

DMS-2602: ECHOCARDIOGRAPHY II

Cuyahoga Community College

Viewing: DMS-2602 : Echocardiography II

Board of Trustees:

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Academic Term:

Fall 2020

Subject Code

DMS - Diagnostic Medical Sonography

Course Number:

2602

Title:

Echocardiography II

Catalog Description:

Introduction to physical signs symptoms, and indications for an echocardiogram reviewed for each major pathology. History and physical examination, laboratory tests, invasive and non-invasive hemodynamic evaluations used to assess various cardiovascular pathologies. Theory and manipulation of Doppler echocardiography with an introduction to interrogation of technical findings. Determination of blood flow within the normal and diseased heart using Doppler echocardiography and applying principles of hemodynamic effects learned. Color and spectral Doppler techniques discussed as applied to clinical transthoracic and transesophageal echocardiographic examinations as well as stress echocardiography.

Credit Hour(s):

4

Lecture Hour(s):

4

Requisites

Prerequisite and Corequisite

DMS-1602 Echocardiography I; and concurrent enrollment in DMS-2301 Intermediate Sonographic Scanning.

Outcomes

Course Outcome(s):

Evaluate patient for possible cardiovascular diseases.

Objective(s):

1. Question patient for clinical history and symptoms in order to determine cardiovascular risk factors.
2. Conclude if patient's signs and symptoms are related to cardiovascular disease.
3. Describe the auscultatory locations and various sounds associated with cardiovascular disease states.
4. Describe the various laboratory tests and their uses with cardiovascular disease.

Course Outcome(s):

Describe how a thorough echocardiogram is performed in order to determine presence of pathology according to the American Society of Echocardiography standards.

Objective(s):

1. Describe and show an understanding of transesophageal echocardiogram, stress echocardiogram and pharmacological stress testing and when to use.
2. List the various imaging modalities used to diagnose cardiovascular diseases and compare their advantages and disadvantages.
3. Describe the correct views, sample placements, Doppler and measurement packages necessary to perform a thorough echocardiogram on a normal or diseased heart.
4. Differentiate between normal and abnormal values for blood flow, valve area, chamber size, function and all other necessary cardiovascular anatomy.
5. Describe the effects of various cardiac lesions on the heart and associated anatomy.

6. Demonstrate knowledge of fetal heart development and congenital diseases that can occur during growth as well as pre and post fetal circulation.

Methods of Evaluation:

1. Weekly quizzes
2. Mid term and final examinations
3. Weekly written assignments
4. Homework
5. Oral presentation
6. Article reviews

Course Content Outline:

1. Concepts
 - a. Protocols
 - b. Scope of Practice
 - c. Disease process and affects
 - d. Patient signs, symptoms and risk factors
 - e. Pathophysiology
 - f. Invasive and non-invasive cardiac testing
 - g. Disease appearance
 - h. Normal and abnormal Doppler flow
 - i. Doppler calculations and results
 - j. Critical thinking
 - k. Heart development and congenital variants
 - l. Transesophageal Echocardiography
 - m. Stress Echocardiography
2. Skills
 - a. Preparing patient for exam
 - b. Assessing patient for cardiovascular disease
 - c. Applying knowledge of cardiac tests
 - d. Recognizing pathology by echocardiogram
 - e. Applying knowledge of instruments
 - f. Analyze findings using critical thinking
 - g. Applying knowledge of the various Doppler modalities
 - h. Determining normal versus abnormal anatomy and Doppler
 - i. Differentiating between artifact and anatomical variants
3. Issues
 - a. Knowledge retention
 - b. Scope of practice
 - c. Exam Preparation
 - d. Communication
 - e. Critical thinking
 - f. Medical ethics
 - g. Difficult examinations

Course Outline

1. Medical history and physical examination
 - a. Signs and Symptoms
 - b. Laboratory tests and results
 - c. Risk factors for cardiovascular disease
 - d. Auscultation, phonocardiography and pulse recordings
 - e. Skin color and temperature

- f. Normal blood pressures and O₂ content
 - g. Blood test and lab results
2. Physical principles and instrumentation
 - a. Doppler types, benefits, and disadvantages
 - b. Color Doppler
 - c. Pulsed wave Doppler
 - d. Continuous wave
 - e. Acoustic windows and optimal angle to flow orientation
 3. Equations
 - a. Doppler Equation
 - b. Bernoulli
 - c. Pressure Half Time
 - d. Modified Simpsons
 - e. Qp:Qs
 - f. Diastolic and Systolic
 - g. Pulmonary Hypertension
 4. Doppler assessment of the aorta
 - a. Aortic dissection and false lumen
 - b. Sinus of Valsalva aneurysm leakage
 - c. Marfan"s syndrome
 - d. Coarctation
 - e. Affects on the cardiovascular system and great vessels
 - f. 2D, M-Mode and Doppler findings
 - g. Measurements and Calculations
 - h. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - i. Echocardiographic changes post therapy
 5. Aortic valve stenosis/sclerosis:
 - a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
 6. Aortic regurgitation / insufficiency
 - a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
 7. Mitral valve regurgitation/stenosis
 - a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations

- e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
8. Tricuspid valve stenosis
- a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
9. Tricuspid regurgitation/insufficiency
- a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
10. Pulmonic valve stenosis
- a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2-D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
11. Pulmonic regurgitation/ insufficiency
- a. Etiologies
 - b. Affects on the cardiovascular system and great vessels
 - c. 2D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
12. Hypertensive Disease
- a. Systemic Hypertension
 - i. Etiologies
 - ii. Affects on the cardiovascular system and great vessels
 - iii. 2D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 - 1. Drug therapy
 - 2. Cardiovascular surgery
 - vi. Echocardiographic changes post therapy

- b. Pulmonary Hypertension
 - i. Etiologies
 - ii. Affects on the cardiovascular system and great vessels
 - iii. 2D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 - 1. Drug therapy
 - 2. Cardiovascular surgery
 - vi. Echocardiographic changes post therapy
- 13. Coronary artery disease/Ischemic heart disease
 - a. Etiologies
 - b. Affects on the cardiovascular system
 - c. 2-D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - i. Strain Echocardiography
 - ii. Strain Rate Echocardiography
 - iii. Speckle Tracking
 - e. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
- 14. Cardiomyopathies
 - a. Dilated or congestive
 - i. Etiologies
 - ii. Affects on the cardiovascular system
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 - 1. Drug therapy
 - 2. Cardiovascular surgery
 - 3. Cardiac Assist Devices
 - 4. Heart Transplant
 - vi. Echocardiographic changes post therapy
 - b. Hypertrophic
 - i. Etiologies
 - ii. Affects on the cardiovascular system
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Maneuvers
 - vi. Therapeutic Modalities
 - 1. Drug therapy
 - 2. Cardiovascular surgery
 - vii. Echocardiographic changes post therapy
 - c. Infiltrative or Restrictive
 - i. Etiologies
 - ii. Affects on the cardiovascular system
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Maneuvers
 - vi. Therapeutic Modalities

1. Drug therapy
 2. Cardiovascular surgery
- vii. Echocardiographic changes post therapy
15. Diastolic Function
 - a. Hemodynamics of diastolic dysfunction
 - b. Pulsed Doppler Assessment
 - c. Mitral Valve Inflow
 - d. Pulmonary Vein flow
 - e. Tissue Doppler imaging (TDI)
 - f. Color M-Mode
 - g. Therapeutic Modalities
 - h. Echocardiographic changes post therapy
16. Pericardial diseases
 - a. Pericardial Effusion and Cardiac tamponade
 - i. Etiologies
 - ii. Affects on the cardiovascular system (hemodynamics)
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 1. Cardiovascular surgery
 - vi. Echocardiographic changes post therapy
 - b. Pericarditis
 - i. Etiologies
 - ii. Affects on the cardiovascular system (hemodynamics)
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 1. Cardiovascular surgery
 - vi. Echocardiographic changes post therapy
 - c. Constrictive Pericarditis
 - i. Etiologies
 - ii. Affects on the cardiovascular system (hemodynamics)
 - iii. 2-D, M-Mode and Doppler findings
 - iv. Measurements and Calculations
 - v. Therapeutic Modalities
 1. Cardiovascular surgery
 - vi. Echocardiographic changes post therapy
17. Prosthetic valves
 - a. Types of Prosthetics and failure by type
 - b. Methods of Doppler assessment
 - c. Cardiovascular surgery
 - d. Echocardiographic changes post therapy
18. Tumors, Masses and Missiles
 - a. Etiologies
 - b. Affects on the cardiovascular system (hemodynamics)
 - c. 2-D, M-Mode and Doppler findings
 - d. Measurements and Calculations
 - e. Therapeutic Modalities

- i. Drug therapy
 - ii. Cardiovascular surgery
 - f. Echocardiographic changes post therapy
19. Artifacts
20. Fetal Heart Development and Congenital Disease
- a. Bicuspid Aortic Valve
 - b. Subaortic membranes and supraortic ridges
 - c. Coarctation of the aorta
 - d. Cor Triatriatum
 - e. Cleft Mitral Valve
 - f. Ebstein's Anomaly
 - g. Patent Ductus Arteriosus
 - h. Parachute Mitral Valve
 - i. Endocardial Cushion defect
 - j. Pulmonic Stenosis
 - k. Atrial Septal Defects
 - l. Ventricular Septal Defects
 - m. Tetralogy of Fallot
 - n. Transposition of the Great Vessels
 - o. Therapeutic Modalities
 - i. Drug therapy
 - ii. Cardiovascular surgery
 - iii. Echocardiographic changes post therapy
21. Other Imaging Modalities for Cardiovascular Assessment
- a. Transesophageal Echocardiography
 - i. Intraoperative Echocardiography
 - b. Stress Echocardiography
 - c. Invasive Tests
 - i. Single-photon emission computerized tomography (SPECT)
 - ii. Positron Emission Tomography (PET) Scanning
 - iii. Computerized Tomography (CT) Scanning
 - iv. Nuclear Testing
22. Miscellaneous Procedures
- a. Contrast Studies
 - b. Three-dimensional echocardiography
 - c. Echo-guided procedures

Resources

Otto, Catherine. (2018) *Textbook of Clinical Echocardiography*, Philadelphia, PA: Elsevier.

Harry, M. and Behrends, T. (2013) *Essentials of Echocardiography and Cardiac Hemodynamics: An Illustrative Guide*, Colorado Springs, CO: Mark Harry Cardiac Ultrasound, LLC.

Pai, R., Varadarajan, P., Chandraratna, P. and Malik, S. (2013) *Echocardiography, A Case Based Approach*, Burlington, MA: Jones & Bartlett.

Silverman, D. and Manning W. (2012) *The Complete Guide to Echocardiography*, Sandbury, MA: Jones Bartlett Learning.

McLaughlin, M. (2019) *Cardiovascular Care Made Incredibly Easy*, Philadelphia, PA: Wolters Kluwer.

Armstrong, William and Thomas Ryan . (2019) *Feigenbaum's Echocardiography*, Wolters Kluwer .

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