valves, as indicated in the image protocol. Doppler waveform spectral analysis is performed and will be utilized to assess for the presence of abnormal pressure gradients and valvular stenosis, as well as variations in hemodynamics.

PRESENTATION AND EXAM FINDINGS:

- Preliminary technologist reports are provided to the interpreting physician.
- All studies are digitally recorded and include, but not limited to: Gray scale and color images as indicated by the image protocol; Velocity measurements taken at locations as indicated by the image protocol.
- The location of the regurgitant jet and the location of the stenotic jet will be documented. Color Doppler waveforms must be obtained from representative locations at the cardiac valves, as indicated in the image protocol. Doppler waveform spectral analysis is performed and will be utilized to assess for the presence of abnormal pressure gradients and valvular stenosis, as well as variations in hemodynamics.
- When available, previous studies should be obtained for comparison.

Adult Echocardiogram Suggested Images

Parasternal Long Axis View (PLAX)

1. 2D Clip at approx. 20cm depth
2. 2D Clip at shallow depth
3. Clip of AV with Color Doppler
4. M-mode of AV
5. M-mode MV
6. M-mode LV
7. 2D Measurements (RV diam, IVSD, LVSD, LVESD, IVSS, LVSS, LVESV, LVEDV)
8. 2D Measurements (RV diam, IVSD, LVSD, LVESD, IVSS, LVSS, LVESV, LVEDV)
9. Clip of TV with Color Doppler
10. PV with CW Doppler (measure PHT if indicated)
11. PV with CW Doppler (measure PHT if indicated)

Parasternal Short Axis View (PSAX)

1. 2D Clip at approx. 20cm depth
2. 2D Clip at shallow depth
3. Clip of AV with Color Doppler
4. Clip of MV with Color Doppler
5. PV with CW Doppler (measure PHT if indicated)
6. 2D Clip of TV
7. Clip of TV with Color Doppler
8. TV with CW Doppler (measure PHT if indicated)
9. Aortic Root with Color Doppler at indicated
10. Aortic Root with Color Doppler at indicated
11. 2D Clip of LV
12. 2D Clip of LV
13. 2D Clip of LV at Papillary muscles
14. 2D Clip of LV at Apex

Apical 4 Chamber View (A4) and 5 Chamber View (A5) (AP4/AP5)

1. 2D Clip at approx. 20cm depth
2. 2D Clip at shallow depth
3. Clip of MV with Color Doppler
4. Clip of MV with Color Doppler
5. PW Doppler at MV leaflet tips (E/A ratio, PHT measurements)
6. CW Doppler of MV (assess MR if)
7. Aortic Root with Color Doppler (measure PHT if indicated)
8. Aortic Root with Color Doppler (measure PHT if indicated)
9. Aortic Root with Color Doppler (measure PHT if indicated)
10. Aortic Root with Color Doppler (measure PHT if indicated)
11. Perform trace of LA (4CH and 2CH - to obtain volume measurement)

12. 2D Clip of AV
13. 2D Clip of AV with zoom
14. Clip of AV with Color Doppler
15. PW Doppler of AVT (measure AV and trace TVI)
16. PW Doppler of AVT (measure RV and trace TVI)
17. 2D Clip of TV
18. Clip of TV with Color Doppler
19. CW Doppler of TV (RVSP measurement)

- Apical 2 Chamber View (A2)**
1. 2D Clip of Myocardium
 2. 2D Clip of Myocardium
 3. Clip of Myocardium with Color Doppler

Apical 3 Chamber View (AP3)

1. 2D Clip of LV Myocardium
2. 2D Clip of Myocardium
3. Clip of Myocardium with Color Doppler
4. PW Doppler of Myocardium (RV/LV) with PW/CV (measure RVSP)

Long Axis View

1. 2D Clip of 4CH at approx. 20cm depth
2. 2D Clip of 4CH at shallow depth
3. Clip of 4CH with Color Doppler at MS
4. Clip of 4CH with Color Doppler at VS

Right Parasternal View

1. 2D Clip of Myocardium
2. 2D Clip of IVC/RA with patient "sniff"
3. 2D Clip of Abdominal Aorta
4. 2D Clip of AV/RVOT
5. 2D Clip of LV

Suprasternal View (w/Intercostal)

1. 2D Clip of Myocardium
2. 2D Clip of Aorta with Color Doppler
3. PW Doppler at Ascending Aorta (PSV measurement)
4. PW Doppler at Descending Aorta (PSV measurement)
5. CW Doppler at Descending Aorta (PSV measurement)

Notes

AV-PSV over 2cm/s requires AVA measurement and use of Pedoff transducer at Apical, RT Parasternal and SSN locations.

- Attempt RVSP measurements at all obtainable views

• ESN views are faceted with Acute Stencils and if indicated by
the ESN, include the date elements on ventricular and
ventricular junction on tech worksheet

- Include ECG display with image clips

SAMPLE ONLY

SAMPLE ONLY

SAMPLE ONLY

SAMPLE ONLY

SAMPLE ONLY