

DMS-2702: VASCULAR SONOGRAPHY II

Cuyahoga Community College

Viewing: DMS-2702 : Vascular Sonography II

Board of Trustees:

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Academic Term:

Spring 2021

Subject Code

DMS - Diagnostic Medical Sonography

Course Number:

2702

Title:

Vascular Sonography II

Catalog Description:

Specialized study of peripheral venous system and abdominal vessels as related to ultrasound imaging. Focus on anatomy, venous hemodynamics, pathology, sonographic appearance of normal and diseased vessels, testing methods and sonographic impressions. Discussion of penile sonography, test validation/statistics and the correlation of related diagnostic imaging modalities.

Credit Hour(s):

4

Lecture Hour(s):

4

Requisites

Prerequisite and Corequisite

DMS-1701 Vascular Sonography I; and concurrent enrollment in DMS-2301 Intermediate Sonographic Scanning.

Outcomes

Course Outcome(s):

Examine and interpret blood flow in normal and diseased vessels using various testing methods.

Objective(s):

1. Describe the microscopic and gross anatomy of a vein.
2. Define the meaning of Gold Standard.
3. Identify and label the vessels of the peripheral venous system, the major arterial and venous vessels of the abdomen, and the penis.
4. Explain the circulation of blood through the venous system and the factors contributing to it.
5. Identify the signs, symptoms and risk factors associated with venous and abdominal vascular diseases.
6. List the pathologies of the peripheral venous system and the abdominal vessels, and describe their sonographic appearances.
7. Compare and contrast the indications, limitations, and uses of direct and indirect testing methods for the evaluation of peripheral venous, abdominal vessels, and penile sonography.
8. Identify the standard imaging views used for each direct and indirect testing method.
9. Recognize the qualitative and quantitative technical findings for venous, abdominal, and penile sonographic exams.
10. Describe the various therapeutic interventions used for venous and abdominal pathology.
11. Describe the cardiovascular effects of hormone therapy in transgender patients.

Course Outcome(s):

Analyze the value of a noninvasive vascular study by comparing it to a reference test - Gold Standard.

Objective(s):

1. Define the meaning of Gold Standard.
 2. Explain the five measures of test analysis.
 3. Diagram a Chi Square and relate the values for each block to the Gold Standard.
 4. Calculate the various parameters used to quantify non-invasive test results to the Gold Standard.
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Course Outcome(s):

Differentiate between the advantages of the various imaging modalities.

Objective(s):

1. Explain the indications/contraindications for venography, arteriography, magnetic resonance angiography (MRA), and computed tomography angiography (CTA).
 2. Differentiate normal from abnormal vessels on a venogram, arteriogram, MRA, and CTA.
 3. Debate the interpretation of ultrasound to the interpretation of venography, arteriography, MRA, and CTA.
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Methods of Evaluation:

1. Article reviews
2. Class participation
3. Final examination
4. Homework assignments
5. Oral/Written quizzes
6. Research/Semester project
7. Technical Impressions
8. Written tests

Course Content Outline:

1. Concepts
 - a. Patient preparation techniques
 - b. Exam protocols
 - c. Cross sectional anatomy of the venous systems
 - d. Pathology related to the venous and abdominal vessels
 - e. Pathophysiology of venous disease
 - f. Venous hemodynamics
 - g. Direct and indirect testing methods of venous evaluation
 - h. Gold Standard
 - i. Test validation
 - j. Related diagnostic imaging modalities
2. Skills
 - a. Identifying cross sectional anatomy
 - b. Correlating medical data
 - c. Calculating the parameters for test validity
 - d. Formulating the technical findings of sonographic images
3. Issues
 - a. Medical ethics
 - b. Physician interaction
 - c. Diversity
 - d. Patient interaction
 - e. Scope of Practice
 - f. Verbal and non-verbal communication limitations

Topical outline

1. Anatomy (routes, variations, and collaterals)
 - a. Venous
 - i. Microscopic anatomy
 - ii. Upper extremity
 1. Deep system
 2. Superficial System

- iii. Lower extremity
 - 1. Deep system
 - 2. Superficial system
 - 3. Perforators
 - b. Abdomen
 - i. Arterial
 - 1. Abdominal Aorta
 - 2. Major aortic branches
 - ii. Venous
 - 1. Inferior vena cava
 - 2. Major vena caval branches
 - 3. Portal veins
 - c. Penile
 - i. Arterial
 - ii. Venous
- 2. Venous Hemodynamics
 - a. Pressure gradient
 - b. Calf muscle "pump"
 - c. Valves
 - d. Respiration
 - e. Gravity and Hydrostatic Pressure
 - f. Effects of collateralization on flow
 - g. Venous flow and pressure changes during the cardiac cycle
 - h. Venous flow changes due to secondary states
 - i. cardiac diseases
 - ii. pulmonary diseases
 - iii. pregnancy
 - iv. inflammatory diseases
 - v. anemia
 - i. Effects of edema on flow
 - j. Effects of hormone therapy in transgender patients
 - venous thromboembolism
 - pulmonary embolism
- 3. Mechanisms of disease
 - a. Venous
 - i. Thrombosis
 - ii. Valvular incompetence
 - iii. Varicose veins
 - iv. Pulmonary embolism
 - v. Soft tissue masses
 - 1. Baker's cyst
 - 2. Lymphedema
 - b. Abdomen
 - i. Arterial
 - 1. Atherosclerosis
 - 2. Renovascular hypertension
 - 3. Mesenteric ischemia
 - 4. Median arcuate ligament syndrome
 - 5. Aneurysm
 - 6. Aortic Dissection
 - 7. Aortic Rupture
 - ii. Venous
 - 1. IVC dilation
 - 2. IVC tumor
 - 3. IVC thrombosis
 - 4. Renal vein obstruction
 - 5. Budd-Chiari syndrome

- 6. Portal vein thrombosis
- 7. Portal hypertension
- c. Vasculogenic Impotence
- 4. Venous testing
 - a. Patient History
 - i. Signs and symptoms
 - ii. Risk factors
 - b. Direct Testing (Color duplex imaging)
 - i. Indications/uses/limitations
 - ii. Patient preparation
 - iii. Scanning techniques
 - iv. Technical impression
 - c. Indirect Testing (CW Doppler & Plethysmography)
 - i. Indications/uses/limitations
 - ii. Patient preparation
 - iii. Scanning techniques
 - iv. Technical impression
- 5. Abdominal testing
 - a. Patient history
 - b. Direct testing (color duplex imaging)
 - i. Indications/uses/limitations
 - ii. Patient preparation
 - iii. Scanning techniques
 - iv. Technical impression
- 6. Penile testing
 - a. Patient history
 - b. Physiology of blood flow
 - c. Testing methods
 - i. Penile pressure and waveform evaluation
 - ii. Color duplex imaging
 - d. Technical impression
- 7. Related diagnostic testing
 - a. Venography
 - b. Arteriography
 - c. Magnetic Resonance Venography
 - d. Computed Tomographic Venography
 - e. Nuclear Medicine
 - f. Laboratory - d-Dimer Assay
- 8. Therapeutic interventions
 - a. Medical
 - i. Prevention
 - ii. Pharmacology
 - b. Surgical
 - i. Thrombectomy/Embolectomy
 - ii. Venous ablation
 - iii. Percutaneous Inferior Vena Cava filter
- 9. Test Validation
 - a. Sensitivity
 - b. Specificity
 - c. Positive predictive value
 - d. Negative predictive value
 - e. Accuracy
 - f. Chi Square

Resources

Krebs, Carol A., Charles S. Odwin, and Arthur C. Fleischer. *Appleton and Lange's: Review for the Ultrasonography Examination*. 4th ed. New York: McGraw Hill, 2011.

Daigle, Robert J. *Techniques in Noninvasive Vascular Diagnosis: An Encyclopedia of Vascular Testing*. 4th ed. Littleton, CO :Summer, 2014.

Ridgway, Donald. *Introduction to Vascular Scanning: A Guide for the Complete Beginner*. 4th ed. Pasadena, CA: Appleton Davies, 2014.

Rumwell, Claudia, and Michalene McPharlin. *Vascular Technology: An Illustrated Review*. 5th ed. Pasadena, CA: Appleton Davies, 2014.

Zierler, R. Eugene and David L. Dawson. *Strandness's Duplex Scanning in Vascular Disorders*. 5th ed. Philadelphia, PA: Lippincott Williams Wilkins, 2015.

Pellerito, John S. and Joseph F. Polak, eds. *Introduction to Vascular Ultrasonography*. 6th ed. Philadelphia, PA: Saunders, 2012.

Size, Gail P. *Inside Ultrasound: Vascular Reference Guide*. Pearce, AZ: Inside Ultrasound Inc., 2013.

Kupinski, Ann Marie. *Diagnostic Medical Sonography: The Vascular System*. 2nd . Baltimore, MD: Lippincott Williams & Wilkins, 2018.

Myers, Kenneth and Amy May Clough. *Practical Vascular Ultrasound: An Illustrated Guide*. Boca Raton, FL: CRC Press, 2014.

Upchurch, Gilbert R. and Peter K. Henke. *Clinical Scenarios in Vascular Surgery*. 2nd ed. Philadelphia, PA: Wolters Kluwer, 2015.

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