Workbook for diagnostic medical sonography answers chapter 9

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LWW.com my children, Hannah and Asher – you are my everything. Thank you for your love and support — and for sharing me with my other children. To these other kids—my students—you inspire me to continue learning and persevering every day. Here, we haven't been looking back very long... We move on, open new doors and do new things because we're curious... and curiosity constantly takes us on new paths — WALT DISNEY CONTENTS PART ONE | BASICS OF ULTRASOUND SCAN 1 Orientation to ultrasound scanning 2 Ultrasonic principles 3 Ergonomics: Avoiding work-related injury PART TWO | INTRODUCTION TO VASCULAR SYSTEM 4 Vascular Anatomy 5 Arterial Physiology 6 Connectivity Physiology PART THREE | CEREBROVASCULAR 7 Extracranial Two-Storey Ultrasound Examination 8 Unusual Pathology 9 Ultrasound After Surgery and Intervention 10 Intracranial Cerebrovascular Examination PART FOUR | PERIPHERAL ARTERIAL 11 Indirect Assessment of Arterial Disease 12 Duplex Ultrasound of Lower Extremities 13 Upper Extremities Arterial Duplex Scan 14 Ultrasound Assessment of Arterial Bypass Transplantation 15 Duplex Ultrasound Testing After Peripheral Endovascular Arterial Intervention 16 Special Considerations in Assessment of Non-Sclerotic Arterology PART FIVE | PERIPHERAL VESEO 17 Duplex Ultrasound Imaging of The End system of the Lower Extremities 18 Duplex Ultrasound Imaging of The Annual System of the Upper Extremities 19 Ultrasound Evaluation and Mapping of the Superficial Vein System 20 Veno Valvular Insufficiency Testing 21 Sonography in the Room for Venous Treatment 22 Role of Ultrasound in Central Vascular Access Device POSITION SIX | ABDOMINAL 23 Aorta and Iliac Arteries 24 Mesenteric Arteries 25 Renal Vasculature 26 Inferior Vein Cava and Iliac Veins 27 Hepatoportal System 28 Assessment of Kidney and Liver Transplantation PART SEVEN | MISCELLANEOUS 29 Intraoperative Duplex Ultrasound 30 Hemodialysis Access to Seedings and Fistulae 31 Estimate of Penile Blood Flow 32 Vascular Application of Ultrasonic Contrast Agents 33 Complementary Vascular Imaging 34 Review of Quality Assurance Statistics of Conceptual Terms Coincides With Key Terms with Their Definitions. KEY TERMS 1. ______ anechoic 2. ______ coronary plane 3. 4. 5. 6. 7. 8, 8. ______ heterogeneous __ homogeneous __ hyperechoic __ isoechoic __ Sagittal plane __ transverse definition of aircraft The ultrasonic image region with echoes that are brighter than the surrounding tissue or brighter than normal Vertical plane dividing the body into the right and left parts of the Ultrasonic Image Region without echoes An ultrasonic image region that has mixed or different ultrasonic echoes of the plane dividing the body into superior and inferior parts The ultrasonic image region that produces the echoes that are same as surrounding tissue with equal brightness Region ultrasound image that has a uniform appearance on ultrasound with echoes appearing similar to vertical plane dividing the body into front and back ANATOMY AND PHYSIOLOGY REVIEW Marking images Complete the markings in the images that follow. 1. Anatomical planes. 2. Positions of patients used in ultrasound scans. 3. Ultrasonic orientation of the image (orientation of the mark as each side of the image). 4. Ultrasonic orientation of the image (orientation of the mark as each side of the image). CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. When reading the patient's medical records, you encounter the abbreviation HTN. What does this stand for? a. Hypertrophic posting b. high terminal nephron c. hypertension d. hypotension 2. When The body is shown standing upright with his hands on the sides and face and palms pointing forward, as it is known? c. Universal anatomical direction standard anatomical position standard position b. a. d. representation of anatomically correct position 3. Which of the following terms points to the head? a. caudal b. posterior c. lateral d. cephalad 4. What anatomical straight divides the body into superior and inferior parts? a. sagittal b. frontal c. transverse d. coronal 5. If you were to see an ordinary carotid artery in a long wasx, what anatomical body plane would you use? a. sagittal b. transversal c. coronal d. hair 6. a.b.c. What is the position in which the patient lies on the left side? right side decubitus left side decubitus right back oblique d. left front hair 7. What position would be appropriate if you took a picture of the right kidney from the back approach? a. supine b. right front hair c. prone d. right side decubitus 8. What position is often used when a vascular technologist examines the veins of the lower extremities to help with venous filling? a. position of half-Fowler b. Trendelenburg's position inclined to position c.d. reversed Trendelenburg's position on 9 October 2013. When scanning in the transverse plane, where should the note be on the handover? a. to the head b. to the feet d. to the patient's right side to the patient's left side c. 10. In vascular imaging, which side of the screen should the patient's head appear on when scanning in a sagittal plane? a. left b. right c. top d. bottom 11. What is a structure filled with liquid that appears black in the ultrasonic image it is said to be? a. hyperechoic b. anechoic c. echogenic d. heterogeneous 12. The mass, which has the same echegenicity as the surrounding liver tissue, is recorded inside the liver. What term would be used to describe this mass? a. isoechoic b. hyperechoic c. hypoechoic d. anechoic 13. How would the internal carotid artery be directed to an ordinary carotid artery? A. The internal carotid artery is distal to the common carotid artery. B. The internal carotid artery is proximal to the common carotid artery. c. The internal carotid artery is lateral to the common carotid artery. d. The internal carotid artery is medial according to the common carotid artery. 14. The patient was found to have a blood clot in his leg. What abbreviation would be used for this diagnosis? a. CVA b. PAD c. IDDM d. DVT 15. What is a plane that passes vertically through the body but not through the middle line? a. frontal plane b. oblique plane c. parasagittal plane d. long-wasged plane Fill-in-the-Blank 1. The vertical plane that exactly passes through the middle line of the body is the plane __ 2. The abbreviation used to describe stroke would be __ 3. Coronary plane dividing the body into front and rear parts also be known as the _____ plane. 4. The airplane may also be known as the __ view, especially with regard to the viewing of the vessel. 5. When recording the pancreas inside the body, the anatomical plane commonly used is a(n) __ plane. 6. A good position of the patient for spleen evaluation would be __ position. 7. When displaying the image in a transverse plane on the ultrasound screen, the patient's left side should be displayed on the side of the __ 8 screen. The term used to structure ultrasonic echoes is __ 9. Plaque recorded in the common feisty artery has regions that are anechoic and hyperechoic. This panel will be described as _____ 10. The directed term describing a structure that is lower than the second structure is __ 11. Celiac artery will be considered __, directed, to the ultimate mesenteric artery. 12. The abbreviation WNL stands for __ 13. If the patient is lying lying down, medical images are shown as if they were looking at a patient from the feet __..._ 14. Improper holding of the ultrasonic noun can cause the image __.to be displayed. _ 15. On the ultrasonic part of the kidneys, the inner part of the kidney is lighter than __,compared to the outer edge of the cortex. Short answer 1. Explain the difference between sagittal versus long-edged and transverse versus short-edged in relation to body planes and orientation to the vascular system. 2. Why is appropriate pass orientation and image standardisation important? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. 1. Mark the image planes used to create the images. 2. Mark the patient's position and the scanning planes used in the pictures. ANSWERS: CHAPTER 1 Match 1.c 2. h 3. d 4. 5. 6. 7. 8. g. a f b e Markup 1-9. 1-8. 1-7. 1-6. 1-5. 1-4. 1-3. 1-2. 1-1. 2-1. 2-6. 2-5. 2-4. 2-3. 2-2. 2-8. 2-7. Coronal Superior Sagittal Anterior Inferior Lateral Medial Transverse Posterior Supine Prone Lateral Oblique Right Front Oblique Left front oblique Left back oblique Right back oblique 3-5. 3-4. 3-3. 3-2. 3-1. Transverse orientation Left rear right front 4-5. 4-4. 4-3. 4-2. 4-1. Sagittal orientation Inferior Posterior Superior Front multiple choice 1.c 2.b 3. d 4. 5. 6. 7. 8. 9. 15. 14. 13. 12. 11. 10. 8. 7. 6. 5. 4. 3. 2. 1. 14. 13. 12. 11. 10. 9. 15. 1.c and b c d c a b a d c Fill-in-the-Blank midsagittal CVA frontal short hair short hair side decubit right echogenic heterogeneous inferior proximalan within normal limits superior to back hyperechoic Sagittal short answer refers to the vertical plane dividing the body into the right and left, while the long wasp implies a length view; there are not always synonyms. The same goes for transverse. Transverse is a horizontal plane that divides the body into superior and inferior parts, while the short wasa transverse view of the vessel. Because of how some structures lie in the body, a long-axle or short view of a vessel may not be a sagittal or transverse plane of the body. For example, in order for a subclavian vein to be seen in a long wasp, a transverse bodily plane would be used. 2. Appropriate orientation of image noticing and standardization are important in order to produce images that are properly oriented, in a standard way. Standard orientations help communicate the findings and interpret correctly. Image assessment/Pathology 1. The image planes used in the image are A. longitudinal, B. coronal and C. transverse through the kidney. 2. A. The patient is lying down and prone with the boss oriented in a long wast, sagittal plane. B. The patient is in the positions of the left and right side pressure ulcers for the coronary image. C. The patient is lying down and prone to handover in the transverse plane. D. The patient is in positions of left and right side pressure ulcers with transceiver transceivers in the transverse plane. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY CONCEPTS 1. 2. 3. 4. 5. 6. ___ artifacts __ bioeffects ______ continuous-wave __ Doppler __ pulsed-wave __ transducer DEFINITION Part of an ultrasonic machine that transmits and receives sound via a series of piezoelectric elements Blood flow measuring tool quantitatively or qualitatively using a pulsed wave or continuous Resuse wave technique in an image not caused by actual spotlights in the body Princip Constant transmission of the sound wave to the patient in order to obtain a spectral Doppler waveform The ability of ultrasound to cause changes in tissue if the appropriate sending principle settings are not used in a small group of sound waves and then waiting for the sound to return so that the image can be displayed ANATOMY AND PHYSIOLOGY REVIEW Marking the image Complete the markings on the images that follow. 1. Mark the wave parameters in these figures. 2. Mark these pliers (1–3) and specify which one is created by each image shape (4–6). CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. .b.c d.d. What is the number of cycles that occurs in 1 second called? amplitude wavelength frequency period 2. a.b.c.d. What's the time for one cycle to happen called? wavelength frequency period propagation speed 3. a.c.b. d. What determines the rate of sound propagation? sound source the thickness of piezoelectric crystals medium through which sound moves and sound source and medium 4. a.b.c. d. What is the height of the cycle from the starting to the peak of the cycle called? frequency propagation rate impedance amplitude 5. What is the number of pulses per second emitted by the ultrasonic system? A. Length of spatial heart rate b. frequency of recurrence of heart rate c. period of recurrence of heart rate d. heart rate duration 6. .c.b. d. What information is needed to determine the length of your spatial heart rate? frequency and wavelength expansion rate and number of cycles per pulse wavelength and number of cycles per pulse period and frequency of heart rate repetition 7. What is the percentage of time the machine transfers to the patient? a. period of recurrence of heart rate b. factor of duty c. acoustic impedance d. frame rate 8. What is the minimum number of piezoelectric elements needed to perform a continuous wave Doppler? a. one b. two c. three d. ten 9. a.b.c. d. Which of the following has the most damping? water muscle bone air 10. What kind of reflection results when sound encounters structures that are less than the wavelength of the transmitted beam? a. Specular b. non-spectacular c. refractory d. Rayleigh scatters 11 a.c.b. d. What of the next one has to be present for reflection? difference in acoustic impedance mismatch in propagation speeds between two media structures much smaller than the wavelength of the ultrasonic beam change in the direction of the sound beam 12 a.b.c. d. What is the change in direction of the transmitted beam at the interface called? reflex backscatter refraction attenuation 13. Assuming soft tissue, how long does it take an ultrasound pulse to reach a depth of 1 cm and return to pliers? a. 6.5 μs b. 13 μs c. 26 μs d. 1540 m/s 14. Which pliers are most commonly used for peripheral and cerebrovascular examinations? a. curvilinear array b. linear sequential string c. phase field d. ring string 15. Which attached man creates a picture in the form of a slice of pie? a. curvilinear array b. linear sequential string c. phase field d. ring string 16. Which of the following is added to pliers to limit the number of cycles in heart rate? a.b.c. d. dimming material matching layer of muted layer lead zirconate titanate 17. After removing the gel and liquid from the non-intracatharian stepdaughter, what should be the next step in cleaning the uduren? A. Apply sterile probe cover. B. Immerse yourself in a high-level disinfectant. c. Wipe with a low-level disinfectant. d. Sterilize with autoclaves. 18. What is the part of the ultrasonic machine that provides electricity that shocks pliers called? a. silencer b. receiver c. silencer material d. pulser 19. a.b. d.c. What does the acronym ALARA mean? as low as reasonably achievable as light as the reference allows the application of low-amplitude spotlight attenuators as low as the reflection allows 20th a.b.c. What does TI show? risk of mechanical bioefacts risks of dampening of thermal bioefacts d. beam intensity measure 21. Which plane resolution parallel to the air? a. temporal b. axial c. lateral d. transverse 22. a.b.c. d. Where is side resolution best? focal zone near the field of the far field of divergent zone 23. A spotlight heading for the aisle would result in what kind of Doppler shift? a. negative shift b. positive shift c. zero shift d. maximum offset 24. a.b.c. d. Which angle results in the most accurate and highest Doppler shift? 0 degrees 60 degrees 90 degrees any angle between 45 and 60 degrees 25. a.b.c. d. On spectral representation, what is represented on the vertical wasx? time rate of amplitude signal depth 26. How is the Nyquist border calculated? a.b.c. d. 1/4 PRF 2× PRF 4× PRF 1/2 PRF 27. What is a complex processing technique that converts complex frequency shifts into spectral waveform? a. Quickly Fourier transform b. spectral expansion c. autocorelation d. Nyquist criterion 28. Which of the following describes sending multiple pulses down a single scan line to create doppler color images? A. Nyquist criterion b. length ensemble c. autocorretion d. fast Fourier transform 29. What is Doppler technique that provides flow information based on the amplitude of Doppler's shift rather than the shift itself? a. Color Doppler b. CW Doppler c. spectral Doppler d. power Doppler 30. a.b.c. d. Which control adjusts the overall brightness of the B-mode image? TGC compression get frequency 31. What processing technique results in better side resolution and reduces the echo of the artifact? a.b.c. d. Spatially complex tissue harmonic recording time receives compensation quickly Fourier transform 32. What control should be adjusted to allow higher speeds to be shown in the spectral Doppler display? a. spectral gain b.PRF/Scale c. correction of angle d. clearance rate 33. What control should be adjusted if the paint either does not fill the container or bleeds outside the wall of the vessel? a. Color invert b. color door size c. color gain d. color frequency 34. During an ultrasound assessment of the aorta, a surgical clip is encountered. What artifact would probably be present because of this clip? a. Shadow b. comet tail c. enhancement d. mirror image 35. What is an artifact caused by wall movements that can be reduced using a wall filter? a. Mess b. mirror image c. echo d. lattice lobes Fill-in-the-void 1. Sound waves are ___ indicating that the movement of molecules within a wave parallels the direction of expansion. 2. The typical frequency range used in medical diagnostic ultrasound is __ MHz. 3. The average rate of expansion in soft tissue used by ultrasonic machines is __m/s. 4. The property of the medium determined by the density and reproduction rate product that helps determine echo reflection is __ 5. Parameter that primarily determines pulse repetition and the period is _____..._ 6. The loss of energy in the sound beam as it travels through the tissue is __._ 7. The average attenuation rate through soft tissue is __ 8. The diaphragm is an example of the __ 9 spotlight. Red blood cells are an example of spray __ 10. If the propagation rate in the second medium is greater than 1,540 m/s, the angle of the transmitted beam will be __ from the angle of the incident. 11. The ultrasonic machine uses the __ equation to determine the travel time of the ultrasonic pulse. 12. Modern reducers __ 13. To improve sound transmission in patients , _ a layer of pliers is used. 14. Piezoelectric elements inside pliers are usually made of __.. _ 15. The measure of the amount of power in the ultrasonic beam divided by the beam area is __ The bioeffication of ultrasound resulting in the formation of bubbles in tissue 16. is ______ 17. No bioeffics with unfossed washbasins with an intensity below __ mW/cm2 were recorded. 18. The side resolution is determined __ 19. Axial resolution is improved by increasing __ 20. The number of images produced per second is called __ 21. ____ is the difference between the transmitted frequency of the ultrasonic tranducer and the returned frequency of the reflector. 22. Doppler's __ degree angle results in no recognizable offset. 23. A common PW spectral Doppler artifact is __ or spectral waveform wrapping which causes positive shifts to appear as negative. 24. The maximum frequency shift that can be sampled during PW Doppler is known as __ 25. Filling in the spectral window due to the wide range of speeds at a certain time is called __ 26. The process used in Doppler color to recognize medium speed and direction is called __ 27. The scroll bar controls used to achieve uniform brightness in the image are known as ___._ 28. The processing technique that sends air to the patient from different directions to improve the appearance of soft tissue is known as __ 29. The Doppler control that allows more or less spectral waveforms to be displayed on the screen at one time is __ 30. __ the artifact occurs as a result of muffle sound and often shows the back of the bone or calcified plaque. Short answer 1. Why are air and bones best avoided during ultrasound examination? 2. What is the piezoelectric effect? 3. What are steps for cleaning and disinfection of the ultrasonic inodue? 4. What are some measures a sonographer can take to follow the ALARA principle? 5. What factors determine and influence the time resolution? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. 1st a. Which artifact is displayed in this picture? B. What can be done to correct this artifact? Which artifact is displayed in this picture? Which artifact is displayed in this picture? Which artifact is displayed in this picture? Which artifact is displayed in this picture? ANSWERS: CHAPTER 2 Match 1.c 2. e 3. d 4.b 5. f 6. marking image 1-1. 1-7. 1-6. 1-5. 1-4. 1-3. 1-2. 1-8. 2-3. 2-2. 2-1. 2-5. 2-4. 2-6. Rarefaction Compression Amplitude Wavelength Propagation 1 ciklus Trajanje impulsa (PD) Razdoblje ponavljanja pulsa (PRP) Curvilinear array transducer Linear array transducer Phased sector array transducer Convex oblik slike izrađen od strane zakrivljenog polja prenosivog spremnika Pravokutni oblik slike izrađen linearnim poljem prenosivim sektorskim oblikom slike izrađenim od strane faznog sektorskog polja transducer Multiple Choice 1. b 2. a 3. c 4. d 5. b 6. c 7. b 8. b 9. d 10. b 11. a 12. c 13. b 14. b 15. c 16. 17. c 18. d 19. 20. c 21. b 22. a 23. b 24. a 25. b 26. d 27. a 28. b 29. d 30. c 31. b 32. b 33. c 34. b 35. a Fill-in-the-Blank 1. uzdužno 2 do 20 2. 3. 1,540 5. dubina impedancije 4. 13. prigušenje 0,5 dB/cm/MHz spekularni Rayleigh veća udaljenost širokopojasnog interneta 12. 11. 10. 9. 8. 7. 6. 17. podudaranje intenziteta olovnog cirkonatnog titanata (PZT) 100 16. 15. 14. 22. Frequency of frame width Doppler offset 90 21. 20. 19. 18. 27. aliasing Nyquist limit spectral expansion of autocorrelation TGCs 26. 25. 24. 23. 30. spatial complex swing shading speed short answer 29. 28. 1. Bones and air are significant attenuators, and the air reflects almost 100% of the beam and bone that reflect 50% of the beam. This amount of damping results in sufficient absorption of the beam so that the sound does not return to the sorbu, creating a shadow in the image. 2. When a piezoelectric crystal is shocked by electricity, a sound wave is formed. After the sound wave is reflected back from the body, the sound wave returns to the piezoelectric crystal, causing the crystal to vibrate. The vibration is then converted back into an electrical signal that can be processed by an ultrasonic system. 3. Carrying appropriate PPE, remove the gel and other liquids from the surface of the passage. Apply a low-level disinfectant approved by the manufacturer to remove most microbes. Intracavitary agents will have to be submerged in a high-level disinfectant. 4. Use the lowest power and the shortest time required for inspection. 5. Factors affecting frame rate/time resolution are image depth, image width, number of focal zones and use of Doppler color. Image assessment/Pathology 1. A. B. To fix the alias: increase the scale / PRF, adjust the baseline down, use a lower frequency, increase the Doppler angle, switch to CW Doppler. 2. Echo. 3. Lattice lobes. 4. Mirror image artifact. 5. Spectral expansion. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ Uncomfortable Places 2. ___ Contact Stress 3. 4. 5. 6. 7. ______ duration ____ force ____ load/load ____ repetition ____ static positions DEFINES TIME period in which part of the body is exposed to ergonomic risk factor Situation when parts of the body are placed far from their neutral position Force exerted by the object on the contracted muscle Situation when part of the body is kept in one position for a long period of time Maintained contact between part of the body and external object Repeated movement involving other ergonomic risk factors, such as force and/or clumsy posture Physical exertion applied by part of the body to perform CHAPTER REVIEW Multiple choice Complete each question by circling the best answer I'm not 1. .b.c d.d. At what age do work-related musculoskeletal disorders generally reach? 55 to 64 65 to 75 45 to 54 30 to 40 2. What causes most work-related musculoskeletic disorders? b. individually, initiation of injury or exposure to the risk factor repeated exposure to one a. d. or more risk factors initial injury followed by secondary similar injury c. maintaining neutral positions during exam performance 3. a.c.b. d. What are the following risk factors for developing WRMSD? excessive force contact pressure vibration of part of the body all of the above 4. What is the most commonly reported symptom reported by sonographers? A. Low back pain b. pain in the arm and wrist c. pain in the shoulder d. neck pain 5. According to a 1997 Health Care Benefit Trust study, what percentage of sonographers reported scanning-related musculoskele life pain? a. 71% b. 81% c. 90% d. 54% 6. What is the main result of repeated exposure to risk factors for WRMSDs? B. Interference with the ability of the body to recover acute start of initial a. injury d. Sudden onset of symptoms associated with exposure Rapid progression of c. disease and musculoskelecy worsening 7. What condition results in nerve compression and deterioration of tendons and ligaments? a. microtears b. degeneration c. inflammation d. swelling 8. What is the sub-product of muscle metabolism that, when built, results in pain? a. lactic acid b. hydrochloric acid c. lactose d. mitochondrial acid 9. Which of the following friction results between the tendon and its sheath, resulting in inflammation and swelling of the tendon? a. tendonitis b. tenosynovitis c. bursitis d. epicondylitis 10. Which can result when the inflamed tendon is filled with lubricating fluid, causing a bulge Skin? a. Carpal Tunnel Syndrome b. epicondilitis c. Ganglion Cyst Inc. 11. What can result when a tendon tries to withstand the load usually required of muscles? a. tendonitis b. tenosynovitis c. bursitis d. epicondylitis 12. What percentage of sonographers symptomatic of WRMSDs suffered career-ending injuries? a. 81% b. 54% c. 33% d. 20% 13. What is the type of posture that requires the smallest amount of muscle effort, protecting muscles and tendons from injury? a. non-neutral posture b. clumsy posture c. neutral posture d. neural posture 14. During the ultrasound examination, under what degree of abduction should the sonographer keep his scanning hand? a.b.c. d. 10 degrees 20 degrees 30 degrees 40 degrees 15. When adjusting the monitor of the ultrasonic system, to what level should the monitor be positioned? a. Chin level b. eye level c. as low as possible d. above the sonographer's head 16 a.b.c. d. What type of grip would it be best to use when holding pliers? palmar adhesion adhesion firm adhesion of adhesion forces 17. Which regulatory agency determines the laws and requirements that employers must comply with regard to workplace safety? a. WRMSD b. WRSHA c. OSHA d. ACLU 18. What piece of equipment should be adjusted during ultrasound examination? a. chair b. table c. ultrasonic machine d. all of the above 19. When performing an ultrasound examination on a hard-to-picture patient (high BMI, limited motility), the sonographer should do all the following EXCEPT: limit time during the exam to reduce exposure to WRMSD risk factors. use the correct body mechanics in as much as possible. push as much as possible throughout the exam using a strong squeeze at the checkout. accept all limitations of the recording option for the exam. 20. Which adaptation does most sonographers NOT do with the test table during ultrasound examination? A. Raise it high enough to limit your attainment. B. Put it down enough to minimize hand abduction. c. Move it close enough to the ultrasonic machine to prevent falls. d. Lock the wheels to prevent movement during the test. Fill-in-blank 1. _____ is defined as painful conditions that are caused or exacerbated by workplace activities. 2. Despite many improvements in ergonomic equipment and training, the 2009 study Many tasks contribute to WRMSDs, including physical, psychosocial, and __ work practices. 4. Risk factors and wrms-related injuries may not be easily visible as symptoms occur after __._.. _ 5. Unpleasant posture often leads to the restriction of blood flow to contraction muscles as a result of __ on blood vessels. 6. Recovery time is important for muscle function as it allows muscles to relax and wash off __ . 7. General term for tendon, usually as a result of repeated stress that causes tendon fibers to tear, is __ 8. The bag of lubrication fluid present in the joint in which the tendons pass through the narrow space between the bones is known as __ 9. Inflammation can result in nerve __, causing weakness, burning sensation and numbness. 10. From a WRMSD prevention point of view, it is better __ ultrasonic system during transport, not __ 11. Symptoms of WRMSD may be present on __, after prolonged exposure to risks rather than while performing work tasks. 12. One of the most common risk factors for sonographers is __ which requires excessive muscle firing and faster onset of fatigue. 13. When performing an ultrasound examination, the ultrasonic system should be placed __ on the test table, without significant space between the two. 14. Lactic flexion of either scanning or non-scan hands should be __ degrees or higher. 15. When using a chair, the height should be adjusted to maintain a neutral trunk, neck and hand posture and ensure that the knees are slightly __ 16. During the sonographic procedure, the patient should be positioned at the edge of the test table to reduce abduction and reach. 17. Providing external __ for the patient for observation can prevent the neck and back of the sonograph from twisting. 18. Not only should the ultrasound examination room and equipment be adapted ergonomically, the __ workstation used for PACS or electronic medical documentation should also be adjustable. 19. A simple modification to reduce shoulder and neck muscle strain and fatigue is to support the hand for scanning using __ or __ 20. Employers and academic programs, as well as professional organizations, provide opportunities for ongoing __ and __ regarding proper scanning techniques and avoiding work-related injuries. Short answer 1. What psychosocial risk factors contribute to WRMSDs? 2. What factors and tasks, including those not directly related to performing the sonographic exam, contribute to WRMSDs? 3. What are some examples of the concept that are large before small? 4. Why is it important to identify symptoms and report and treat WRMSD early? 5. What are the components of neutral scanning recommended for sonographers to avoid WRMSDs? Case study 1. You are asked to consult another sonographer regarding ergonomic scanning. When observing the sonographer, notice that many unpleasant positions are used and that the ultrasonic system, chair and table all need to be adjusted. What advice would you give this sonographer to solve clumsy and customize the equipment? ANSWERS: CHAPTER 3 Match 1.b 2. e 3. and 4. 5. 6. 7. 7. c f d Multiple choice 1.c 2.b 3. d 4.c 5.b 6. 7. d 8. 9.b 10.c 11. and 12. d 13.c 14.c 15.b 16. 17.c 18. d 19.c 20.b Fill-in-empty 1. WRMSD 2. 3. 6. 5. 4. 7. 7. 11. 10. 9. 14. 13. 12. 15. 20. 19. 18. 16. 16. 1. 2. 3. 4. 90 workflow prolonged exposure to compression of toxins tendonitis bursa compression push; drag rest awkward posture parallel to the 90 lower monitor computer cushion; education on clumsy towels; Training Short response Psychosocial risk factors include lack of influence or control over your job, increased requirements, lack or poor communication, monotonous tasks and perception of low support. Physical factors such as uncomfortable posture, excess capture and downward force. Psychosocial factors as described above. Other tasks such as workstation equipment and setup (increasing interaction with computers); staff shortages, increased workload and continuation of outdated scanning techniques with known risk factors. The concept of large before small means that one should first use large muscles, then smaller muscles, and eventually tendons. Some examples include pushing before pulling and using palmar grip rather than grip. Since the onset of symptoms is gradual, recognizing symptoms and reporting them are important in order to get appropriate treatment. Earlier treatment can be started as well as the outcome of the injury and could potentially prevent career-ending injuries. 5. Facing forward without rotation of the door or excess neck extension. Upright spine without twisting or bending the trunk. Hands/hands in front of the body during elbow scans near the trunk. Avoid excess reach by scanning and nonscanning by hand. Avoid uncomfortable wrist positions, including excess bendability, overtime or rotation. The forearms are close to the body and approximately parallel to the floor. Legs well supported on the floor, chair rung, or ultrasonic system when sitting. Knees slightly lower than hips when sitting. Weight evenly distributed over both legs when standing. Case study 1. Position the ultrasonic system in parallel with the test table without significant space between the two. Adjust the system monitor so that the top of the monitor is at eye level and in front of the sonographer. Adjust the system control panel to reduce reach and maintain the elbow of the non-current arm on the body side with 90 degrees or more of inflection. Adjust the height of the test table so that the angle of hijacking the scanning hand is 30 degrees or less, and the bending of the elbow is 90 degrees or more. If you are sitting, adjust the height of the chair to maintain neutral posture of the trunk, neck and arm, and with knees slightly lower than the hips. Position the patient at the nearest edge of the test table to reduce the abduction and reach of the Reposite all settings as needed during the review. GLOSSARY OVERVIEW OF GLOSSARIES Match key terms to their definitions. KEY CONCEPTS 1. 2. 3. 4. 5. ______ artery ____ arteriole __ capillary ______ vein __ vein DEFINITION A small blood vessel with only an endothelium and a basement membrane through which nutrients and waste is exchanged A small vein that is continuous with the capillary Blood vessel that flows blood from the heart Small artery with a muscular wall; Terminal artery, which continues into the capillary network Blood vessel that carries blood according to the examination of anathema and physiology of the heart Marking image Complete the markings in the images that follow. 1. Schematic diagram of arterial walls. 2. Schematic diagram of venous walls. 3. Illustration of the external carotid artery and its branches. 4. Diagram indicating the orientation of the vertebrae through the cervical vertebrae and into the cranial cavity. 5. Veil drainage of the brain, head and neck. 6. Diagram of the upper extremity arterial system. 7. Veil drainage of the arm and veins of the upper extremities. 8. The abdominal aorta and its branches, as well as the inferior vein of the cava and its inertia. 9. Diagram illustrating the main portal vein and its tributaries. 10. Diagram of the arteries of the lower extremities through the thigh. 11. Diagram of the arteries of the lower extremities through the calf. 12. Diagram of the surface veins of the leg. Diagram of the lower extremity of the deep vein system. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. At what level of the circulatory system does the exchange of oxygen, carbon dioxide, waste and nutrients occur? a. aorta b. inferior vein cava c. arterioles d. capillaries 2. What statement describes the exchange of nutrients and oxygen at capillary level? A. In the Chets, re-control of carbon dioxide and waste takes place. B. The exchange of nutrients and oxygen is at the same time as the exchange of carbon dioxide and waste. c. Nutrients and oxygen exchange occur only on the vein side. d. Capillary permeation for the exchange of nutrients and oxygen is the same within all tissue beds. 3. .b.c d. What statement describes the capillary pervasiveness of large molecules? It's the same in all tissues. Varies depending on the characteristics of the tissue bed. It only varies with beds of tissue in the brain. It's selective only in the liver. 4. Why can arterioli control the resistance of the vascular bed? A. They have concentric layers of smooth muscle cells. B. These are the smallest arteries in the circulatory system. c. These are vessels leading to capillaries. d. They have all three main layers of tissue: intimacy, media and Adventition. 5. What of the following is not an example of a large elastic artery? a.b.c. d. common carotid artery of the superficial femoral artery of the common or strong artery of the aorta 6. What is the main difference arteries and veins of similar size to the composition of their walls? A. Veins have thinner walls overall with less muscle. B. Veins have thicker walls with more elastic fibers. c. Veins have thinner walls as a whole with more muscle. d. Arteries have thinner walls as a whole with more muscle. 7. .b.c. d. Which of the following is not an example of a large vein? portal vein inferior vein cava superior vein cava brachial vein 8. a.b.c. d. What's the statement on the vein valves that's false? They allow bidirectional flow under normal conditions. They are more numerous in the veins of the lower extremities. They are usually absent from the veins in the chest and abdomen. They only have two flyers. 9. What structure forms veins valves? a. three semi-dular cusps c. elastic and collagen fibers from basement membrane projections b. intima layer d. projection of media layer 10. What is the statement on the first branch of the internal carotid artery TRUE? a.b.c. d. 11. a.b.c. d. The ophthalmic artery is usually the first branch at the petr level. The ophthalmic artery is usually the first branch on a cave level. The ophthalmic artery is usually the first branch at the cerebral level. The internal carotid artery has no branches. Where does the left ordinary carotid artery usually come from? left succlass artery aortic arch innominate artery right sukklana artery 12. What is the statement related to the vein of drainage of the head and neck FALSE? A. Drainage occurs in the back via vertebral veins. B. Vertebral veins are formed by a dense vein plexus. c. External jugular veins are drained into brachyocephalic veins. d. Inner jugular veins are taken to brachyocephalic veins. 13 .b.c. d. What tissues supply the branches of the right or left Sukklav arteries? brain and neck thoracic wall and shoulder aoretic arch and A and B 14. a.b.c. d. What artery is not usually a branch of the ulnar artery? Radial arteries interosseous artery repetitive ullar artery superficial palmar arch 15. What of the next IS NOT the superficial vein of the upper extremities? a. interosseous veins b. basilica veins c. cephalic veins d. medial antebrahyal veins 16. a.c.b. d. What are the three branches of celiac or celiac? SMA, IMA and liver artery SMA, right gastric artery and left gastric artery spleen, left gastric and liver artery spleen, right gastric and liver arteries 17. a.b.c. d. What is the second name for internal iliatic arteries? hypergastric arteries of the hypogastric artery of the epigastric artery of the subgastric artery 18 a.b. d.c. Which of the following are the terminal branches of the popliteal artery? tibial and peroneal arteries and sural arteries of the anterior and posterior tibia arteries of the anterior tibia artery and tibioperoneal trunk 19 a.b.c. d. Where does the deep veda system of the lower extremities begin? deep plantar arc medial plantar arch side plantar arch back vein arch 20. Typically, what happens as the pulmonary vein and artery pass through the adductor canal? A. Vein ranges from medial to lateral artery. B. The vein ranges from the lateral to the medial artery. c. The vein ranges from the anterior to the back of the artery. d. The vein ranges from the posterior to the anterior part of the artery. Fill-in-blank 1. The exchange of gases, nutrients and waste takes place mainly at the level of __ in the circulatory system. 2. The bind side of the capillaries dries out __..._ 3. Arterioles are the main control of __ the circulatory system. 4. Arteries are classified not only by size, but also in the composition __ 5. Femoral arteries, brachial artery and mesenteric arteries are examples of __._ 6. The veins of the lower extremities have __ walls of the upper veins of the extremities. 7. The thickest layer in large veins is __ 8. The largest part of the composition of the wall in large veins is adventitia containing __ 9. Valves located in the veins are called __ because they have two semi-dular leaflets. 10. Tumultuous, cavernous and cerebral levels correspond to __ part of the internal carotid artery. 11. The unique arrangement of intracranial branches of internal carotid and vertebral arteries serving as an important collateral network is called __..._..._ 12. The first and largest branch of the aortic arch is __ 13. Typically, __ is considered the first and largest branch of brahia. 14. The upper extremity of the superficial vein coursing along the medial boundary of the bicep muscle is __ 15. Bronchial, esophagus, frephagal, frenetic, intercostal and subcostal arteries of the branch are __._ 16. The two branches of the anterior-lateral surface of the aorta just below level 17. 18. 19. 20. renal arteries are __ Right and left ordinary idyca bifurcate from the abdominal aorta, usually at the level __._.. _ The second name of the deep femoral artery is __ The continuation of the lateral segment of the dorsal vein arc is __ Veins passing between the tibia and fibula through the upper part of the interoseous membrane are __._ Short answer 1. Why are arterioli called the stopcocks of the circulatory system? 2. What are the main differences in the composition of the wall between the arteries and the veins? 3. Describe the pelteal artery is divided into different veal vessels and as the veins are configured from the calf back into the popliteal vein. 4. The liver has a unique arrangement of vessels and receives blood from two sources. What are the two sources? 5. Where do deep and superficial vein systems originate from the lower extremities? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. Using this figure as a guide, describe the collateral pathway that could be used to permeate the brain if the left internal carotid artery is obscured. A common procedure in cardiovascular surgery is the use of radial artery as a duct for transplantation of coronary artery bypass. Using this figure as a guide, describe to keep the arm pervased if a radial artery is picked for this procedure. ANSWERS: CHAPTER 4 Match 1.c 2. d 3. a 4.b 5. e Mark image 1-1. 1-2. 1-4. 1-3. 1-8. 1-7. 1-6. 1-5. Tunica intimacy Tunica media Tunica adventitia Endothelium Internal elastic membrane Smooth muscle External elastic membrane Adventitia 2-1. 2-2. 2-4. 2-3. 2-5. 2-9. 2-8. 2-7. 2-6. Tunica intimacy Tunica media Tunica adventitia Valve Endothelium Internal elastic membrane Smooth muscle Outer elastic membrane Adventitia 3-1. 3-4. 3-3. 3-2. 3-8. 3-7. 3-6. 3-5. 3-10. 3-9. 3-14. 3-13. 3-12. 3-11. 3-17. 3-16. 3-15. Površna temporalna arterija Maksilarne arterije Lica Arterija Vanjska karotidna arterija Lingualna arterija Superior arterija štitnjače Karotidni sinus Prava uobičajena karotidna arterija Brachiocephalic arterija Aoretski luk Unutarnja torakalna arterija Desna sukklasinska arterija Costocervical deblo Štitnjače Kralježak Arterija Unutarnja karotidna arterija Okcipitalna arterija 4-1. 4-4. 4-3. 4-2. 4-7. 4-6. 4-5. 4-10. 4-9. 4-8. 4-14. 4-13. 4-12. 4-11. 4-17. 4-16. 4-15. 4-20. 4-19. 4-18. 4-23. 4-22. 4-21. 4-24. Frontalni režanj Srednja cerebralna arterija Temporalni režanj Lijeva stražnjica komunicira arteriju Basilar arterije Posterior inferiorna cerebelarna arterija Prednja leđna arterija Unutarnja karotidna arterija Lijeva vanjska karotidna arterija Zajednička karotidna arterija Vertebral arterija Subclavian arterija Brachioceph aklalna arterija Desna sukklavijalna arterija Obična karotidna arterija Vertebral arterija Desna vanjska karotidna arterija Unutarnja karotidna arterija Superior cerebelarna arterija Posterior cerebralna arterija Desna stražnjica komunicira arteriju Optička chiasm Prednja prednja cerebralna arterija Anterior komunicira arteriju 5-1. 5-4. 5-3. 5-2. 5-5. 5-8. 5-7. 5-6. 5-11. 5-10. 5-9. 5-14. 5-13. 5-12. 5-17. 5-16. 5-15. Superficial Temporal Vein Cavernous Sinus Maksillary Vein Retromandibular Vein Facial Right Inner Jugular Vein Right Anterior Jugular Vein Right Brachiocephalic Vein Superior Vein Cava Right Axeillary Vein Right Subclavian Vein Right Vertebral Vein Right Outer Jugular Vein Right Transverse (Lateral) Sine 6-12. 6-11. 6-10. 6-9. 6-16. 6-15. 6-14. 6-18. 6-17. 6-21. 6-20. 6-19. 6-23. 6-22. Desna vertebralna arterija Uobičajene karotidne arterije Lijeva sukklavijalna arterija Brachiocephalic deblo Unutarnja torakalna arterija Lateralna torakalna arterija Thoracodorsal arterija Ulnar arterija Površinski palmarni luk Digitalne arterije Duboki palmarni luk Radijalna arterija Circumflex skapulalna arterija Brachial artery Subscapular arterija Axillary arterija Prednji humeralni cirkumflex arterija Posterior humeral circumflex arterija Thoracoacromial deblo Desno sukklavna arterija Suprascapular arterija Dorsal scapular arterija Thyrocervical deblo 7-1. 7-3. 7-2. 7-6. 7-5. 7-4. 7-8. 7-7. 7-11. 7-10. 7-9. Basilica Vein Vein Venae Comitantes Interosseous Arteries Venae Comitantes Ulnar Arteries Palmar Digital Veins Deep PalmAry Vein Arc Superficial Palm Vein Vein Venous Arch Venae Comitanti Radial Artery Median Antebrachial Vein Vein Venae Comitantes Brachial Artery Cephalic Vein Axillary Vein 8-1. 8-2. 8-6. 8-5. 8-4. 8-3. 8-9. 8-8. 8-7. 8-11. 8-10. 8-14. 8-13. 8-12. 8-17. 8-16. 8-15. 8-20. 8-19. 8-18. 8-24. 8-23. 8-22. 8-21. Left Inferior Phenynic Vein Esophagus Left Surreal Vein Left Renal Artery Left Renal Vein Inferior Mesenteric Artery Left Ovarian Artery (Testicles) Left Ovarian Vein (Testicles) Left Common Iliac Vein Left Inner Ilocal Vein Ureter Right Inner or Narrow Artery Rights Common Ilica Artery Right vein ovaries (testicles) Right ovary (testicle) artery Abdominal aorta Right renal vein Right renal artery Right adrenal vein Superior mesenteric artery Celiac disease trunk Inferior vein cava Right inferior phenylic vein Jep veins 9-1. 9-3. 9-2. 9-7. 9-6. 9-5. 9-4. 9-9. 9-8. Esoper veins Left gastric vein Splenska vein Inferior mesenteric vein Superior mesenteric vein Main vein portal right gastric vein Right portal vein Left vein 10-1. 10-3. 10-2. 10-5. 10-4. 10-8. 10-7. 10-6. 10-11. 10-10. 10-9. 10-13. 10-12. Medical Circumflex Femoral Artery Superficial Ferene Artery Descending Genicular Artery Superior Medial Genicular Artery Inferior Medial Genicular Artery Popliteal Artery Inferior Lateral GenesCular Artery Superior Lateral Genicular Artery Perforating Artery Profundal Femoral Artery Lateral Circumflex Femoral Artery Common Femoral Artery Inguinal Ligament 11-1. Superficial femoral artery Popliteal artery Anterior tibial artery Peroneal 11-4. 11-3. 11-2. 11-8. artery Posterior tibial artery Dorsalis pedis artery Medial plantar artery 11-7. 11-6. 11-5. 11-9. Lateral plantar artery Plantar arc 12-1. 12-3. 12-2. 12-5. 12-4. 12-7. 12-6. 12-10. 12-9. 12-8. 12-13. 12-12. 12-11. 12-16. 12-15. 12-14. 12-14. 12-17. External iliac vein Medial accessory saphenous vein Perforating veins (Dodd is Popliteal perforirajuće Russian Perforating Russian (Boyd je perforator) Perforirajuće Russian (Sherman perforator) Perforating Russian (Cockett je perforator) Medicinske marginalne Russian Leđne metatarzalne Russian Russian Digital Veins Back Venous Arch Lateral Marginal Vein Small Saphenous Vein Popliteal Vein Side Accessory Saphenous Vein Common Femoon Vein Inguinal Ligament 13-1. 13-5. 13-4. 13-3. 13-2. 13-8. 13-7. 13-6. 13-12. 13-11. 13-10. 13-9. 13-15. 13-14. 13-13. 13-13. Large Saphenous Vein Femoral Vein Popliteal Vein Posterior Tibial Veins Medial Planarna Vein Plantarna Vein Plantar Digital Vein Plantar Venous Arc Side Planar Vein Peroneal Veins Anterior Tibial Veins Small Saphenous Vein Profundal Femoral Vein Common Femoral Ligament Inguinal Ligament Multiple Choice 1. d 2.b 3.b 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. a b a d a c d a c d a b b Fill-in-the-Blank 1. 2. 3. 4. 6. 5. 7. capillaries venules resistance of arterial walls of medium artery thicker adventitia 9. fibrous and elastic tissues bicuspid 8. 10. 13. 12. 11. 14. 18. 17. 16. 15. 20. 19. intracranial circuit Willis brachiocephalic trunk of deep brachial artery or profunda brachii basilica veins lowering ovarian aorta or testicular arteries of the fourth lumbar vertebrae of profunda femoris small saphenous veins of the anterior tibial vein Short answer They provide the main point of resistance in the vascular System. 2. Arteries have well-developed smooth muscle layers, more muscular than veins. Veins have more elastic fibers and collagen than muscle fibers, and their walls are thinner compared to arteries of similar size. Veins contain valves, while arteries do not. The popliteal artery first bifurs into the anterior tibial artery and the tibioperoneal trunk. The tibioperoneal trunk then bifurcates into the posterior tibial and peroneal arteries. On the venous side, paired posterior tibial and peroneal veins merge into a common posterior tibial and common peroneal trunk. These usual trunks then merge to form a tibioperoneal vein of the trunk. Paired front tibias blend similarly into a common front tibia trunk. The vein of the tibioperoneal trunk and the common anterior tibial vein of the carcass then merge to form a popliteal vein. 4. 30% of the blood from the jeptic artery, and 70% of the blood from the vein portal. 5. The superficial cheerful system begins at the dorsal vein arch, which joins a large saphenous vein. A small saphenous vein begins as a continuation of the lateral segment of the dorsal vein arch. The deep system begins with a deep palmar arch, which continues as medial and lateral plantar veins. These veins are then united to form posterior tibias. Image assessment/Pathology 1. Several collateral pathways are possible: external-internal: the left outer carotid artery on any of several branches of the outer carotid. The branches of the ECA connect to the branches around the orbit. The flow will then reverse through the ophthalmic artery into the terminal internal carotid artery and into the middle Artery. Intracranial crossover: right internal carotid artery in the Willis circuit and into the right anterior cerebral artery. The flow then moves across the anterior communication artery and retrograde through the left anterior cerebral artery, and eventually into the middle cerebral artery. Posterior-to-anterior collateralization: the flow ranges from the vertebrae to the basilalar artery. From the basilium artery to the posterior cerebral artery. From the left posterior cerebral artery, the flow moves over the left posterior communication artery and into the terminal of the left internal carotid artery and medium cerebral artery. 2. Digital arteries in the fingers are fed from palm arcs. Palmary arches feed from radial and ulnar arteries. Since both arteries feed on palm arches, the fingers can permeate with any artery as long as the arches are complete. Therefore, if the radial artery is harvested (removed) for use as a bypass line, the ulnar artery can lead to the whole arm. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ potential energy 2. ______ kinetic energy 3. 4. 5. 6. ____ Poiseuille law ______ laminar flow ____ viscosity __ inertia DEFINITION Energy of work or motion; in the vascular system is partially represented by the rate of blood flow Stored or resting energy; in the circulatory system it is an intravascular pressure Fluid flow in which it travels smoothly in parallel layers The law specifying the flow of fluid volume flowing through the vessel is directly proportional to the fluid pressure and the fourth power of the radius and is reversed Proportional fluid viscosity and vessel length The tendency of the body at rest or a body on the move to stay in motion The property of a liquid that resists a force that tends to cause fluid flow CHAPTER REVIEW Multiple choices Complete each question by circulating the best answer. 1. Where in the vascular system is the lowest energy represented by the lowest pressure that is found? a. right atrium b. left atrium c. right ventricle d. left ventricle 2. Which of the following statements on gravitational energy and hydrostatic pressure is FALSE? A. They are components of total energy in the vascular system. B. They tend to cancel each other out. c. These are components of kinetic energy in the vascular system. d. They are expressed in relation to the reference point. 3. What causes the blood in the circulatory system to move from one point to another? a.b.c. d. hydraulic filtration pressure or energy gradient hydrostatic pressure inertia 4. In the entire vascular system, how does the area of the residual section of vessels change? A. Increases from the aorta to the capillary level. B. Decreases from aorta to capillary level. c. It remains the same from the aorta to the capillary level. d. Increases only at the artriol level. 5. Which of the following statements on blood flow rate is FALSE? A. Speed refers to the rate of blood movement in time. B. Blood speed increases from capillaries to veins of the system. c. Blood speed increases from aorta to capillary. d. Rate of blood change with the retile of the vessels. 6. Which of the following could not be used as a unit to measure the flow volume? a. mL/s b.m/s c. cL/min d. L/min 7. In the vascular system, what constitutes a potential difference or voltage in Ohm's law? a. volume flow b. resistance c. pressure gradient d. vessel radius 8. Changes in what of the next most significant will affect resistance in the vascular system? a. volume flow b. velocity c. viscosity of blood d. vein radius 9. When vessels are arranged in parallel, how does this affect the entire system? a. Lower overall resistance than when vessels in series b. are higher overall resistance than when vessels are in series c. does not affect the overall resistance of system d. interferes with the flow of collateral 10. a.b.c. d. Which of the following characterizes the flow of low resistance? retrograde flow alternating antegrade / retrograde flow pre-construction flow narrowing arteriolar bed 11. What are the following characteristics in terms of high resistance flow FALSE? A. The flow profile can be two to three stages. B. The flow shows alternating antegrade/retrograde flow. c. The flow profile is due to vasoconstriction of the arteries. d. The flow profile is due to the vasodilation of the artriol. 12. What flow profile is usually shown at the vessel's entrance? a. flow of plugs b. laminary flow c. turbulent flow d. simplified flow 13. Which of the following laminar flow statements is FALSE? A. The layers of cells in the center of the vessels move fastest. B. The layers of cells on the wall of the vessels do not move. c. The speed in the centre of the vessel is half the mean speed. d. The difference in speeds between layers is due to friction. 14. .b.c d.d. What is needed to move blood flow in a turbulent system? higher speed higher pressure higher radius smaller radius 15. What is the function of the hydraulic filter of the arterial system (composed of elastic arteries and high resistance arthroles)? A. Ensure adequate gas/nutrient replacement in the arteries. B. Convert the flow of the heart output into a steady flow. c. Ensure proper conduction of pressure waves. d. Distribute the flow to the capillaries. 16. In the diastole, how is it achieved to convert potential energy into blood flow? a. expulsion of stroke volume from the heart b. elastic twitching of arteries c. cardiac contraction d. filtering effect 17. How is resistance to the arterial system controlled? A. Contraction and relaxation of smooth muscle cells in the media of arthrioles. B. Contraction and relaxation of the heart. c. By contracting and relaxing muscle cells in the surrounding tissue. d. Capacition of the arterial system. 18. Which of the following will result when norepinephrine releases a sympathetic nervous system? A. Relaxation of smooth muscle cells in arteroles is triggered by b. The contraction of smooth muscle cells in arteroles is triggered by c. There is no effect on smooth muscle cells in arteriola d. It has no effect on the tone of the arteriole walls of the 19th century. Most notably, abnormal energy losses in the arterial system would be due to pathologies such as obstruction and/or stenosis due to which of the following? a. increased length of sthenosis b. friction from atherosclerotic plaque C. reduction of vessel radius d. increased viscosity 20. a.b.c. d. Which of the following collateral vessel statements is FALSE? Collateral is existing pathways. Resistance in collateral is largely fixed. Vasodilator drugs have a great impact on collateral. Midzone collaterals are small intramuscular branches. Fill-in-blank 1. In the human body, the main component of blood that affects viscosity is __ 2. The highest pressure in the vascular system (from about 120 mm Hg) is found in __..._.. _ 3. When moving beyond the reference point of the right atrium, 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. Hydrostatic pressure ______ The principle stating that total energy remains constant from one point to another without changes in flow rate is __ Inertia and viscosity are two components of the vascular system that contribute __ In the circulatory system, if the volume of blood or flow remains the same, the reduction of the surface of the vessel should stimulate a(n) __ blood speed. The law defined by the declaration that electricity through two points is directly proportional to the potential difference in two points and inversely proportional to the resistance between them is __.. _ The overall resistance in the system in which the elements are arranged in the series is __ of individual resistances. The low resistance flow profile characteristically displays the flow __ throughout the heart cycle. The third antegrade phase seen in the high resistance flow profile is associated with __ proximal vessels. After exercise, under normal conditions, the resistance of the tissue bed in the lower extremities will change from __ In the laminar course, the layers of cells in the center of the vessel move of the layers closest to the wall of the vessel. Turbulence in the blood vessel is mainly the result of a change in blood speed and __ Reynolds' number above which flow turbulence begins to occur is __ The arterial system can be compared with __ resistance filters and the capacitance of the electrical circuit. Pulse pressure in arterial systems is the difference between __ and __ pressure. An example of a local feedback mechanism that controls blood flow is that a drop in interstitial __ will trigger arterioles to dilate. In the area of atherosclerotic plaque, the exposure of the suenfotelial collagen matrix is __ and can cause platelet accumulation. 19. Energy losses caused by synose will be more pronounced with a smaller reduction in diameter in the resistance system __ 20. Under normal conditions with exercise, blood flow __ by at least three to five times the value of sleep. Short answer 1. How does the Bernoulli principle apply to the circulatory system? 2. In the human circulatory system, when viscous and inertial losses occur? 3. Why is the rate of blood decreasing as blood travels from the aorta to the artriol? 4. According to the Poiseuille Law, how is the volume flow affected by changes in the radius of the vessel? 5. Why is hydraulic filtration necessary in the circulatory system? 6. How does the capacition in the arterial system change with age? 7. What are the main factors that control peripheral circulation? 8. How does critical synosis affect pressure and flow? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. From this Doppler spectrum: What type of distal vascular bed does this vessel feed? Why does this type of vascular bed result in this waveform? Set an example of a vessel that would demonstrate this type of waveform. From this Doppler spectrum: What type of distal vascular bed does this vessel feed? Why does this type of vascular bed result in this waveform? Set an example of a vessel that would demonstrate this type of waveform. CASE STUDY 1. The patient presents to the vascular laboratory for a two-storey ultrasound evaluation of the carotid artery system. During evaluation, the vascular technologist notices turbulence in the proximal common carotid artery. Discuss factors that contribute to turbulence and indicate circumstances that may have led to turbulent flow being recorded in this artery. 2. The patient presents a vascular laboratory for the evaluation of peripheral arterial occlusive disease. During evaluation, blood pressure is taken on the patient's ankles both before and after exercise. Before exercise, the patient's ankle pressures were recorded within the normal range; however, ankle pressures were reported after exercise be much lower. Why could this change happen? ANSWERS: CHAPTER 5 Match 1.b 2. a 3. d 4.c 5. f 6. e Multiple choice 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18.c b a c c a c c a c b a b 19.c 20.c Fill-in-empty 1. 5. 4. 3. 2. 7. 6. 8. 14. 13. 12. 11. 10. 9. hematocrit left pistonjet increases Bernoulli's principles of energy loss (through transformation into another form of energy, mainly heat) increase Ohm's law of sum antegrade compliance high to a low faster radius of 2,000 15. hydraulic filter sistaly; diastolic oxygen thrombogenic low 19. 18. 17. 16. 20. increases the short answer 1. The total energy in the vascular system is the balance between potential energy and kinetic energy. Therefore, if the blood speed rises, there must be a decrease in pressure. For example, measuring the speed in the stenotic aortic valve can determine the pressure drop over the valve. 2. Viscous losses occur as layers of blood rub against each other moving through the vessel (friction). Inertial losses occur whenever blood is forced to change direction or speed. Inertial losses depend on the density and speed of blood flow. In blood vessels, energy losses due to viscosity effects are greater than those due to inertia. 3. The speed is inversely related to the total cross-section area. The total cruciate area of the blood vessels increases from the aorta to the arteriol, and this results in a decrease in speed. 4. The volume flow is directly connected to the radius to the fourth power. As the radius increases, the volume flow increases, but at a much higher rate. For example, if the radius has increased by a factor of 2, the volume flow will increase by a factor of 16.5. Hydraulic filtration converts the intermittent output of the heart into a constant flow through the capillaries. Constant flow in capillaries ensures adequate exchange of nutrients and waste. 6. Capacition decreases with age as the walls of the vessel become rigid. As the wall of the vessel becomes more competitive with age, this results in an increase in sistalacic pressure as well as pulse pressure. 7. Peripheral circulation is controlled centrally by the nervous system and locally by conditions in the tissue bed. Arterioli control the blood supply to a particular region or organ. Different chemicals and changes in the concentration of many substances affect arterioles. 8. As synosis increases to critical levels, pressure and flow will decrease. This is more pronounced in a low resistance system. Image assessment/Pathology 1. 1. Vascular bed of low resistance. 2. Vascular beds of low resistance occur in areas that need constant perfusion and have vasodilated arteries. 3. Examples of low resistance arteries would be the internal carotid artery, renal artery, spleen or other artery that feeds the organ. 2. 1. High-resistance vascular bed. 2. Vascular beds of high resistance occur in areas of do not need constant perfusion such as muscles and vasoconstristed arteries. 3. Examples of highly resistant arteries would be the external carotid artery, brachial artery, saclavian artery, superficial femoral artery or other arteries travelling to muscle beds. Case study 1. The risk of turbulence is associated with factors described by Reynolds' number, such as blood vessel diameter, blood flow rate, blood density and blood viscosity. As diameter and speed increase, the risk of turbulence increases. Turbulence in the proximal common carotid artery indicates proksimal stinosis to this level. 2. The patient probably has stinosis in the lower extremities somewhere that is not hemodynamically significant at rest; however, with the additional demand for exercise, synosis becomes significant. Exercise will cause a greater reduction in peripheral pressure. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ hydrostatic pressure 2. ______ transmural pressure 3. ______ edema 4. ____ venous valvular insufficiency DEFINITION Pressure exerts on the walls of the vein Excessive fluid accumulation in cells, tissues or cavities of the body Pressure within the vascular system due to the weight of the blood column Abnormal retrograde flow in the veins CHAPTER REVIEW Multiple choice Complete each question by circulating the best answer. 1. Approximately how much blood holds the large part of the circulatory system? a. 66% to 67% of total blood volume b. One third of the total blood volume c. 3% to 4% of total blood volume d. Half of total blood volume 2. a.b.c. d. Which statement of resistance to the end system is incorrect? Veins offer flow resistance through increasing pressure. Veins offer natural flow resistance in some parts of the body. The elliptical shape in the vein increases resistance. The circular shape in the vein reduces resistance. 3. .b.c d. What veins DO NOT offer natural resistance to flow in the vein system? subclavian veins of the femur vein of the jugular vein inferior vein cava 4. In a 6-foot-tall individual in a standing position, hydrostatic pressure will add roughly as much to the measured pressure on the ankle? a. 170 mm Hg b. 100 mm Hg c. 15 mm Hg d. 20 mm Hg 5. What is the minimum pressure inside the vein needed to prevent it from collapsing? a. –50 mm Hg b. –5 mm Hg c. 5 mm Hg d. –35 mm Hg 6. What is the pressure gradient over the capillary bed in the uplift of the hand due to the change in hydrostatic pressure? a. 100 mm Hg b. 80 mm Hg c. 40 mm Hg d. 20 mm Hg 7. After the vein acquires a circular shape, how can the volume of blood in the vessels change only with? a. a large increase in pressure b. a small increase in pressure c. no increase in pressure d. 8. When an individual moves from a supine to a standing position, which of the following pressures specific to the venous system increases? a. osmotic pressure b. hydrostatic pressure c. transmural pressure d. gravitational pull 9. What is the next non-force that affects the movement of fluid at capillary level (in or outside the surrounding tissue)? a.b.c. d. intracapsilarian pressure of interstitial osmotic pressure of capillary osmotic pressure of transmural pressure 10. How does the action of the calf muscle pump, under normal circumstances, neutralize the loss of fluid in the interstimial tissue? A. Helps increase vein pressure. B. Helps reduce vein pressure. c. Helps reduce osmotic pressure. d. Helps reduce interstemental pressure. 11. Under normal circumstances, the breathing inspiration phase results in all the following EXCEPT: the rise of the diaphragm. diaphragm descent. increase in intra-abdominal pressure. reduction of intra-surgical pressure. 12. With total or partial thrombosis of the prosimal main veins of the lower extremities, what action is not unusual for the flow profile from distal non-cruel veins? A. Change from continuous to fasic b. For a change from fasic to pulsatile c. Change from pulsatile to phase d. Change from fasic to continuous 13. What is the following essential to ensure the proper functioning of the pump for calf muscles under normal conditions? a. proper functioning of valve c. well-developed gastroknemius muscle anguished sinusoids well developed b. d. venous sinusoids of the soleal muscle superficial venous system 14. How much pressure can be generated by contraction of an effective calf muscle pump under normal conditions? A. At least 50 mm Hg b. At least 15 mm Hg c. At least 200 mm Hg d. At least 5 mm Hg 15. How do primary varicose veins differ from secondary varicose veins? A. Do not affect a small saphenous vein. B. Develop in the absence of deep vein thrombosis. c. Do not rely on the calf muscle pump. d. Do not rely on the proper closure of valves in deep veins. 16. The increased pressure in the distal vein system seen in secondary varicose veins is due to all the following EXCEPT: distal obstruction of the perenary system. bidirectional flow in perforators. increased pressure in the deep vein system. increased pressure in the superficial vein of the system. 17. .b.c. d. What is a fibrin cuff? According to the product of decomposition of thrombus. Fibra's accumulation around the capillaries. Catching fibrin and white blood cells in the veins. Movement of fibrin and other plasma proteins into the tissue. 18. .b.c. What caused vein dystension during pregnancy? increased vein flow rate incompetent valves increased compliance of veins d. compression of superior veins cava 19. Which makes continuous flow profile from the veins of the lower extremities means? A. The flow no longer responds to pressure changes from breathing. B. Flow is increased in pregnancy. c. This is the result of incompetent valves in the deep system. d. This is the result of incompetent valves in the superficial system. 20. What are the main physiological components that control blood flow in the vein of the system? a. Vein capacitority b. transmural pressure c. hydrostatic pressure d. all of the above Fill-in-blank 1. Veins are known as body capacition vessels because they act as __._._ 2. The area of shipments of the scattered vein could be __ larger than the surface of the corresponding artery. 3. The fact that veins are usually paired in many parts of the body increases __ the vascular system. 4. The main force affecting the vein system is __ 5. Hydrostatic pressure is measured by blood density × acceleration due to gravitational × __..._ 6. Hydrostatic pressure in the hand raised straight above the head would be __ 7. Transmural pressure is equal to __ between intravascular pressure in the vein and pressure in the surrounding tissue. 8. When standing, low pressure compression socks have(n) __ effect in reducing vein pressure and volume. The liquid, which usually moves into the interstitial space of tissue, is usually absorbed by vessels ___ 10. The pressure exerted by liquid when there is a difference in solut concentrations across semipermeable membranes is __ pressure. 11. ____ plays an important role in regulating vein return to the heart by changing intracranial and intra-abdominal pressures. 12. In venous thrombosis, the effect of breathing and changes in intraabdominal pressure has a __ effect on the pressure gradient from the legs. 13. The calf muscle pump helps to return the vein flow to the heart when the individual stands because it acts against __ pressure. 14. Venal reflux in the distal calf during contraction of calf muscles under normal conditions is prevented by closing the valve in __._._...... 15. Primary varicose veins rarely include __ vein. 16. In secondary varicose veins, the flow of perforators can be __, which increases pressure within the superficial system. 17. A serious consequence of vein insufiction and secondary varicose veins is the veil stasis __ 18. During pregnancy, increased vein compliance, pressure, and distension in pairs with reduced velocity vein flow from the legs can contribute to the development of __._.. 19. Typically, varicose veins become __ with subsequent 20. Vein Doppler signals observed during ultrasound examination are a direct result of the vein __._.. _ Short answer 1. How do veins change their resistance to blood flow? 2. When standing, what provides increased hydrostatic pressure in the arteries and veins? 3. What determines the shape of the vein? What shapes do veins take based on this amount? 4. What actions occur during inspiration and expiration that affect the veil of blood flow? 5. What role do the pump and calf muscle perforators play in primary varicose veins? 6. What are the underlying problems associated with vein blood flow that help to create venous ulcers of the trail? CASE STUDY 1. The patient presents a vascular laboratory for the assessment of the lower extremity of the vein system. During the examination, the technologist notices a continuous venous flow pattern in the common feisty vein. What do these results suggest? 2. A 45-year-old patient presents a vascular laboratory with a visible varicose vein. After the study, the patient states that she previously had deep sena thrombosis during pregnancy. Based on this history, would you expect primary or secondary varicose veins and which veins systems can be affected by vein valvular insufiction? ANSWERS: CHAPTER 6 Match 1.c 2 and 3.b 4. d Multiple choice 1st and 2nd and 3.b 4. 5. 6. 7. 8. 9. 20. 19. 18. 16. 15. 14. 13. 12. 11. 10. 5. 4. 3. 2. 12. 11. 10. 9. 8. 7. 6. 18. 17. 16. 15. 14. 13. 20. 19. 1.b c c a c a c a b a b a d Fill-in-the-Blank reservoir 3 to 4 times capacitate Hydrostatic pressure height column blood negative differences small lymphatic diaphragm small hydrostatic perforators small saphenous bidirectional ulcers deep vein thrombosis tends to physiology Short response to different, veins can change the area of the suction. When partially empty and elliptical in shape, veins offer great resistance. When distended and circular in shape, it veins off almost without resistance to blood flow. 2. The pressure gradient over the capillary bed is the same as it was in lying positions. 3. The shape of the vein is determined by transmural pressure. At low transmural pressures, the veins will be fleas. As transmural pressure has increased, veins will become more elliptical. At high transmural pressures, the veins will become circular. 4. During inspiration, the diaphragm descends, reducing the pressure in the chest cavity that draws air into the lungs, as well as increasing the veinous blood flow from the upper extremities to the chest. Intra-abdominal pressure increases, reducing the veil return from the legs. During expiration, the diaphragm rises, reducing intra-abdominal pressure, resulting in an increase in vein return from the legs. Intratoraral pressure increases, reducing blood flow to the chest. 5. The calf muscle pump is still working to stimulate blood towards during contraction; however, during relaxation, blood falls back down the superficial veins due to valvular incompetence. This blood can then re-enter the deep system through the perforators. This creates an ineffective circular motion of the blood. 6. Persistent increased veinous pressure/vein hypertension causes capillary dystension and increased capillary pressure, resulting in the opening of compounds between endothelial cells. Plasma proteins then move from vascular space to tissue, and additional fluid monitors the movement of proteins into the interstitial space. After these conditions, tissue degradation occurs. Case study 1. Normal venous blood flow is a respiratory fasic, influenced by changes in intra-abdominal pressure during breathing. The continuous flow pattern in the vein segment indicates that this pressure change is some way interrupted. This usually indicates obstruction/thrombosis in proksimal venous systems to where continuous flow has been observed; in this case, probably either axles. 2. Based on the history of deep vein thrombosis, this patient probably has secondary varicose veins. This would result in a vein valvular insuction in deep and superficial vein systems. The perforating system can also be turned on. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ transient ischemic attack 2. ______ carotid bulb 3. 4. 5. 6. ____ bruit ___ spectral analysis __ spectral expansion __ Doppler angle DEFINITION Most often defined as the angle between the doppler ultrasonic beam line and the arterial wall core (also called the insonation angle). This is a key variable in the Doppler equation used to calculate the flow rate By increasing the width of the spectral waveform (frequency band) or filling a normal clear area below the sistal tip. This represents the turbulent blood flow associated with arterial lesions An episode of neurological symptoms similar to stroke that usually takes several minutes to several hours and then is completely resolved. This is caused by a temporary interruption of blood flow to the brain in the distribution of cerebral artery Light dilation involving variable parts of the distal common and proximal internal carotid arteries, often including the origin of the external carotid artery. Here are baroreceptors that help control reflex blood pressure. Carotid bulb tends to be most prominent in normal young individuals Signal processing technique that displays the complete frequency and amplitude content of Doppler flow signals. Spectral information is usually presented as wavelengths with frequency (converted to a speed scale) on a vertical axis, time on a horizontal axis, and grayscale amplitudes blowing or swishing sound that is heard with a stethoscope while auscultating across the artery, such as carotid. The sound stems from vibrations transmitted through tissues when blood flows through the stenotic artery. ANATOMY AND PHYSIOLOGY REVIEW Mark a picture Complete the tags in the following images. 1. If the Doppler wave forms mentioned above were from a normal (undissquired) internal carotid artery, indicate what wave shapes would best represent. 2. If the following Doppler waveforms are taken from normal (undissailable) vessels, mark the artery that best characterizes the flow based on waveform contours. 3. Under the assumption of normal anatomy, mark the vessels. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. What is the secondary objective of examining the system of extracranial carotid arteries by duplex ultrasound? B. Identify patients at risk of stroke diagnose fibromuscular dysplosis a.c. Document the progression of disease d. To review iatrogenic problems 2. Which folio is most commonly used to perform a two-storey assessment of the extracranial cerebrovascular system? A. Linear string of 7-4 MHz b. 8-5 MHz curvilinear array c. 4-1 MHz phase field d. 5-3 MHz phase field 3. The patient presents the vascular laboratory for carotid-vertebral duplex examination. After the study, the patient discovers a 2-week history of intermittent blindness in the right eye. The symptoms are resolved in a matter of seconds. What would these symptoms indicate? a. CVA b. RIND c. TIA d. DVT 4. How should the patient's head be placed to speed up the carotidvertebral two-storey examination? A. Head straight ahead and elevated on the pillow. B. The head rotated 45 degrees away from the side inspected with a pillow under the shoulder. c. The head rotated 90 degrees towards the side inspected using a pillow. d. Head straight with a flat towel placed under the door. 5. What is the most common technique used to identify vertebrae? A. Look at the common carotid artery and gently tighten the pliers. B. Look at the Sukklav artery and lean the pliers superior. c. Look at the basilast artery and angle the pliers worse. d. See vertebral processes and medially overeal angle. 6. When qualifying the appearance of plaque by ultrasound, the use of which of the following terms is discouraged due to poor reliability? a. homogeneous/heterogeneous b. smooth/irregular c. ulcerated d. calcified 7. As plaque develops and fills the carotid bulb, what kind of change can be expected in Doppler wave form at this level? a. Extremely high speed c. disappearance of normal flow of helium flow around plate b. d. development steal waveform 8. Which from the next WILL NOT result in symmetrical (i.e., seen both in carotid and sometimes in vertebral arterial systems) in the Doppler spectrum? a. Aortic valve or root stenosis b. brain death c. subclavian steal d. intra-aortic balloon pump 9. In a normally hemodynamically low resistance system or vessel, such as internal carotid and vertebral arteries, what will a change in the highresistance pattern suggest? a. proximal stinoosis or occlusion b. distal stinosis or occlusion c. steals syndrome d. normal change due to exercise 10. What is reactive hyperemia, a provocative manoeuvre used during a two-level assessment of the extracranial cerebrovascular system, used for demonstration? A. Diagnosis of brain death. B. Change from latent or partial to complete theft of subclavian. c. The existence of a unilateral congenitial small vertebrae of the artery. d. The effect of the balloon pump with inside the halo. 11. Which of the following is not sound tip for sonographers who want to prevent recurrent stress injuries during scans? a. Be ambidextrous. B. Arrange the bed and equipment to be near the patient. c. Stay well hydrated throughout the day. d. Avoid stretching exercises. 12. What of the following is not a characteristic of a normal Doppler wave contour? a. Brisk stagnant acceleration b. sharp sistal tip c. increased the spectral expansion of d. clear spectral window 13. Why do Doppler wave forms in common carotid arteries show a contour indicating a relatively low resistance flow? a. 70 % of its flow is supplied by ICA b. 90 % of the flow is supplied by ICA c. 70 % of the flow is supplied by the ECA d. 90 % of the flow supplied by the ECA 14. What type of flow is characterized by a dulled, resistant waveform that often occurs before complete occlusion? a. steal the flow b. tardus parvus flow c. bidirectional flow d. string sign flow 15. a.b.c. d. What is doppler's power statement FALSE? Represents the amplitude of the Doppler signal instead of changing the frequency. It depends on the angle of insonation. It does not provide information on the direction of flow. It can detect low-flow states. 16. The patient presents the vascular laboratory with severe distal obstruction of the HSF; however, the internal carotid and external carotid artery remain a patent. What's this lesion usually called? a. subclavian steal b. string syndrome sign lesions c. suffocating lesions d. tardus parvus lesion 17. During the two-storey assessment of the internal carotid artery, peak systalic velocity was recorded at 532 cm/s and the final diastolic velocity was 167 cm/s. According to university of Washington criteria, what category of snoosis would these findings fall into? a. 16% to 49% snoosis b. 50% to 79% synosis c. 80% to 99% snoosis d. occlusion 18. In order for subclavian syndrome or occurrence to appear, where severe snoosis or occlusion should be present? A. Discval artery distal to the origin of the vertebrae of the artery. B. Left suclavian artery or brahyocephalic artery proximal to vertebral origin. C. regular carotid artery. d. Anywhere in the brachial arteries. 19. What of the following would affect the pulsed contour of the Doppler spectrum in all vessels of the extracranial cerebrovascular arterial system even when there is no disease? a. low-heart output b. aority root synosis c. intra-aortic balloon pump d. all of the above 20. During the two-storey assessment of the carotid artery system, the velocity in the outer carotid artery reached 250 cm/s, and turbulence was reported immediately after the surface of the increased speed. What do these findings suggest? a. >50% snoosis b. Normal findings for ERS c. 50% to 79% synosis d. >80% stenosis Fill-in-the-Blank 1. The primary goal of examination of the extracranial cerebrovascular system by two-storey ultrasound is to identify patients at risk of __..._ 2. Approximately ____ bruita from the neck is associated with significant stinose of the internal carotid artery. 3. Lesions or stenations in the internal carotid artery may be present without symptoms __ 4. High-quality stinoons of the internal carotid artery, as flow-restricting lesions, are rarely the primary cause of neurological symptoms due to __._.. _......_ 5. Flow separation can be seen in carotid bulbs and will be represented by a short flow __ 6. Transient symptoms that manifest as speech difficulties can be considered __...__.. __._.__._ 7. Neurological deficits lasting between 24 and 72 hours are classified as __..._ 8. If significant flow turbulence is recorded in the proximal law the usual carotid, it becomes imperative to examine __._.. _ 9. Usually there are two recommended methods for distinguishing the internal from the external carotid artery. In one method, one would perform ___ to show oscillations on the Doppler spectrum. 10. The use of curved or phase fan is recommended for examination of distal internal carotid arteries, especially in patients with apathy veins, fibromuscular dysplasia or vessels that are __.). _.). _)..). _).. 11. In order to assess the subclavian artery, pliers are placed in a(n) __ orientation at the base of the neck. 12. The internal features of plaque found in the extracranial cerebrovascular system are usually associated with the __ 13 plaque. Bleeding inside the plaque under the fibrous cap (intraplacal bleeding) can cause plaque to become __ 14. Dissectment of intimacy, especially in common carotid arteries, can be mixed with artifacts from the wall __._.. _ 15. __ injury is defined as any adverse condition of a patient who is unintentionally induced by a healthcare professional during a diagnostic procedure or intervention. 16. Latent, indecisive, interchangeably and completely are concepts describing phases _ 17. Wave contour distal significant snorosis is often called __ pattern, characterized by a moist, rounded waveform with reduced speed and delayed acceleration. 18. In the presence of significant common carotid stinosis, the criteria of the ICA/ICATN ratio are __ 19. ____ Doppler is particularly useful in detecting extremely low speed flow, including string character flow. 20. According to criteria developed by the University of Washington, the categories of snoosis below the threshold of 50% differ from each other in the presence or absence of flow separation, the extent of spectral __ Short answer 1. How can internal and external carotid arteries be safely differentiated? 2. What is the primary criterion for determining stinosis of the internal carotid artery? Once this primary threshold has been exceeded, what secondary criterion is used to further categorize the disease? 3. According to the recommendations of the Consensus Panel, what are the findings consistent with the occlusion of the internal carotid artery? 4. What did NASCET identify as the best criteria for determining >70% snoosis? 5. How is storosis determined in extracranial vessels other than the internal carotid artery? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. Based on the characteristics of the Doppler spectrum from this internal carotid artery, what is the possible cause of this wave contour? Based on doppler characteristics in this common carotid artery, what is the possible cause of this wave contour? CASE STUDY 1. 72-year-old patient presents vascular laboratory for duplex evaluation of carotid arteries. After examination, these images are obtained from the left carotid system. Based on these images(s) what can be inferred about the left internal carotid artery and (b) what would you expect the findings to be in the right carotid system (assuming no significant stinosis)? 2. A 68-year-old male patient presents a vascular laboratory for carotid vertebrae two-storey examination of arteries. Brachial blood pressure in this patient have been reported to be 142 mm Hg on the right and 114 mm Hg on the left. During the two-level study, bilateral carotid artery systems were reported without significant stenosis; however, increased velocity was reported in the left Sukklav artery. In addition, a waveform of alternating flow type is observed in the left vertebral artery, while the right vertebral artery shows a normal Doppler wave contour. Based on these findings(s) what disease process occurs in this patient and (b) what additional test could be performed to help increase these findings? ANSWERS: CHAPTER 7 Match 1.c 2. d 3. f 4. e 5.b 6. marking image 1-3. 1-1. 2-3. 2-2. 2-1. Distal Internal Carotid Artery Proksimal Internal Carotid Artery Area Of Carotid Bulb Common Carotid Artery Internal Carotid Artery Outer Carotid Artery 3-3. 3-2. 3-1. Common Carotid Artery Internal Carotid Artery Outer Carotid Artery Multiple Choice 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.c c b a c 13. and 14. 15. 16. 17. d c c 18.b 19. d 20. a Fill-in-the-Blank 1. 7. 7. 5. 4. 3. 2. 11. 10. 9. 8. 16. 15. 14. 13. 12. 19. 18. 17. stroke One third of neurological collateral flow reversal of aphasia reverasia A conspicuous ischemic neurological deficit (RIND) brachiocephalic artery temporal taps deeper transverse echogenicity of unstable inner jugular veins Iatrogenic steal the phenomenon of tardus parvus not valid Power extends short answer Two main methods used to differentiate ICA from ERS. First, ecA is usually found medial on ICA and has multiple branches outside of carotid bifurcation. Secondly, a temporal touch manoeuvre can be used in which the superficial time artery is touched, sending a series of oscillations down the ECA that can be visualized in the spectral wave form of the ECA. 2. The primary criterion for determining the degree of ICA stinosis is PSV, specifically PSV >125 cm/s is consistent with stinosis of >50%. Once this threshold is met, EDV becomes a secondary criterion used to further categorize the disease, especially EDV >140 cm/s indicating >80% snoosis. 3. There are no recognizable patent lumens on the grey flow shoot and no flow with PW Doppler, color doppler or Doppler power supply. The color and power of Doppler are especially useful in this case because near occlusive lesions can be misdiagnosed as occlusions when only grayscale ultrasound and PW Doppler spectral wavelengths are used. 4. NASCET has defined the best criteria for determining snoosis of >70% as PSV >230 cm/s or internal carotid to the usual carotid PSV ratio of 4.0 or greater. 5. Non-ICA extracranial vessels do not have specific speed criteria; therefore, for the determination of snoosis are these vessels, more general guidelines apply. These guidelines include focal speed increases in PSV twice the usual proximal site (speed ratio >2), presence of posttenotic turbulence, and distal waveform changes such as wet, rounded waveforms with delayed acceleration (tardus parvus). Image Assessment/Pathology 2. Proksimal snorosis Distal occlusion CASE STUDY 1. 1. a. The left internal carotid artery is completely occluded, as evidenced by the lack of flow in the ICA lumen, as well as the higher than normal waveform of resistance observed in the EZTN. B. On the right, speeds and wavelengths would likely fall within normal parameters; however, speeds could also increase due to compensatory flows that could occur if the right acts as a significant collateral. 2.a. Latent subclavian theft is in this patient based on left succlassical stinosis, characteristics of alternating flows in the left vertebrae and large differences in brachia pressure. B. Reactive hyperemia can be performed to show a change from latent theft to total theft. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY CONCEPTS 1. ______ aneurysm 2. ______ arteritis 3. 4. 5. 6. 7. 8. ____ body carotid tumor ____ disection ___ fibromuscular dysplasia ____ intimal flap ___ pseudoaneurysm __ definition of artery dilation with disruption of one or more layers of the vessel wall causes hematoma to spread; it is also called a false aneurysm of Tears along the inner layer of the artery resulting in splitting or separating the walls of the blood vessel Localized dilation of the artery wall Benigna mass (also called paraganglioma or chemodect) of the carotid body, what is a small round mass on the carotid bifurcation A small tear in the wall of the blood vessel, resulting in part of the intimacy and part of the media protruding into the lumen vessels; This free part of the blood vessel wall may appear to move with pulsations in the flow Quality of torturous, meticulous and twisting Abnormal growth and development of the muscle layer of the wall artery with fibrosis and collagen deposition causes stenosis Inflammation of the examination of the artery chapter Multiple choice Complete each circling question by circulating the best answer. 1. Pulsatila mass at the base of the neck can be indicative (and often replaced) by an aneurysm, when the most likely torturousness of what follows? a. Proksimal sukklavial artery b. proksimal vertebral artery c. proksimal ordinary carotid d. proximal inner jugular vein 2. What is not the characteristic of flow in secondary lumen created by tear or dissection? b. the same flow direction as in the right lumen flow direction, exiting a.c. false lumen through secondary proximal tear alternative d. antegrade/retrograde flow pattern in and out of false high-speed lumens as would be seen in stenosis 3. What is the likely source of symptoms in patients under 50 years of age presenting themselves to a vascular laboratory with symptoms of stroke (without typical risk factors)? b. dissecting of one of the snorosis of carotid vessels due to atherosclerosis a.c. carotid tumour of the body d. excruciating distal ICA with kinking vessel 4. When performing Doppler on the etile inner carotid artery, how should the cursor be aligned if the speed measurement has to be done on the curved segment of the artery? A. Position the corner pointer so that it is located on the inner inside of the curve. B. Position the corner pointer so that the center of the pointer is parallel to the walls and the central stream. c. Position the corner pointer so that the end of the pointer parallels the walls At d. top point of the curve Place the corner pointer where the highest speeds are indicated by doppler color. 5. Which of the following is the main feature that should be present for diagnosis dissecation? b. The colour pattern clearly shows two flow directions in the right lumen a.c. a recognizable thrombus inside the false lumen atherosclerosis along the back d. wall of the hyperehic (white/bright) line in the lumen of artery 6. What condition consists of a repetitive pattern of narrowing and small dilation in the internal carotid arteries, giving the appearance of a series of beads? a. dissection b. aneurysm c. fibromuscular dysplasia d. presence of enlarged lymph nodes 7. In patients with hypertension, an accidental diagnosis of fibromuscular dysplasia in the carotid artery system should lead to a subsequent assessment of which vessels(s)? a.b.c. d. sukklav arteries of the renal artery of the intracranial vessel aorta 8. Which of the following describes the diameter of the vessel >200% of the diameter of the normal part of the ICA or >150% of the EZTN? a. Real aneurysm of carotid vessels b. large carotid lamp c. normal carotid lamp d. pseudoaneurism 9. a.b.c. d. What is the distinguishing flow pattern in the neck of pseudoaneurysm? low resistance arterial sample alternating, on-and-fro sample fasic venous sample high-speed stinotic sample 10. Why is it important to thoroughly assess the wall of the artery vessel where perforation led to pseudoaneurysm? A. Aliasing is very likely in the field of perforation. B. Disseament may occur along the wall of the vessel. c. Thrombosis is likely to occur in this area. d. Plaque is often present in the area. 11. .b.c d.d. When is radiation-induced artery injury suspected? The plate is widespread. Plaque has high echegenicity. Plaque is vascularized. The plate is insulated and is located in an atypical area. 12. What are the main forms of arteritis found in the carotid system? B. Takayasu's disease and temporal arteritis giant cell arteritis and FMD a.c. FMD and CBT d. none of the above 13. 62-year-old woman presents vascular laboratory pulsatil mass in the neck, and hoarseness in the voice is observed. What would you suspect? a. carotid tumour of the body b. spontaneous disseasion of c. fibromuscular dysplasia d. common carotid artery aneurysm 14. Why is it crucial to examine the entire visible length of the vessel when assessing the surface time artery for signs of temporal artery? A. The inflamed area is not continuous. B. The ship is often eausy. c. Dissement is often present locally. d. Dilation areas are present locally. The 15th 30-year-old female presents the vascular laboratory with reduced radial impulses and claudication of the upper extremities. What would you suspect? A. Takayasu's disease b. giant cell arteritis c. carotid tumor of the body d. dissection of the 16th 60-year-old female presents the vascular laboratory with a history of headaches and tenderness in the time area, as well as jaw claudication. What would you suspect? A. Takayasu's disease b. carotid tumor of the body C. giant cell arteritis d. spontaneous dissectment of the 17th 25-year-old man involved in competitive bike races presents in the vascular laboratory symptoms of headaches and subtle neurological changes after a collision on the track. What would you suspect? a. Giant cellular arteritis b. spontaneous dissectment c. Takayasu's disease d. carotid tumor of the body 18. 75-year-old man with a long history of COPD presents in the vascular laboratory for the evaluation of his carotid arteries. Random mass is visualized on carotid bifurcation on the right side, splaying the inner and outer carotid arteries. What would you suspect? a. Spontaneous dissection b. carotid tumor of the body c. giant cellular arteritis d. Takayasu's disease on January 19th, 1995, was the most common in the world. You are asked to assess the pulsatile neck mass in an 80-year-old female with the recent placement of a central line in the right inner jugular vein. What would you suspect? a. Pseudoaneurysm b. increased lymph node c. carotid tumor of the body d. disseasion 20. 50-year-old male with a history of non-Hodgkin's radiation-treated lymphoma presents in the vascular laboratory with some neurological changes. What would you suspect? a. Body carotid tumour b. enlarged lymph nodes c. radiation-induced arterial disease d. dissecation fill-in-the-blank 1. It is difficult to apply flow rate criteria to accurately assess the eduous internal carotid artery. Therefore, it is recommended that the combination of __ recording together with Doppler speeds will show a suspicious area. 2. Dissealing an arterial wall can create what is commonly called __ lumen. 3. It is important to obtain a thorough medical or life history to evaluate subtle neck trauma in patients with __._.. _ 4. With dissections that seem spontaneous, the primary risk fact is often __ 5. Fibromuscular dysplasia affects predominantly __ arteries. 6. One of the best tools available on two-storey ultrasound to clearly show the appearance of a series of beads associated with fibromuscular dysplasia in the internal carotid arteries is __.. _ 7. The doppler spectrum in the arteries found inside the body's carotid tumor will usually display __ characteristic resistance. 8. In order to avoid overestimating the diameter of the carotid artery aneurysm, measurements should be taken at the widest diameter in __ view along the flow rate. 9. Penetrating trauma to the neck, the presence of a bypass in the carotid system or a history of endarterectomy can (although rare) lead to the formation of __._.. _. The area of maximum narrowing seen with radiation-induced arterial injury is usually at the end of the područja_ _ 11. The long, homogeneous narrowing commonly seen in a young female patient's sukklav artery would suggest __ 12. In a cross-view, the halo surrounding the outer layer of the artery of the face may suggest __. 13. Two clearly different Doppler spectrums seen as Doppler sampling on each side of the white line in arterial lumens suggests __._...._......._ 14. A typical pattern of color flow within pseudoaneurysm in a transverse point of view will show a(n) __ appearance, with red on 15. 16. 17. 18. 19. 20. half the mass and blue on the other. Inflammation of the artery, which can lead to the breakdown of the structure of the arterial wall, is generally considered __._.. _._ The injury to vase vases of the vaseum, which is located in the media of the arterial wall and results in fibrosis of part of the wall, is the basis for the lesions seen with __.. _.. _ Typically, non-negative neck paragangliomas are also called __ Abnormal growth of smooth muscle cells in the media of the internal carotid artery has been shown by the underlying pathological mechanism __ It is believed that possibly one quarter of the adult population is present with some degree __ bilaterally, predominantly in the distal internal carotid arteries. In order to ensure that the changes in speed (especially sudden increases) in the torment vessel are the result of snoosis rather than sudden changes in flow direction, vessels should be thoroughly tested in __ Short response 1. How can pseudoaneurism be differentiated from an enlarged lymph node? 2. In addition to the ultrasound findings, what should a vascular technologist pay attention to when evaluating a patient suspected of being unusually vascular pathology? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. Describe the flow direction in areas A, B and C (relative to pliers). 2. In area B, how would you mark the mosaic of the colour seen? 3. What is the arrow most likely pointing to? What would the Doppler spectrum seen here (in the context of the pathology shown) suggest regarding the volume of the sample? CASE STUDY These two images were taken at the same level in the patient. Which artery is most likely shown in these pictures? Why? What techniques are used in each image to show the flow? What is the advantage of using each technique? Flow rates are recorded as: PSV: 98.7 cm/s and EDV: 21.6 cm/s. What is missing? Talk about the accuracy of the data. These images were taken at the bifurcation level of the internal and external carotid arteries. What rather unusual pathology is most likely represented in this picture? Describe relevantly which leads to your conclusion. Between Image 1 and Image 2, the sonographer changed one of the color display settings. Explain the reasons for the choice. What alternative tool could be used? What symptoms can this patient have? The 69-year-old woman was presented to a vascular laboratory with jaw claudication, visual disturbances and tenderness over her eyelid. This image was taken during an ultrasound examination. What does this picture suggest? Which other vessels may be affected? ODGOVORI: POGLAVLJE 8 Podudaranje 1. c 2. h 3. d 4. 5. 6. 7. 8. b g e a f Višestruki izbor 1. c 2. d 3. a 4. 5. 6. 7. 8. 9. 20. 19. 18. 17. 16. 15. 14. 13. 12. 11. 10. 6. 5. 4. 3. 2. 1. 7. 13. 12. 11. 10. 9. 8. 17. 16. 15. 14. 20. 19. 18. 1.b d b a b a d a d a c b b a c Fill-in-the-Blank boja lažno spontana distenzija hipertenzije bubrežne arterije snage Doppler niske uzdužne pseudoaneurizme distal Takayasu bolest div stanica arterijatis seciranje yin-yang arteritis zračenja-inducirana arterijska ozljeda karotidni tumori tijela fibromuskularne displazije mučnost B-mod Kratki odgovor Hranjenje arterija na svaku strukturu može pomoći diferencirati dva. Pseudoaneurysms have a neck that connects to the original vessel, which has a characteristic flow pattern. Within the pseudoaneurysm itself, a swirly, yin-yang pattern was recorded. The feeding artery in the lymph node will have a characteristic arterial pattern of low resistance. The flow inside the lymph node will also show low resistance of the arterial sample, as well as an apparent venous flow. 2. Ultrasound findings are important and are often unique to any unusual pathology; however, patient history plays a very important role in determining which pathology a technologist should take into account. Image Assessment/Pathology 4. A = away, B = towards, C = away Aliasing Disseasing False Lumen Case 3. 2. 1. Study 1. The artery most likely shown in these images is the internal carotid artery. One quarter of older adults (especially females) show pronounced mucosa of the internal carotid artery. Figure 1 shows the flow using Doppler power, and Figure 2 shows the flow using a pulse wave and Doppler color. The power of the Doppler does not depend on the angle of inczonation and therefore can show the flow through the lumen of the vessel. The color and spectral Doppler depend on the angle and may not accurately display the flow through the boat's lumen. There's no angle on the Doppler Cursor where speeds are recorded. Speeds are also recorded in the most emaciated areas of the vessel, which can cause falsely elevated speeds. In this case, it would be important to record speeds at different points within the vessel, especially in areas where the vessel is flatter and pay attention to changes not only in speed, but also turbulence and the shape of the Doppler spectrum per se. Pathology the most in this image you can see the body's carotid tumour (CBT). Carotid bodies are usually found when bifurcating the internal and external carotid arteries. In its normal state, the accumulation of cells at bifurcation is uninteged on ultrasound. After these cells grow or multiply due to their locations, the resulting tumor will usually displace the internal and external carotid arteries, resulting in the typical appearance seen here in which both arteries wrap around the egg or circular mass. The Doppler color scale is lowered in the second image (at the expense of creating an alias in the main arteries) to show that the body's carotid tumor is highly vascular. Retaining the standard doppler color setting used for residual carotid system inspection may not be allowed to detect flow to the carotid body. Power Doppler could also have been used to show the vessels in the tumor. Symptoms of CBT include discomfort in the area, dysphagia, headaches, or a change of voice. 3. Temporal or giant cellular arteritis is the most likely diagnosis in this patient. Other vessels that could be affected would be aortic arc and carotid vessels, in particular external carotid arteries and its branches. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ carotid artery stenting 2. ______ carotid endarterectomy 3. ____ arteriotomy 4. ______ in-stent restenosis 5. ______ definition of polytetrafluoroethylene Surgery during which the carotid artery opens and removes plaque to restore the normal luminal diameter Narrowing of the luminous body of the stent, which causes stinosis Surgical incision through the wall of the artery into lumen Shortened PTFE, a synthetic graft material used to create graft and blood vessels; The common name of the brand is Gore-Tex Catheter-Based Procedure in which a metal mesh tube is placed in an artery to be opened, after balloon angioplasty to dialysis stinosis CHAPTER REVIEW Multiple choices Complete each question by circling the best answer. 1. Where does a typical carotid endarterectomy involving longitudinal arteriotomy begin and end? b. normal distal ECA on bulb and ICA normal proximal ICATN on ICA a.c. normal proximal ICA bulb d. normal distal part of ICA in ZTN 2. What of the following is not a common problem that leads to stenosis at the level of arteriotomy performed during endarterectomy? a. use of patch b. narrowing due to seams c. retained plaque d. hyperplastic response 3. Why doesn't the eversia technique for carotid endarterectomy require a band-aid? A. The stitches are on the distal cone of the ICA. B. The stitches are on the surface wall of the artery. c. After the procedure, the ICA returns to its original position. d. The stitches are on the light bulb area. 4. When assessing the site of endarterectomy within 48 hours of surgery, it should be borne in mind to prevent infection using all the following EXCEPT: the use of sterile gel. leaving sterile dressing in place. sterile pads. sterile equipment cover. 5. Due to limitations in the assessment of vessels after endarterectomy, what becomes more important for the assessment? b. flow quality in vertebrae flow quality in proximal ICA a.c. flow quality in distal ICA d. flow quality in contralateral ICA 6. a.b.c. d. What malformation can be associated with swelling of the neck after the HUP? pseudoaneurysm hematoma infection all of the above 7. What is the collection of perivascular fluid above the improper buckling of the patch indicator? a. Active infection b. pseudoaneurysm c. hematoma d. patch rupture 8. What is stenosis at a CEA site usually considered to be the result more than 24 months after endarterectomy? a. Neointimal hyperplasia b. thrombosis c. atherosclerotic process d. intimate flap 9. During the two-storey evaluation of the patient after the HUP, residual plaque was recorded at the distal end of the surgical site, creating a sudden edge of the arterial wall. What is this deficiency commonly called? a. intimal flap b. disseasion c. shelf lesion d. myointimal hyperplasia 10. If the speed criteria established for the original (unoperated) carotid arteries could not be valid in post-CEA ICA? a. HUP with primary closure b. HUP with the closure of patch c. eversion CEA d. original criteria are not used after any hup procedure 11. a.b.c. d. Which artery is most commonly used to insert cas catheters? pulmonary artery common femoral artery brachial artery common carotid artery 12. What guide is used for CAS, which is usually used for deployment and positioning for the first time? a. Embolism protection device b. balloon catheter c. stent catheter d. to inn 13. Stent distortion is reported by mechanical forces on the neck from all the following except: tilting the head. Coughing. rotation of the door. Swallowing. 14. For maximum efficacy, how far should the stent extend the proximal and distal to the lesion? a. a few centimeters b. less than 1 mm c. a few millimeters d. more than 10 mm 15. During the two-level inspection after CAS, the stent was noted to have an irregular limit with a sudden edge. Turbulence was recorded by color and spectral Doppler. What do these findings suggest? a. stent fracture b. stent deformation c. stent restenoza d. dissection 16. a.b.c. d. What is the statement true for the post-procedure speed increase in CAS? It's always a sign of restenosis. It's not as common as the HUP. It's not necessarily a sign of restenosis. This is the result of high stent compliance. 17. How is the flow maintained in the ECA when the stent is deployed from the ICATN? A. european auditor of the European Auditor. B. Retrograde flow from the surface temporal artery. c. Through a bypass installed with a stent. d. Flow through stent interstices. 18. During a two-storey assessment of the carotid artery stent, the velocity at the distal end of the stent reaches 350 cm/s. Turbulence has been reported distal in this area. What do these findings suggest? a. >30% in stent sthesis b. >80% in stent snosis c. >50% in stent sthesis d. normal finds in stent 19. When you monitor the ICA stent, when do most > 50% stenos? a. within 18 months b. within 1 month c. within 12 months d. within 6 months 20. What next can cause difficulties with carotid artery stents, such as balloon expansion restriction, inadequate stent spread and increased risk of stent fracture? a. Smooth, homogeneous plaque b. torturous anatomy of the carotid artery c. calcified plaque d. intraluminal thrombus Fill-in-the-Blank 1. Real restenosis of carotid endarterectomy in the first few months after surgery is due to __._._ 2. The solution most commonly used to reduce the potential for stenosis caused by a carotid endarterectomy procedure involves seeding __._....._ 3. Most of the problems that arise after carotid endarterectomy will be located at the limit of arteriotomy __ 4. A vein used as a surgical patch for a carotid endarterectomy will often permeate, such as providing a double layer of the vessel wall, with __ vein facing the lumens of the artery. 5. The evernasia technique for endarterectomy involves complete __ ICA and ECA at the carotid lamp level. 6. It is not unusual to find captured air directly above the CEA site. In this case, the sonographer could take pictures of vessels using an approach that is more __ 7. The patch and swelling associated with CEA usually lies __ to endarterectomy. 8. If pseudoaneurysm is visualized after the HUP, the most likely source for this pathology would be __ 9. A potential complication with a synthetic patch is that they are more __ than a vein patch, especially when the synthetic patch is aneurysmal. 10. The conclusion of a recent study on the speeds of a normal ICA distal cea patch was that these speeds were __ of those of unoperated ICA. 11. Postprocedural complications of CAS are not limited to carotid vessels, but can also be seen in the __ 12 artery. Although the stent material is highly reflective, it does not produce ____ that can limit the stent visualization. 13. The stent should be painted in several flat aircraft, ensuring that __ stents on the surrounding board are completed. 14. Protrusion of stents in lumen vessels, together reduced flow channel through the Doppler color stent, denotes stent __ 15. The biggest concern of poststent evaluation is __ 16. Increased catheter manipulation at the calcified plaque level can increase the response __ and lead to restenosis. 17. When using flow rate criteria, the primary discriminator of significant restonosis in CAS is __ 18. The superior restenosis seen in CAS should correlate with PSV of __. 19. Dense scope calcification is of particular concern to CAS, as the expansion of balloon __ 20. Reintervention for CEA or CAS would be warranted if the lesion treated leads to __._ Short answer 1. Why do surgeons use patch closure arteriotomy from carotid endarterectomy? 2. What materials are commonly used for surgical patches for carotid endarterectomy? 3. After the carotid stent is set and self-spreading is allowed, what is the next step? 4. What sonographic imaging techniques or tools should sonographers use to assess safety for evidence of diffusion tapering? 5. When would a re-study of the HUP or CAS be required? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. What does pathology suggest in this image of a Dacron patch in a carotid artery? In this picture taken on a follow-up exam after a carotid endarterectomy, what is the most likely structure outlined by an arrow? What does the arrow in this picture most likely represent? What is shown in these pictures? What is shown in these pictures? CASE STUDY 1. A 55-year-old man with a long history of type I diabetes was recently treated for hemodynamically significant stinosis of the right internal carotid artery, with a stent. The procedure was performed on May 2nd. The patient is scheduled to monitor the sonication of stented carotid a month after the procedure. On June 5, the patient reports to the vascular laboratory for examination. The sonograph records the flow rate in the range of 150 cm/s within the stent (vs. speeds of 90 cm/s in ICA proksimal and distal stent). What should be taken into account in relation to these flow rates? What should be ruled out in this first post-round exam? On December 12, the patient reports to the vascular laboratory for a six-month follow-up. His doctor noticed bruit during a physical examination the previous day. What should be taken into account based on these findings? What should be recommended for follow-up based on the likely results in this exam? 2. A 78-year-old woman underwent a left carotid endarterectomy 1 month before being introduced in your vascular laboratory. The operation was performed at another object and the notes are not available. The patient is referred by a doctor based on concerns from his son that his mother does still experience some pain and swelling on the left side of the neck. Without operational notes, what should you consider about the closure used in the process? What complications should be considered in connection with this type of closure? When assessing the swelling from the accumulation of fluid from inflammation or infection, how can you distinguish swelling from the place of the incision from the infection at the place of closure? ANSWERS: CHAPTER 9 Match 1. e. 2. a 3.c 4.b 5. d Multiple choice 1. d 2. and 3. d 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.b c d a c b a b c a c d d b a c Fill-in-the-Blank 1. 2. 3. 4. 11. 10. 9. 8. 7. 6. 5. 16. 15. 14. 13. 12. 12. 12. Neointimal hyperplasia patch distal intimacy transection posterior superficial disorder of the seams thrombogenic higher common femoral artifact or shading apposition deformation restenosis hyperplastic PSV 20. greater than 300 cm/s limits symptoms Short response 19. 18. 1. The use of patches reduces the potential for stinoosis by expanding the boat's lumens. The use of the patch also reduces the potential intrusion of hyperplastic response, as well as reduced perioperative carotid thrombosis, perioperative stroke and late restonosis. 2. Autogenic veins or synthetic materials, such as Dacron or polytetrafluoroethylene. 3. The second balloon catheter is installed to allow the stent to fully expand. 4. Color and/or power Doppler, as well as gray recording scale and spectral Doppler. 5. Re-research would be necessary when the treated lesion progresses to high-quality stinosis, the patient experiences symptoms of cerebrovascular accident or both. Image assessment/Pathology 1. Fluid collection/infection in Dacron patch Patch 2. 4. Intimal flap Deformed stent; the walls of the stent are not pleasant to the walls of the vessel with 3rd plaque observed between the walls of the vessels and the stent. 5. Severe stinosis at the distal site of the carotid artery/proximal stent. Case study 1. Speeds ranging from 150 cm/s in the stent are not uncommon and may be due to a change in conformity between the original artery and the rigid stent. In the absence of evidence of thrombosis, stent displacement or other evidence of snoosis, this exam would be considered normal and follow-up recommended for 6 months. Due to the presence of bruit, in-stent restenosis should be considered. If the narrowing of lumens is less than 50%, more frequent serial exams should be ordered. If the narrowing is greater than 50 % and/or progression is rapid, a review of the procedure should be strongly considered. 2. The use of patches to close endarterectomy sites should be considered. Complications associated with the patch include pseudoaneurysm and infection (especially with a synthetic patch). Swelling from inflammation at the site of the incision will be more superficial and usually more painful than the fluid associated with infection or band-aids. Infection by accumulation of fluid at the level of the patch will present itself as a encapsumented liquid in the soft tissue surrounding the patch. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ transcranial Doppler 3. ______ transcranial duplex recording ______ circle Willis 2. 4. 5. 6. 7. 8. ____ vasospasm __ collateral ______ pulsatility ______ Lindegaard ratio ___ Silk ratio DEFINITION Non-invasive test on intracranial cerebral blood vessels using ultrasound and providing both blood vessel images and a graphical representation of the velocity inside the vessels Expressed as Gosling's pulsatity index (peak systalic velocity minus the ultimate diastolic velocity divided by timed peak speed) Vein compared to another vessel; the vessel that is important for maintaining blood flow around another sernotic or occluded vessel The medium cerebral artery (MCA) means the rate divided by the submandibular internal carotid artery (ICA) means speed. This ratio is useful in differentiation of increased volume flow from reduced diameter when encountering high speeds in MCA or intracranial calculation of the ICA ratio used to determine vasospasms from hyperdynamic flow in the back circulation. Bilateral velocity of vertebral arteries recorded in the atlas loop is added together and added on average. This average speed is then divided into the highest basilary mean speed Approximately circular anastomosis of arteries located at the base of the brain Sudden tightness in the blood vessel, causing blood flow restriction A non-invasive test that uses ultrasound to measure the rate of blood flow through the intracranial cerebral vessels of anathOMY and PHYSIOLOGICAL EXAMINATION Marking images Complete the markings in the following images. 1. The Circle of Willis and the Branches. 2. Four approaches used for intracranial exams. CHAPTER REVIEW

Multiples Complete each question by circling the best answer. 1. What is the range of average diameter of basal cerebral arteries? a. 1 to 3 cm b. 1 to 3 mm c. 2 to 4 cm d. 2 to 4 mm 2. It is estimated that 18% to 54% of individuals display variations at the Willis circuit level. Which of the following is not one of these variations? a. variation in the number of arteries b. variation in vessel calibre c. variation of vessel course d. variation of origin of branches 3 a.b.c. d. What's the statement on the anterior cerebral arteries that's false? Both arteries (right and left) are often identical. The anterior communication artery is located above the optical chiasma. Both arteries communicate via the anterior communication artery. Both arteries first course mediated to internal carotid arteries. 4. What term is used when posterior cerebral arteries depend on the internal carotid artery for blood flow (at least partially)? normal PCA flow b. fetal origin pca c. transposition PCA d. anomalous position PCA 5. Which of the following is the typical characteristic of an endless limb for a transcranial Doppler? a. 1 to 2 MHz pulsating wave b. 1 to 2 MHz continuous wave c. >4 MHz pulsating wave d. >4 MHz continuous wave 6. What is the frequency range of Doppler in the standard two-storey imaging system for transcranial imaging? a. 1 to 2 MHz b. 2 to 3 MHz c. 4 MHz d. >4MHz 7. What is the initial target vessel to explore through a transtemporal acoustic window? a. ACA b. PCA c. MCA d. carotid siphon 8. a.b.c. d. What do Lindegaard and BA/VA ratios help categorize? distal ICA synosis subarachnoid bleeding dissect vasospase 9. a.b. d.c. What is the relationship THAT MCA > ACA > PCA = BA = VA? relative flow rates of relative vessel size in relative flow direction in vessels relative to acoustic window 10. Which of the following is not the criterion used to identify vessels or segments of vessels in intracranial circulation? b. flow direction in relation to vessel diameter no.c. sample volume depth d. vessel flow rate 11. What imaging technique creates a display that shows flow intensity and direction in multi-depth color bars, creating a path map to track signals from the vessel? a. PW spectral Doppler b. CW spectral Doppler c. color Doppler d. power M-mode 12. What of the following is not the primary diagnostic feature of doppler signals for the assessment of intracranial blood vessels? b. changes in different ratios from the established speed change criteria e.g. d. have identified changes in flow pulsatity criteria from established standards c. changes in flow direction from established standards 13. What collateral pathway will NOT show direct evidence of significant carotid artery disease? a. crossover collateral through ACoA c. rear to anterior flow through PCoA leptomeningeal collateralization b.d. reverse ophthalmic artery 14. What characteristic is NOT part of the five primary criteria used to identify the intracranial arterial segment? a. flow direction b. pulsatity index c. sample volume depth d. window/access used 15. A limited transcranial Doppler or transcranial two-storey imaging exam can be ordered for all of the following EXCEPT: assess the anemia of heart cells. monitor microembolism during endarterectomy. vasospasm monitoring. assess the suffering of one vessel. 16. What is the statement of use (and benefits) of audio signals during TCD and TCDI FALSE? A. The nuances in the signal can be heard before they can be seen on the Doppler spectrum. B. High-speed signals could be missed due to the turbulent flow on the Doppler spectrum. c. Audio signals can help redirect sonographers into acquiring the Doppler spectrum. D. has no sound capability. 17 .b.c. d. What is the following Atlas loop approach used for? Visualization of the inner carotid of the siphon. Visualization of distal vertebrae. Obtaining data for the characterization of vasospasm of the basic arteries. Alternate window on foramen magnum approach. 18. To ensure patient safety when using transorbital access, what technical setting do you always need to address? A. Reduce the acoustic intensity. B. Lower the speed scale. c. Increase Doppler's winnings. d. Increase the doppler color scale. 19. At a depth of about 65 mm from the transtemporal window, with a Doppler door pattern of 5 to 10 mm, you should get two Doppler spectrums (one on each side of the baseline). What do these Doppler spectra are for? a. Siphon/MCA b. right MCA/left MCA c. ACA/ACoA d. MCA/ACA 20. When is the evidence of vasospasm usually seen after subaracloid bleeding? a. 3 to 4 days after the bleeding began 6 to 8 days after the bleeding began 2 to 4 c.b d. weeks after the bleeding began 6 to 8 weeks after the bleeding started Fill-in-the-Blank 1. On average, the center of Willis' circle is about the size of __ 2. Anterior intracranial arterial circulation occurs as a continuation of __..._.. _ 3. Parasellar, genus and supraclinoid segments are part of __..._ 4. The anterior inferior cerebellar and superior cerebellar arteries are branches of __..._.. _ 5. From the transorbital window, the carotid siphon was identified at a depth of __ mm. 6. The best acoustic window for insonate vertebral and basilar arteries is through __ 7. The vessel identified through the transtemporal window at a depth of 65 mm with buttocks and poorer rotation on the tranducer is __._.. _........_.... 8. Regardless of the technique used (TCD or TCDI), the documentation of data obtained on intracranial arteries shall be based on __ 9. All arteries examined during TCD or TCDI examinations supply the brain except __._.. _ 10. When the umecer is placed 1.25 below the mastoid process and the back of the sternocleidomastoid muscle, the technique is called __ approach. 11. Gosling index expresses __ Doppler signals. 12. McA mean speed divided by submandibular ICA mean speed represents calculation for __ ratio 13. The Ypsylateral increased velocity observed in the ACA and PCA with significant stinose or mca occlusion resulted in 14.15. 16. 17. 18. 19. 20. ____ collateralization. Estimating the MCA from a time window with multiple rear locations will require targeting a transducer __..._._ The most common mechanism of posterior stroke circulation, usually a heart attack ______ Paediatric patients with ___ are recommended annual TCD screening to prevent stroke. For acute thrombosis, the __ scale is used to classify changes that can occur quickly with recanalization and re-occlusion in acute stroke. Mean flow rate in MCA of >200 cm/s, rapid daily increase in flow rate and hemispheric ratio ≥6.0 predicts the presence of significant __._.... A TCD signal containing very short or short, high amplitudes, one-way crackles, chirps or sowing indicates __.. _ The finding correlated with cerebral circulatory arrest is __ in wave form of TCD. Short answer 1. With transcranial Doppler, why is spectral expansion inevitable? 2. What are the main quantitative values used for diagnostic purposes in the transcranial exam? 3. Due to individual variations of the time window, how is this area divided? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. What do the profile of doppler spectrum and flow rates obtained in the right MCA suggest? In this picture, why should the examination be limited and the diagnosis difficult? What arteries of willis's circle couldn't get information for? CASE STUDY 1. You are asked to assess a 25-year-old man, an accident following a motor accident with a head injury, who is currently in critical condition in the intensive care unit. Your lab doesn't usually process neurological exams, so you don't have a protocol set up for these exams. What would be the main consideration in this case? To set up an effective protocol that would allow exams to be completed, the main arteries for monitoring would be minimal. What vessels would you assess and what approach would you use? How would you set a timetable for monitoring this patient? A 2nd 75-year-old woman was seen for follow-up in a vascular lab. Previous exams have documented severe snorosis of the distal right inner carotid artery. The patient remained mostly asymptomatic. In this examination, the result shows complete occlusion of the right internal carotid artery. He still doesn't remember a lot of changes or symptoms. Her doctor is ordering a transcranial study to evaluate intracranial circulation. What collateral pathways can lead to this redistribution of flow? What would you expect the flow to be intracranial (especially in terms of flow direction)? ANSWERS: CHAPTER 10 Match 1. h 2. a 3. f 4. 5. 6. 7. 8. g c b d e Image marking 1-1. 1-3. 1-2. 1-5. 1-4. 1-7. 1-6. 1-10. 1-9. 1-8. 2-4. 2-3. 2-2. 2-1. OA is an ophthalmic artery ACoA's anterior communication artery CS is a carotid siphon ICA's internal carotid artery ACA's anterior cerebral artery MCA's mean cerebral artery PCoA is posterior communicating artery PCA's posterior is the posterior of the artery PCA's posterior cerebral artery Artery VA is transtemploral transtemporal transorbital submandibular foramen magnum multiple choice 1. d 2. a 3. a 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.b and b c d a b d ad a Fill-in-the-Blank 1. 5. 4. 3. 2. 7. 6. 12. 11. 10. 9. 8. 17. 16. 15. 14. 13. 20. 19. 18. 18. frame internal carotid artery carotid siphon basilar Artery 65 to 80 foramen magnum PCA (posterior cerebral artery) spectral wave forms of ophthalmic artery atlas loop pulsativeness Lindegaard leptomening alley slightly anterior embolism sickle cell anemia Thrombolysis in brain Ischemia (TIBI) vasospas embolic events on-andfro or antegrade systolic and retrograde diascopic flow Short response 1. The neck of the sample is relatively large compared to the size of the estimated artery. 3. Median speed and pulsatity index Posterior, medium, front, 2nd and frontal locations Image assessment/Pathology 1. Vasospasm 2. The technical difficulties listed here would not allow for the assessment of the following arteries: MCA, ACA, Terminal ICA (most importantly), as well as ACOA, PCOA and P1 pca segment. Case study 1. Basal artery vasospasm. Medium cerebral (transtemporal window) and basilar artery (foramen magnum window). Daily exam for at least 2 weeks: in the first 3 to 4 days after the initial bleeding to monitor vasospasm; up to 8 days to record the peak of vasospasm; between 1 and 2 weeks to record vasospasm resolution. 2. Typical collateral pathways include ECA to ICA via ophthalmic artery, crossover collateral through ACoA, and rear to front collateral through PCoA. With eca to ICA via ophthalmic artery, the OA would be reversed. With a crossover, the Ypsylateral ACA would reverse, and the flow could be detected in the ACoA. With posterior to front collateral, increased flow would be recorded in the Ypsilateral PCA, and flow can be detected in PCoA. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ Claudication 2. ______ pain at rest 3. 4. 5. 6. 7. 8. ______ ankle-brachial index ____ pletismography ____ photopletymography ______ Raynaud's disease ___ thoracic drop syndrome ____ Allen test DEFINITION Pain in the extremities without exercise or activity, therefore, at rest, may occur in the area of the legs, feet or ankle Pain in muscle groups brought by exercise or activity that subsides with the cessation of activity; may occur in the calf, thigh and buttocks The ratio of sistalac ankle pressure to brachial sisstoly pressure of vasospasm of digital arteries resulting from exposure to cold; can be caused by numerous etiologies Indirect physiological test that detects changes in infrared light scattered in the back as an indicator of tissue perfusion Indirect physiological test that measures volume change or impedance throughout the body, organ or limb Plexus of the brachial nerve, subclavian artery or subclavian vein in the region where these structures exit the thoracic cavity and of course peripherally towards the hand A series of maneuvers that test the digital perfusion of the hand as they compress and release radial and ulnar arteries ANATOMY AND PHYSIOLOGY REVIEW Marking the image Complete the markings on the images that follow. 1. Various Doppler wave shapes. 2. Digital PPG wavelengths. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. Which method is most commonly used to calculate ABI? A. The lowest pressure on the ankle to the lowest sistalic pressure of the right or left brachia. B. The highest pressure on the ankle to the highest sistalic pressure of the right or left brachia. c. The lowest pressure on the ankle to the highest sistalic pressure of the right or left brachia. d. Highest pressure on the ankle to the lowest sistalic pressure of the right or left brachia. 2. .b.c d.d. What is the statement of intermittent claudication FALSE? Pain by exercising is relieved by rest. It can be asymptomatic at rest. ABI values are generally between 0.5 and 1.3. The value of the ABI can never exceed 1.3. 3. What is the statement on the importance of early assessment .b.c. d. presence of PAD IS FALSE? Patients are at increased risk of cardiovascular mortality. Patients are at increased risk of cardiovascular morbidity. Patients will eventually need amputation. PAD is a marker for systemic damage to arteries. 4. Paod progression can be established at the follow-up of patients by physical examination and clinical history, as the patient can describe all the following except: a decrease in walking distance. increase recovery time. skin and nails change. pain by changing position. 5. Severe PAOD may be suspected with all the following EXCEPT: leg pain while sitting. discoloration of the skin and scaling. claudication pain after less than a 50-ft walk. constant pain in the legs. 6. Thoracic drop syndrome may include all the following presentations EXCEPT: pain with the hand in a neutral position. neurological pain. I'm edeming my hands and forearms. pain with your hand raised above your head. 7. Techniques commonly used to indirectly test arterial perfusion in the thigh and leg include all of the following EXCEPT: pletizmography. photoplethysography. Doppler waveforms analysis. segmental systalic pressure. 8. In order to ensure the accuracy of the data, in particular for recording segmental sistan pressures, how long should the patient be allowed to rest? a.b.c. d. 5 to 10 minutes 10 to 15 minutes 20 minutes should not rest 9. What is the appropriate size for a blood pressure fox used on the extremity to ensure the accuracy of the data obtained to determine sistalic pressure? a. 12 cm wide cuff on upper arm b. 10 cm wide on the ankle d. between 10% and 15% wider than the diameter of the limb segment 20% c. wider than the diameter of the limb segment 10. All the following can result in incorrect measurement of sistafical pressure in the lower extremities EXCEPT: the cuffs are too narrow. the deflation rate is too fast. the segment of the limbs is raised above the heart. Dorsalis pedis artery is used to listen to signals. 11. What will the use of 4 cuffs in relation to method 3 cuffs to assess arterial disease in the lower extremities help determine? a. whether the disease is present on a distal femoral level. b. whether the disease is present at the level of proksimal femoral disease. c. whether the disease is present at the iliofemoral level. d. whether the disease is present on a popliteal level. 12. Which of the following clear diagnostic criteria for assessing the disease is between the two segments of the limbs when using sistalacic pressure determination? A. A drop of more than 30 mm Hg between the proximal and immediate distal segments. B. An increase of more than 30 mm Hg between the proximal and immediate distal segments. c. A 50 mm Hg drop between the proximal and immediate distal segments. d. An increase of 50 mm Hg between the proximal and immediate distal segments. 13. Which of the following is not a common method for induce symptoms by exercising in a patient suspected of having arterial insufiction but relatively normal at rest? A. Use a treadmill to walk with a set protocol. B. Have a patient walk at their own pace until symptoms appear. c. For the patient to perform the heel is raised until symptoms appear. d. Lifting the limb above the heart while the patient is lying on the test table. 14. Which of the following is not one of the main advantages of recording pulse volume (PVR)? A. Records the total perfusion of the segment. B. It can provide data even with calcified arteries. c. It is easy and quick to perform. d. Provides quantitative values. 15. What is the most convenient (and reliable) technique for obtaining digital pressures with the use of a small digital cuff? a. PVR b. PPG c. CW Doppler d. PW Doppler 16. What is the most suitable technique for recording changes in arterial insuffication with thoracic drop syndrome with a specific (and sometimes adapted) set of manoeuvres? a. PVR on the limb segment b. CW Doppler in the brachial artery c. pressure recording in the brachial artery d. PPG at digit 17. What are the typical changes in skin color (in the hands and fingers) associated with Raynaud's disease from room temperature to exposure to cold temperature and ending in rewarming? a.b.c. d. white, blue, red, blue, white blue, white, red blue, red, white 18. Allen test should be performed before all the following procedures EXCEPT: the formation of an arterous fistula. creating access to dialysis. harvest of cephalal veins for the bypass. harvesting of the radial artery for the coronary bypass. 19 Allen usually performed by placing PPG sensors on the middle or forefinger to record digit perfusion, while radial and ulnanar arteries are compressed at the same time. radial and ulnar arteries are sequentially compressed. radial artery is compressed individually. the ulnarna artery is compressed individually. 20. Using the PPG sensor on the landmark showing signs of increased vasospasm from the primary Raynaud's disease, what characteristic waveform will it usually display? a. peak pulse on the anacrotic part of b. anacrotic notch in late diastole c. dicrotic notch in systolic d. dicrotic notch in fill-in-the-blank 1 diastolic. Most often, symptoms of arterial disease are described as intermittent claudication because symptoms occur __..._ 2. Symptoms observed or described by intermittent claudication can determine the location of the disease because the disease __ is at the site of symptoms. 3. Symptoms of the lower extremity requiring sitting and/or spine flexures to relieve are usually associated with __._._ 4. Paleness of altitude and dependent rubor is usually noticed with __ arterial diseases. 5. The cause of primary Raynaud's disease is __ 6. PAOD in the upper extremities occurs in __ all cases. 7. Ideal positioning of patients for indirect arterial testing should take into account that not all extremities are elevated above __._._ 8. To record accurate segmental sistalic pressures, it is important not only to ensure that the cuff is the right size for the limb segment, but also to enable the patient to complete __ 9 before starting the exam. The ideal cuff deflation rate for accurately determining the return of a Doppler signal when measuring systole pressure in any segment should be approximately __..._ 10. The lowest ABI limit considered within the normal resting range is __.. _ 11. The change in ABI in the __ area between repeated studies indicates a significant change associated with worsening OF PAOD. 12. When recording pressures from the place of the proximala on the ankle, the vessel (PTA or DPA) with pressure __ is used to obtain a Doppler signal. 13. Under normal conditions (absence of disease), high thigh pressure using 4-cuff methods will usually be at least __ higher than normal brachiatic pressure. 14. In the upper extremities, using segmental pressure as diagnostic criteria, a significant disease will be likely when a decline of at least __ is recorded between two successive segments (from proksimal to 15. 17. 18. 19. 20. immediately distal segment). ABIes that return to sleep values after more than 10 minutes of postexercise are a good indicator __..._ Notwithout the growing debate about correct nomenclature used to describe continuous waveforms (CW) Doppler waveforms, the normal WAVE form of CW Doppler from the artery of the lower extremity should be __ Typical cuff inflation for recording segmental heart rate volume (PVR) is __.. CW Doppler and PVR analysis of waveforms are examples of criteria __ for the diagnosis of arterial disease. Normal TBI (toe/brachial index) should be at least __ Testing for increased sensitivity to cold using immersion in ice water should only be used in patients with suspected __._.. _._ Short answer 1. What are the characteristic features of intermittent claudication that distinguishes it from other causes of lower limb pain? 2. What is the typical protocol used to test exercise on the claudication symptom assessment bar? 3. What are the upper extremity positions used in testing for thoracic drop syndrome? 4. Why is normal resting sistal pressure higher on the ankle than on brahi (no technical errors)? 5. What are the typical contraindications to exercise in determining the severity of arterial insufiction in patients with a relatively normal resting test? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. 1. Which technique was most likely used to obtain these waveforms? 2. What does the size refer to (recorded as size 9? 3. Based on these images, where is the primary lesion? 4. This image was obtained from a patient sent to a vascular laboratory for evaluation before harvesting a radial artery for coronary bypass transplantation. How is the name of the test performed here? 5. Based on the results of this test that the arrow shows the results by compressing the radial artery, what would you conclude? CASE STUDY You are asked to interpret an indirect arterial assessment on a patient due to suspected artery inadequacy from one of your technologists. The patient is in the intensive care unit and unresponsive. The patient was recently admitted, and in addition to a doctor's clip stating a reduced heart rate in the left lower extremity, you have no other records available. The record shows an ABI on the left of 0.65 (at rest) with an ABI on the right of 1.02, and wave shapes as seen in the image. What technique was used to obtain waveforms on this exam? How do you know? What do the results suggest (based on analysis of waveforms and ABI)? Were there any technical faults? If so, explain. The patient presents the vascular laboratory for the upper extremity of indirect arterial evaluation, with an additional request for evaluation of thoracic drop syndrome. The patient notices left arm pain that seems to be associated with use, but not necessarily the position. There was a decrease in left radial heart rate compared to the right. The results of segmental pressure and Doppler waveform studies are in this picture. What do these findings suggest? Would TESTING TOS be appropriate in this person? Why or why not? Are there other vessels outside the upper extremity that could benefit from a duplex assessment based on these findings? ANSWERS: CHAPTER 11 Match 1.b 2. a 3.c 4. 5. 6. 7. 8. f e d g h Markup 1-1. 1-4. 1-3. 1-2. 1-5. 2-2. 2-1. Triphasic Bifašić: bidirectional Biphasic: one-way monophasic: moderate/ heavy monophasic: severe / critical Normal waveform A peak pulse waveform often in primary Raynaud's multiple choice 1.b 2. d 3.c 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. d a b d a d a c b a Fill-in-the-Blank 1. 4. 3. 2. 6. 5. 8. 7. 10. 9. 11. 17. 16. 15. 14. 13. 12. with exercise of proksimal spinal you severe idiopathic idiopathic less than 5% heart rests 3 mm Hg/s 0.9 0.15 highest 30 mm Hg 20 mm Hg multilease disease bidirectional 55 to 65 mm 19. Hg qualitative 0.8 18. 20. primary Raynaud's disease (also known as idiopathic Raynaud's disease) Short answer 1. Intermittent claudication occurs by exercise (each time the same amount), occurs in large muscle groups and can be reproduced. In addition, claudication is mitigated by quiet standing. 2. The typical treadmill workload ranges from a level of up to 10% of the class and 1 to 2 miles/h for a maximum of 5 minutes (or earlier if limited by symptoms). 3. To assess thoracic drop syndrome, wave forms are recorded with their hands resting on their laps; elbows to the back and hands almost upright, palms forward (military position); raised above the head; abducted from behind; straight to the side, (kidnapped) with his head forward, then completely turned left and then right (Adson manoeuvre); and any other position that causes symptoms. 4. Due to increased resistance and elastic twitching of the distal arteries (such as distal tibial arteries). 5. Cardiac arrhythmia, hypertension (>180 mm Hg), postcard procedure, chest pain (can also add shortness of breath and instability). Image estimation/Pathology 1. PVR or heart rate volume recording Size corresponds to winnings or 2. 3. waveform amplitudes Without information from a high level of thigh and based on the information provided, a significant disease is probably 4. present on the proximal to medium superficial femoral artery on the left side of Alen 5. test These results show that by compression of the radial artery the hand is no longer adequately purified (therefore the ulnaral artery does not contribute to the overall perfusion of the hand, and therefore palm arcs may be incomplete). Case study 1. PVR or pulse volume recordings (indicated by images of air present in each cuff and fixed pressure of 65 mm Hg at each level). On the left, the high pressure of the thigh is much lower than brachiate pressure with the associated wet, delayed PVR waveform. These findings orofemoral inflow disease. No other significant reductions in segment pressures were observed in the rest of the left leg. On the right, the ABI is within normal limits, and waveforms and pressures are consistent with normal findings, with the exception of high thigh pressure (technical error). A technical error was reported on the right foot. The real ABI is within normal limits, and PVR wave forms suggest normal findings throughout the limb; however, the right high thigh pressure is 117 mm Hg, while the highest is brachial 123 mm Hg. When using method 4 cuffs, high pressure of the thigh should be at least 20 to 30 mm Hg HIGHER than the hand. Other pressures down the limb are consistent with the findings of the waveform. High thigh pressure should be repeated in this case. 2. Findings in this study suggest synosis/occlusion of the left sukklav artery. Doppler wave forms exhibit monophasic characteristics, and there is associated low brachial pressure compared to gums. The right upper extremity shows normal segmental pressures and waveforms. This patient would not benefit from a TOS assessment because there is already evidence of significant arterial obstruction on the left side, and the patient's symptoms are more consistent with fixed obstruction rather than positional compression. Due to the involvement of the Sukklav artery, the left vertebrae artery would benefit from the assessment as this may be a case of subclavian theft syndrome. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ____ duplex arteriography 2. ______ contrast arteriography 3. ______ plaque 4. ______ definition of aneurysm Radiological imaging technique performed using ionizing radiation to provide detailed arterial system configurations and pathology information Localized artery dilation involving all three layers of the arterial wall Ultrasound imaging of the arterial system performed for the sake of Identification of atherosclerotic disease and other arterial pathology, providing a detailed map of the arterial system of the estimated deposit of fatty material inside the wall of the vessel, which is characteristic of atherosclerosis ANATOMY AND PHYSIOLOGY REVIEW Marking the image Complete the markings on the images that follow. Mark the vessels in the picture. Mark the vessels in the picture. Mark the vessels in the picture. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. What is the main technical limitation in the routine use of two-storey ultrasound instead of contrast angiography to visualise the arteries of the lower extremities due to? A. Most plaque will be calcified. B. Most equipment does not have this recording capacity. c. Most sonographers are not trained to obtain diagnostic data. d. Most doctors are not trained to interpret the data. 2. On the back approach fossa, what branch was identified on the anterior aspect of the image in relation to the popliteal artery? a. anterior tibial artery b. geniculate artery c. gastroknemius artery d. tibioperoneal trunk 3. Which artery is best visualized by a calf-level posterolateral approach? a. posterior tibial artery b. peroneal artery c. popliteal artery d. tibioperoneal trunk 4. What method is good practice for a thorough assessment of arterial disease in the lower extremities when using B-mode to inspect the vessel? A. Looking at sagittal only b. Looking at cross-view only c. Switch from medial to side d. Using both transverse and longitudinal planes 5. What is the primary tool for assessing diseases of the arteries of the lower extremities using two-storey ultrasound (with the exception of aneurysm)? a. Aliasing on color Doppler b. B-mode image c. color display with doppler d. peak systalic speed 6. How is the speed ratio (Vr) calculated? a.b.c. d. PSV on the stinosis that PSV procurimalan shares with stinosis. PSV proximalan stinosis shared by PSV on stinosis. PSV on the stinosis psv distal shares with stinosis. PSV distal on snorosis shared by PSV on stinosis. 7. What is not considered from the following when assessing the possibility of treating arterial angioplasty lesion with angioplasty or stenting (or both)? a. the size of artery b. position of branches c. synosis length d. place of stinosis 8. Why does two-storey ultrasound take precedence over contrast angiography to inspect the wall of vessels? A. Plaque thickness can be measured. B. Plaque characteristics can be determined. c. The thickness of the wall can be measured. d. The remaining lumen can be measured. 9. Which of the following is the main trap of two-storey ultrasound (in general) in the study of arterial disease? b. flow at speeds below 20 cm/s flow rate of more than 400 cm/s a.c. length of the occluded segment d. collateral vessel 10. When using duplex ultrasound to record slow flow (70% stinosis in the superficial feisty artery. Case study 1. Based on the symptoms the patient has, chronic peripheral arterial occlusive disease would be expected to be found in the left lower extremity. More specifically, with the severity of the symptoms, an occlutia of the superficial femoral artery would be expected with a little escape into the calf. 2. This process is probably acute due to the age of the patient and the lack of significant risk factors for arterial occlusive disease. Reasons for using duplex over contrast arteriography include the portability of the ultrasonic system, no delays in the performance and interpretation of the study, the ability of the duplex to determine the age of occlusion/thrombosis, the ability to estimate inflows and outflows, and the ability to visualize the vessel wall to determine possible locations for intervention. Areas that would require attention in this patient would be the infrapopliteal segment of the arterial tree, especially all tibial vessels. If acute occlusion is due to embolus, this is probably the place to implant embolus. In addition, the sonographer will be able to estimate the vessels of the influx and determine the extent of the disease. Finally, the sonographer will also be able to assess the status of the veins if the bypass becomes the treatment of choice. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ Thoracic Output 2. Raynaud's Syndrome 3. ______ Takayasu's arteitis 4. ______ definition of vasospasm The form of vasculitis of large vessels, resulting in intimal fibrosis and narrowing of the blood vessel Sudden narrowing of the blood vessel, which will reduce lumen and blood flow rate Vasospastic disruption of digital vessels Superior opening of the thoracic cavity, which is bordered by the collarbone and the first rib. Suclavian artery, subclavian vein, and Brachian nerve plexus pass through this opening anathOMY AND PHYSIOLOGY REVIEW Marking images Complete the markings in the following image. 1. Upper extremity arteries in principle. 2. Anatomy of thoracic socket. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. What percentage of peripheral artery diseases of the extremities represent arterial diseases of the upper extremities? a. 5% b. 15% c. 20% d. 50% 2. Which of the following did not highlight the etiology of arterial diseases in the upper extremities? b. mechanical obstruction or compression to the embolism of thoracic socket a.c. from various sources (including the heart) vasoconstriction of digital arteries d. diffuse atherosclerosis of the axillary or brachial artery 3. Which is an extended segment of the proximal descending aorta that can give.b.c. d. rise to takeoff of the aberrant suclavian artery? Ortner Thoracic Drop Syndrome Raynaud's Syndrome Kommerell's diverticulum 4. b. compression between the first rib and the compression of the scale muscles between the a.c. collarbone and the first compression of the ribs by brahial plexus d. compression by pectoralis minor 5. What is not the potential consequence of subclavian artery compression at thoracic output? a. thrombosis b. embolism c. stenosis d. aneurysm 6. a.b.c. d. Injury to which arteries can result in hypothermia hammer syndrome? radial arteries on the wrist of the interoseous artery in the middle of the forearm of the ulnaary artery on the wrist of the posterior branch of radial artery 7. What arteries do the strict window, and the infraclavicular and supraclavicular approaches, all used for visualization? a. Sukklav arteries b. vertebral arteries c. common carotid arteries d. axillary 8. Under normal conditions, what is the range of artery flow rate in the forearm? a.b.c. d. 80 to 120 cm/s 40 to 60 cm/s 120 to 150 cm/s 10 to 20 cm/s 9. What condition are the aneurysms of sukklavian arteries often associated with? a. Vasospasm b. injury or trauma c. thoracic drop syndrome d. Raynaud's disease on October 10th. What is the landmark indicating the transition from the axillary artery to the brahijual artery? a. superior boundary of the first rib c. neferolateral boundary teres of the main muscular posterolateral boundary b. d. pectoralis main muscle side margin of the first rib 11. How is primary Raynaud's syndrome different from secondary Raynaud's syndrome or Raynaud's phenomenon? A. There are underlying diseases. B. No underlying diseases. c. There is no difference. d. Symptoms are different. 12. Although rare, digital arteries may become occlutised from embolisation. Which of the following is not the predominant source of embolism? a. aneurysm of sukklav arteries c. stenosis of the proximal upper extremities of fibromuscular diseases b. d. artery of the forearm thromboangitis obliterans 13. To effectively assess the perfusion and/or vasospasm of digital arteries, how would one record wave form obtained by PPG? a. before and aftercoming fingers b. pre- and postexercise c. pre- and post-cold immersion d. before and after hand abduction 14. Compression of structures on thoracic output can occur with all the following EXCEPT: hypertrophy of muscle scales. hypertrophy of the pectoral smaller muscle. the presence of a cervical rib. the presence of abnormal fibrous strips. 15. What is the statement on the compression of brachial plexus and vascular structures on the thoracic socket FALSE? A. Compression of any of them will give similar symptoms. B. The compression of any of them cannot be easily confirmed by provocative manoeuvres. c. Compression of both often occurs condescitely. d. Confirmation of neural symptoms is best done by electromyography (EMG). 16. How is the arterial smaller form of thoracic drop syndrome defined? A. Intermittent compression of the succlassifier artery when the arm is in a neutral position. B. Significant compression of the sukklav artery to the collarbone. c. Intermittent subclavian compression when the hand is raised above the head. d. Significant compression of the Sukklav artery with the first rib. 17. What condition is associated with significant synose or occlusion of the arteries of the arm and/or forearm of atherosclerosis? a. Diabetes and/or renal failure b. coronary artery disease c. peripheral arterial disease d. systemic disease d. systemic disease 18. 47-year-old male smoker presents vascular laboratory of fingertip ulceration. What disease process should this patient suspect? b. steal the syndrome from the small veins of buerger disease a.c. Raynaud's Syndrome d. from the aneurysm of sukklav arteries 19. What form of arterial inflammation can affect the ophthalmic artery, as well as sukklavska or axillary? A. Takayasu's arteritis b. Raynaud's phenomenon c. Buerger Disease d. Giant Cell Arteritis 20. What is the most significant difference between giant cell arteritis and Takayasu's disease when both affect the Sukklav artery? a. age of patient b. sex patient c. health of patient d. physical habitus patient Fill-in-the-Blank 1. The __ artery is the first large branch of the aortic arch and is divided into real common carotid and sukklav arteries. 2. On the left side of the arteries __ occurs directly from the aortic arc in 4% to 6% of patients. 3. An artery resting between the muscles of the bicep of the anterior and triceps of the muscles of the posterior is __ artery. 4. The artery, which lies deep in the pectoralis main and smaller, is __ artery. 5. High takeoff most often occurs as a variant of the artery __ 6. The interosseous artery usually takes off from __ artery. 7. The assessment of the axillary artery with a duplex is often achieved with the hand in position __ 8. Using a stern note window, the origin of the subclavian artery is usually first identified with doppler color in __ view. 9. With Doppler, all arteries in the upper extremities should, under normal conditions, show __ resistance. 10. To help visualize the arteries of a relatively small caliber in the forearm, the sonographer may use __ hands to increase blood flow. 11. The most common systemic condition resulting in secondary Raynaud's syndrome is __ 12. Digital arterial necrosis associated with Raynaud's symptoms will rarely be seen with __ Raynaud's syndrome. 13. Provocative manoeuvres showing compression of subclavian arteries on the thoracic socket may occur in 20% of individuals __ 14. One-sided digital ischemia should prompt the sonographer to look for a source of __ from multiple proximal arteries. 15. Duplex ultrasound has proven to be an effective means of assessing the upper extremity __, although computational tomographiographic arteriography or direct surgical research is currently the standard of care. 16. Clinical, significant stinosis or occlusion of the upper extremities of arteries from atherosclerosis is usually limited to the artery __ 17. Symptoms of fever, maladiness, artrelgy and myalgia are not uncommon at the __ stage of Takayasu's disease. 18. Immunosuppressive and anti-inflammatory drugs are the primary treatment for several forms of __..._.. _ 19. A definite diagnosis of Buerger's disease is ____ 20. When evaluating an aneurysm vessel, it is important to visualize in the right __ plane not to overestimate the diameter. Short answer 1. What is a retroescophagal suclavian artery? What, if any, symptoms can have a patient as a result? 2. How do vertebral arteries differ from thyroid and costocervical trunks? 3. Although there are no accepted speed criteria for determining the degree of stinosis in the upper arteries of the extremities, what are the general guidelines correlated with >50% stinosis? 4. When trauma occurs in the upper extremity, what pathological findings should be of concern to the vascular technologist and are often visualized in the image of B-mode? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. Which of the Doppler spectrum (A) or (B) would best represent what might be expected in an area marked with an angiogram (C)? 2. Which artery shows pathology in these pictures? 3. Where could you find Doppler spectrum (B)– distal or proximal stinosis? 4. Based on the landmarks visible on this angiogram, the arrow indicates a defect in which vessel? 5. What would you expect to see with the corresponding Doppler and doppler paint on ultrasound? CASE STUDY 1. The healthy 45-year-old presents in mid-February to a vascular laboratory (located in Vermont), with ischemic and discolorations in several digits of her hands and feet. What initial questions should I focus on? She reveals to us that she is an avid skier and spends most of her free time on the slopes. What do you expect your exam results to reveal? 2. A 25-year-old man working for the construction department of the city represents a pulsative mass at the level of the medial aspect of the wrist that slightly extends to the upper palm of the right hand. Small ischemia changes are visible both at the top of the fourth and fifth fingers. What is the most likely cause of this presentation? What is the best test you can use for diagnosis in a vascular laboratory? What do you expect the results to reveal? ANSWERS: CHAPTER 13 Match 1st d 2.c 3. a 4.b Mark Image 1-1. 1-4. 1-3. 1-2. 1-7. 1-6. 1-5. 1-12. 1-11. 1-10. 1-9. 1-8. 1-13. 2-5. 2-4. 2-3. 2-2. 2-1. 2-6. Aoretski luk Brachiocephalic deblo Pravo uobičajena karotidna arterija Desna vertebralna arterija Subclavian arterija Axillary arterija Profunda brahijalna arterija Brachial arterija Radijalna arterija Ulna arterija Interosseous arterija Površinski palmarni luk Duboki palmin luk Clavicle izrezao je prednji skalalni mišić sukklavske vene Prvo rebro sukklavske arterije Brachial pleksus Višestruki izbor 1. a 2. d 3. d 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. c b c a b b b d c a b d a Fill-in-the-Blank 1. 3. 2. 4. 5. 6. 7. 9. 8. innominatni ili brahiocefalni kralježak brahijalni aksilarni radijalni ulnarni zalog high 10th warming of scleroderma primarily normal embolization of injuries or traumas 16. 15. 14. 13. 12. 11. 17. subclavian acute 20th arteritis angiography axial 19. 18. Short answer 1. When the takeoff of the right succlass artery is distal to the left sukklav artery that takes off on the aortic arch. Most patients are asymptomatic; however, some may have difficulty swallowing from esophageal compression or recurrent laryngeal nerve paralysis (Ortner syndrome). 2. Vertebrae arteries show a lower resistance profile (higher diastal flow) than the thyroid gland or costocervical trunks. In addition, thyroid and costocervical trunks have branches immediately after their origin. 3. PSV ratio (with normal segment) of 2 or more, loss of triphastic or biphasic waveform (loss of reversal component) and posttenotic turbulence. 4. Intimal tears or artery disseasion; thrombosis or occlusion of the vessel. Image assessment/Pathology 1. Doppler spectrum (A) Left sukklavial artery Distal on distal snorosis 4. 3. 2. 5. axial or proximal high-velocity brachial artery; signs of turbulence on color Doppler Case Study 1. Initial questions should focus on describing the color changes that occur, for example, what color, what color change order, and when color changes occur. Additional questions may focus on finding any systemic diseases, scleroderma or systemic lupus erythytetosis, as well as lifestyle risk factors, such as smoking, or other conditions that can cause finger embolism, such as TOS. Displaying signs and symptoms would lead more to disorders like Buerger's disease or Raynaud's syndrome because digits of both hands and fingers are affected. PPG of all digits at room temperature and post-cold immersion (if normal at room temperature) would probably help for diagnosis. This additional information would lead to primary Raynaud's syndrome as the most likely diagnosis in this case. PPG wave forms are expected to be relatively normal at room temperature, with extended time to return to normal after a cold dip. Duplex ultrasound will be used to determine whether there is a fixed occlusive lesion proximal to digits or potentially in digits. 2. Hypotenary hammer syndrome (due to recurrent injury at the level of the ulnar artery hamate area). The best tool to use would be two-storey ultrasound at the pulsatile mass level, although PPG fingers can also be used as an auxiliary test. The results would likely show an aneurysm of the distal ulnar artery or one of its branches, with a possible thrombus (to emboss the inlaid digits). OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. 2. 3. 4. 5. 6. ___ bypass ______ graft ___ in situ bypass ______ anastomosis ______ arteriovenous fistula definition of hyperemia Vod which can be a prosthetic material or autogenic vein used to redirect blood flow from one artery to another Connection between artery and vein resulting from surgery or other iatrogenic agents Channel that redirects blood flow from one artery to another, Usually working on shunt flow around the occluded part of the vein Large saphenous vein is left in place in a normal anatomical position and is used to create a diversionary channel for blood flow around the occluded artery Increase blood flow. This can happen after exercise. It can also occur after the restoration of blood flow after a period of ischemia Connection created surgically to connect two vessels that were not previously associated with AnatOMY and PHYSIOLOGY REVIEW Marking the image Complete the markings in the images that follow. 1. Types of overriding vein transplantation. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. Which of the following is not considered to be a method for assessing the infrainguinal transplantation of the lower extremities? a. Physical/clinical assessment of b. ankle to brachiate index c. chemical blood chemistry plate d. pletismography 2. What veins would normally be used for in situ bypass in the lower extremity? a. cephalic vein b. basilic vein c. small saphenous vein d. large saphenous vein 3. What is the advantage of synthetic transplantation compared to autogenic vein transplantation? a. High thrombogenic potential c. low rate of early technical problems high rate of progressive stinosis at b. d. artery inflow high long-term rate of suffering 4. Why are in situ infrainguinal bypass grafttes using large saphenous veins a common and preferred technique? A. There is a better matching of the size of the vessel when inflow and outflow. B. No need for lyze valves. c. The branches of large saphenous veins provide additional collateral. d. This allows for reverse flow. 5. What is the term for describing autogenic vein transplantation in which the vein retains its original anatomical direction? a.b.c. d. reverse antegrade orthograde retrograde 6. Regardless of the type of bypass, where is the distal anastomosis usually found? a. distal to disease b. proksimal disease d. at the level of popliteal artery at the level of dorsalis pedis c. 7. Which of the following is not one of the main causes of early autogenic venous thrombosis transplantation (in the first 30 days)? a. underlying hypercoagulable condition b. myointimal hyperplasia c. inadequate vein platoon d. inadequate run-off bed 8. After 24 months, what is the probable cause of snoosis in the inflow or outflow containers? a. myointimal hyperplasia d. retained or improperly set progression of atherosclerotic disease c.b. capture 9. At the very least, which physiological test should be included in the assessment of the lower bypass the graft? b. full segmental pressure test with CW Doppler waveforms PVR a. waveforms only d. PVR waveforms with high thighs and pressure below the knee ankle-brachial c. index 10. What artery is not usually used as an influx for lower limb transplantation? a.b.c. d. common femoral artery profunda femoris geniculate artery poplital artery 11. Which attachment would allow optimal imaging near the field to assess surface, in situ transplant veins? a. 2 to 3 MHz sector b. 3 to 5 MHz curvilinear c. 5 to 7 MHz linear d. 10 to 12 MHz linear 12. What view can be used for initial rough bypass scanning, including inflow and outflow, and can be useful to identify tributaries in situ graft? a. sagittal b. coronal c. transversal d. long 13. What is not a potential random finding related to perigrapht space? a. retained valve b. seroma c. hematoma d. abscesses 14. Where will myointimal hyperplasia usually occur in autogenic vein transplantation? a. on proksimal anastomosis b. in distal anastomosis d. at the site of the previous sinus valve in midgraft only c. 15. If an intimal flap or dissectment is present in the bypass, what is the typical cause? a.b.c. d. valve retention intraoperative technical problem of fibrosis in the aneurysm of the inflow artery on the distal anastomosis 16. In synthetic aortofemoral or femoro-femoral transplantation, where pseudoaneurysms can occur, while rare? a. midgraft c. anywhere along the length of the sheathing of proksimal anastomosis b. d. distal anastomosis 17. Arterio's fistula, occasionally seen in in situ bypass transplants, is the result of a failure in the ligate what of the following? a. small saphenous vein b. perforating vein c. small arterial branch d. defect on valve lysis 18. a.b.c. d. How is the mean transplant flow rate calculated? Taking several measurements at the midgraft level. Average speed on proximal and disas constant anastomosis. On average, the rate from inflows and outflows of arteries. An average of three or four speeds from non-tophomatic segments. 19 .b.c. d. What is the first modality that should be used to examine the bypass? B-mode spectral Doppler color Doppler power Doppler 20. After monitoring the transplant bypass done 4 years ago, what can the Doppler spectrum showing a delay in the systole indicate? a. technical deficiency of atherosclerotic snorosis of anastomosis in the inflow of c.b. arteerioven fistula within the inevitable malfunction of the distal occlusion Fill-in-the-Blank 1. Two-storey ultrasound has been shown to be reliable in detecting significant pathology in infrainguinal transplant bypass in patients with __ prior to measurable changes in physiological testing. 2. Combining a physiological study with two-storey ultrasound to assess infrainguinal bypass is important for detecting significant and evaluation ______..._ 3. Types of bypasses can be categorized based on the material used for transplantation and __ employees. 4. Vein transplants have a higher rate of suffering than synthetic transplants (regardless of location) because vein transplants are lower __._._.. _..... 5. The types of materials used for infrainguinal bypass transplantation include autonomic veins, synthetic materials, and __ 6. In the first 30 days of the perioperative period after the bypass is installed, the most common problems are __ 7. In the period from 1 to 24 months the postoperative period 75 % of the revisions of the seed are performed for stenose on the proximal or distal __._.............. 8. To document the stenosis within the bypass, PSV and EDV is extensive, inside, and distal on stenosis should be noted, as well as poststenotic _____....._ 9. In order to ensure accurate documentation during bypass monitoring, it is important that the sonograph is familiar with the type and location of the bypass and therefore refers to __._ 10. Twenty-four months after the bypass is performed, the main cause of the failure will be __, the main cause of failure will be __, primarily in the arteries of outflows and outflows. 11. During subsequent bypass tests by means of a comparison of flow rates for diagnostic purposes, efforts should be made to obtain speeds at the same location as with the same __ as previously employed. 12. When assessing distal anastomosis and the outflow artery of the bypass, it may encounter a(n) __ at peak systalic velocity in the cast artery as the artery may have a smaller caliber. 13. Inside the veins of the channel, the two most common image abnormalities observed are __ 14. Color Doppler can be useful in assessing the bypass for defects; however, care must be taken because the paint can also be __ small wall defects or other pathology. 15. Although found in the lower extremities, the Doppler spectrum in the bypass may display __ characteristics of resistance, often due to hyperemia or arteriesoven fistula. 16. The blunted, monophasic spectral Doppler sample with zero diastolic flow usually indicates __ 17. Reducing the average transplant flow rate by more than __ from the previous exam indicates a potential transplant failure. 18. The speed ratio of 3.5 to PSV >300 cm/s is consistent with __ % stinos. 19. Tunneled PTFE femoral to popliteal graft will be __ rather than in situ graft. 20. To examine the distal anastomosis and outflow of femoral to dorsalis pedis bypass graft, one may decide to select probes with frequency __ Short answer 1. What is an important consideration selecting autogenic veins for infrainguinal transplant bypass in reverse? 2. What are the indications for a two-level ultrasound bypass assessment outside the routine surveillance schedule? 3. What is the typical surveillance schedule for an autogenic vein bypass? When might this schedule change? 4. What is the minimum proposed documentation of the transplant bypass on duplex ultrasound examination? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. What pathology can be seen on the figure? What does this picture suggest? What does the doppler wave pattern seen in this image suggest? CASE STUDY 1. A 75-year-old man with a long history of cardiovascular disease and reconstruction of vascular procedures in the lower extremities represents a pulsatic mass in the right inguinal area. The history of vascular reconstruction includes the aortobifemoral bypass and the left sciatic to the popliteal bypass. What are the two options to explain the presence of pulsatile mass? 2. The 81-year-old female presents the vascular laboratory with a cold right foot and evidence of ulceration on several digits of the right foot. She's not one of your regular patients. You don't have any information on this patient, and she can't remember what was done and when, but you see some scarring on the medial aspect of her leg, suggesting that a bypass may have been done. What should be your initial test/assessment? After the initial assessment, decide to use two-storey ultrasound to get an idea of what has been done. Just below the inguinal ligament, you see a vessel take off with bright white, two-layer walls and flow with spectral and Doppler colors. What does this finding suggest? You can not estimate transplantation further than 1 to 2 cm of distal anastomosis, so sample the proximal part of the graft and try to find distal anastomosis or outflow. You get a Doppler signal in the popliteal artery. Doppler spectrum in proksimal graft shows a PSV of 130 cm/s without diastonic flow and very sharp but narrow waveforms. Doppler spectrum in the popliteal artery shows delays in systole and PSV of 11 cm/s with diastolitic flow. What can you deduce from this data? ANSWERS: CHAPTER 14 Match 1.c 2. a 3. d 4. f 5.b 6. e Markup 1-1. in situ bypass superficial femoral arteries popliteal arteries Multiple Choice 1-3. 1-2. 1.c 2. d 3.b 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. a c a b c d d c d a b Fill-in-the-Blank 1. 5. 4. 3. 2. 10. 9. 8. 7. 6. 13. 12. 11. 18. 17. 16. 15. 14. 20. 19. 1. asymptomatic global limb perfusion surgical technique of thrombogenic cryombogenic veins of technical anastomosis of postoperative note progression of atherosclerosis angle increase valves; myointimal hyperplasia mask low distal snorosis or occlusion 30 cm/s deeper higher short answer Valves should not be licked (removed) as the leaflets will open in the direction of the flow. 2. Indications for a two-storey bypass assessment outside the routine surveillance schedule include acute onset of pain, reduced or absent pedal impulses, non-combing permanent ulcers or a recent history of loss of limb swelling indicating respiratory failure and ischemia. In addition, poor physiological testing results, including an ankle brachia index falling by more than 0.15. 3. A typical autogenic vein transplant control schedule includes an initial exam within the first 3 months, followed by intervals of 3 months for the first year, every 6 months for the second year and annually thereafter. More intensive supervision may be warranted in patients undergoing intraoperative audit, early postoperative thrombotomy or revision, and a patient with limited majority conduits. 4. The minimum documentation would include images of grey artery flow, proksimal anastomosis, midgraft, distal anastomosis and cast arteries. It will also take a spectral Doppler recording of at least peak sistal speeds and painting the color flow of those same pages. Any abnormalities would require additional documentation. Image assessment/Pathology 1. Aneurysm of distal anastomosis of perigraft liquid 2. 3. accumulation Distal occlusion of transplantation or outflow vessels Case Study 1. Pulsatile mass can be caused by pseudoaneurism, its location and history of aorphid transplantation. A real aneurysm is also a possible explanation for the pulsative mass, since it is possible that this patient is prone to aneurysm (the reason why the aortobifemoral graft was made in the first place may have been to turn off the aneurysm). 2. You can assess the impulses in the right side and/or get blood pressure on your ankle to calculate your ABI. The finding suggests synthetic graft, possibly PTFE. This allows you to conclude that the transplant likely tunneled, and the distal anastomosis may be above the knee in the distal SFA or proksimal popliteal artery. Also, scars may suggest that several procedures were done on this patient. The speeds and profiles of the Doppler spectrum strongly suggest the occlusion of transplantation with flow reconstitution at the level of the popliteal artery (it can be fed by a still functional native system). OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ angioplasty 2. ______ atherectomy 3. ______ dissection 4. ______ hyperplasia 5. ____ definition of stent Tear along the inner layer of the artery resulting in splitting or separating the wall of the blood vessel The tuba-like structure located inside the blood vessel provides suffering and supports the non-surgical procedure of removing plaque from the artery using special catheter with a device on top that cuts off plaque Abnormal increase in the number of cells; increase in the number of smooth muscle cells within intimacy in response to injury to blood vessels Surgical repair of the blood vessel by reconstructing or replacing part of the vessel. The procedure can be done with a catheter with the tip of the balloon used to increase narrowing (stinosis) in the review of the chapter of the blood vessel Multiple choice Complete each question by circling the best answer. 1. What is primarily considered when deciding on the type of intervention for patients with arterial occlusive diseases of the upper or lower extremities? a. the location and extent of the disease b. coobid risk factors c. etiology of the disease d. risk-benefit ratio of procedure 2. Which of the following is not one of the endovascular treatments of choice for more extensive arterial synosis? A. Balloon angioplasty b. subintimal angioplasty c. mechanical atherectomy d. stent graft angioplasty 3. What are the main factors that transatlantic consensus criteria between societies (TASC) II use to classify the severity of the lesion? a. Type of lesions c. etiology and severity of the disease enlargement and etiology b. d. disease location and anatomy of the disease 4. Which TASC II lesions are most fair for endovascular intervention? a. TASC A and B lesions b. TASC C and D lesions c. TASC A and C lesions d. TASC B and D lesions 5. What of the following is not associated with poor outcomes (high risk of failure) of endovascular procedures? a. diabetes b. renal failure c. coronary disease d. tibial disease 6. What is not a symptom of bad limb reperfusion after endovascular procedure? a. claudication b. restenosis c. pain at rest d. ulcers 7. Why is relying on a patient's history of evaluating successful limb reperfusion often challenging? A. Patients are often active and work through symptoms. B. Patients are often sedentary and do not walk enough to produce symptoms. c. Patients are often diabetic and have significant nerve damage. d. Patients are often obese and cannot be sufficiently assessed as a duplex. 8. In patients with claudication, how much should the ABI increase to show a significant improvement in limb perfusion? a.b.c d. 0.10 0.15 0.20 0.95 9.b. a.c. d. When would a two-storey assessment of the site of angioplasty not be indicated? calcified tibial arteries with asymptomatic patient asymptomatic patient with monophasic tibia arterial wave forms of normal ABI with monophasic tibia arterial wavelengths of normal ABI with triphastic tibia arterial wavelengths 10. Which of the following should perform a common waveform of the femoral artery is monophase or has an abnormal acceleration time? a. Assessment of the assessment of the poplite artery c. assessment of the profund femoris artery of ilia arteries b. d. 11 assessments need to be made. If areas of lumen reduction or disrupted flow are identified by Doppler color, how should they be assessed next? a. Power Doppler b. PW Spectral Doppler c.B-mode d. angiography 12. When assessing prosthetic bypass or stent graft, what is the speed associated with graft thrombosis? a. 2 b. PSV >180 cm/s and Vr >2 c. PSV >300 cm/s and Vr >3.5 d. PSV >30 cm/s and Vr 50% proximal stinosis or distal endovascular intervention is interpreted as a(n) __ finding. 15. A speed ratio greater than 2 with associated lumen reduction, disrupted flow on the color doppler and increasing focal speed >180 cm/s all indicates _._..... 16. Classification of angioplasty diseases is usually cited in one of three categories: 70%; Occlusion higher thrombosis failure secondary patecia Short answer To document improvements in limb perfusion it was enough to expect symptoms and signs to resolve and detect stinosis sites of angioplasty that may result in failure of the procedure. A pad patient is prone to disease progression, including myointimal hyperplosis, which produces snoosis inside or adjacent to the intervention site. In addition, two-storey ultrasound can be performed during the procedure for assessing residual stinosis and is very precise in detecting complications at the site of angioplasty in relation to the progression of atherosclerosis. To document the retention of the vessel/lumen stent, first describe the characteristics of the arterial plaque, and then show all the evidence of deformation of stent-stent-transplantation or thickening. Comments on the severity of limb ischemia (mild, moderate or severe), changes in relation to pre-intervention values, and in patients with CLI, whether adequate foot perfusion has been achieved (leg pressures >30 mmHg). At the site of angioplasty, the area should be interpreted as ingesting, moderate stenosis, severe stenosis or occluded. 5. In patients with critical limb ischemia, an initial follow-up examination should take place within 2 weeks after the intervention. If this initial test is normal, follow-up testing should be performed at intervals of 3 months. If the initial exam shows synosis from 50% to 70%, follow-up is recommended in 4 to 6 weeks. Image assessment/Pathology 1. 2. 3. 4. 1. A B C 70% or more of the stonosis case study failure during this period was most likely due to restenosis from myointimal hyperplasia. Two-storey ultrasound findings suggest that the stent is a patent with no evidence of stenosis. With symptoms of claudication and ABI decline, this indicates that the disease has developed or become significant on another level. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ vascular artemicitis 2. ______ giant cell arteritis 3. 4. 5. 6. 7. 8. ______ Buerger disease ___ Takayasu's arteritis ____ embolism ____ aneurysm ______ _____ arteriovenous fistula DEFINITION Obstruction or occlusion of the blood vessel by transporting clots of blood, mass, bacteria or other side of the substance Inflammatory disease affecting blood vessels A type of vascular arteritis affecting the aortic arc and its large branches A type of vascular arteritis also known as thromboangitis obliterans; affects small and medium arteries A type of vascular arteritis also known as temporal arteritis, which is associated with the superficial temporal artery and other arteries of the head and neck Abnormal communication between the artery and the vein, which may be due to iatrogenic injury or trauma or can be congenitally acquire dilation of the artery wall involving all three layers of the wall of the vessel Spreading hematoma; Hole in the arterial wall that allows blood to leave the vessel and collect in the surrounding tissue CHAPTER REVIEW Multiple choice Complete each question by circulating the best answer. 1. When using spectral Doppler, peak systalic speeds are routinely recorded. Under what conditions is it especially useful to record enddiastolic speeds? A. Distal on snorosis. B. When an aneurysm is present. c. When abnormal high or low resistance flow patterns are present. d. End diastolic speeds should always be recorded. 2. Which layer of the blood vessel wall will most likely undergo infiltration of white blood cells during the inflammatory process to which most diseases of arteritis are encountered? a. media layer b. intimacy layer c. adventitia layer d. and intimacy and media equals 3. In patients with signs and symptoms of giant cellular arteryatis and asymmetric blood pressure, what should also be evaluated? a.b.c. d. aortic arc of the lower extremity of the artery upper extremity of the artery digit 4. When evaluating giant cellular arteritis on the imaging of gray tobs, an anechoic area surrounding the affected vessel is often present. How is this look often described in the picture? a. doughnut b. halo c. makaroni d. burger 5. a.b.c.d. Which vessels are most commonly affected by Takayasu's arteritis? joint carotid artery of the innominate artery of the axillary artery of the Sukklav artery 6. When present, where will the symptoms of claudication of the lower extremities with thromboangiitis unaware most likely be localized? a. arch of the foot b. ankle c. calf d. thigh 7. What is an essential assessment for determining the appropriate diagnosis of Buerger's disease? a. Ankle or joint arteries with spectral and color Doppler proximal large b.c. arteries with duplex ultrasound indirect testing of calf with PVR d. waveforms digital assessment with PPG waveforms 8. What symptom would be typical in patients with arterial lesions due to radiation-induced arteritis? a. the beginning of claudication a few months after the end of treatment b. visual disturbances and jaw claudication d. ischemic digit ulcers during treatment with pulsatile mass radiation in the c. radiation area 9. The cardiac source of arterial embolism can be seen with all the following EXCEPT: atrial fibrillation. Endocarditis. mitral valve prolapse. left ventricle thrombus. 10. What term describes artery embolism as a result of deep vein thrombosis in the presence of intracardia from right to left schant? a. Cardioembolic disease b. Buerger disease c. ventricular embolization d. paradoxical embolism 11. Pseudoaneurysms can be seen with all the following EXCEPT: postcard catheterization. as an inflammatory response. at the site of infection of synthetic transplants. with dialysis access transplantation. 12. What does the Yin-Yang symbol describe? b. flow pattern in arteriovenous fistula flow pattern in aneurysm a. sac d. flow pattern in the area disseasing flow pattern in c. pseudoaneurism bags 13. What are most iarthrogenic arteriovenous fistulas result? a. Catheterization of femoral arteries b. placement of the central vein c. penetrating wound d. total knee replacement 14. a.b.c. d. What is the statement on popliteal artery capture syndrome FALSE? It affects males more often than females. It often affects both limbs. It's an acquired condition. It's a congenital condition. 15. What is the preferred manoeuvre for diagnosing popliteal artery capture syndrome? a. ABI with treadmill exercise test c. duplex assessment with active plantar flexpiption duplex assessment involving b. d. rotation of physiological testing of limbs with dependent limbs and then elevated 16. What condition is congenital connective tissue disorder often resulting in the formation of an aneurysm? A. Buerger's disease b. Takayasu's disease c. Ehlers–Danlos syndrome d. Kawasaki Syndrome 17. What is the primary place for developing an aneurysm associated with Marfan syndrome? a. abdominal aorta b. common femoral artery c. popliteal artery d. aortic arc 18. What is the devastating complication of Ehlers-Danlos syndrome? a. aneurysm b. rupture of arteries c. thrombosis d. atherosclerosis 19. 80-year-old woman presents vascular laboratory tangible excitement in the right groin after catheterization procedure. After a two-level assessment of the area, an increased diascopic flow was observed in the highly proximal right common femoral artery, and a prominent pulsatness was observed in the right common femoral vein. Significant color bruit is listed in the area as well. What do these findings suggest? b. arterene fistula of common femoral vessels of acute arterial a. embolism c. a real common dissection of the femoral artery d. pseudoaneurysm of the right common femur artery 20. 42-year-old male smoker presents vascular laboratory with ischemic ulcers, on fingers as well as on fingers. The patient also notices some tingling in his legs. What should be suspected of this patient? a. Thromboangitis obliterans b. trapping of popliteal arteries c. Takayasu's arterisitis d. aneurysmal sukklav artery disease 21. 66-year-old woman presents to the vascular laboratory a sudden appearance of severe pain of the lower lower extremities, pallor and pulse. The patient describes the history of atrial fibrillation. What should be suspected of this patient? B. The true common pseudoaneurysm of the femoral artery by pseudoaneurysm radiation in a. d. iliac system of the heart source of acute embolism on the right leg of acute c. aneurysm aneurysm of the polyurise 22. 73-year-old woman presents vascular laboratory with spastic headaches, jaw claudication, visual disturbances and tangible tape over the forehead. What should be suspected of this patient? a. Thromboangitis obliterans b. giant cellular arteritis c. Takayasu's arteritis d. pseudoaneurysm of the temporal artery 23. 53-year-old male presents the vascular laboratory with a pulsatil mass in the right groin. The patient recently underwent a catheterization procedure for the heart stem. After a two-storey assessment, an incapactulated mass was recorded by toand-fro flow recorded in the duct connecting the real common femoral artery to the mass. What do these findings most likely represent? b. arteriesovenous fistula of common femurs acute arterial occlusion a.c. true common femoral artery diction d. pseudoaneurism of a real common femoral artery 24. 32-year-old Asian woman presents vascular laboratory with weak radial impulses and several transient ischemic attacks. What should be suspected of this patient? a. Thromboangitis obliterans b. giant cell arteritis d. atherosclerotic carotid artery disease Takayasuov arteritis c. 25. 75-year-old male presents vascular laboratory cold, pulse-free limbs shortly after catheterization through a real common femoral artery. After a two-storey assessment, the echogenic material was recorded in a common femoral artery with a waveform of the staccato type obtained only proksimally for this area. What do these findings suggest? b. Arterene fistula common femoral a. artery diction d. acute arterial occlusion of the right common femur artery c. pseudoaneurysm of the true common ferene artery Fill-in-the-Blank 1. The etiology of arteitis is unknown; however, the inflammatory process often involves an a(n) __ state. 2. Symptoms described by patients suffering from some forms of arterositis are often __ to the symptoms of patients with atherosclerosis. 3. The form of artelitis rarely seen in patients under the age of 50 is __...____ 4. On B-mode imaging in patients with Takayasu arteritis, the pruning of the thickening of the vessel wall is often noted and ______ character. 5. Takayasu's disease process, coupled with the possible occlusion of the vessel's lumens, can be complicated by the formation of __._.. _._ 6. While giant cells and Takayasu's arteritis are more common in __; thromboangitis obliterans is more common in ____ 7. Although smoking is always present in the history of patients suffering from Buerger's disease, it is even more prominent in areas where smoking includes __._....... 8. Although radiation-induced arteritis lesions often resemble atherosclerotic lesions, radiation-induced lesions are usually __ and __ 9. In patients with a sudden onset of leg pain, the absence of plaque and collateral flow most likely indicates __ as the cause of symptoms. 10. It has been shown that 80% to 99% of arterial embolisms have __ source. 11. Epidemiological studies have shown that the place outside cerebral circulation most commonly affected by artery embolism __._ 12. The most common site of iatrogenic pseudoaneurism is __ 13. The characteristic flow pattern observed on the Doppler spectrum at the pseudoaneurysm neck level is often referred to as __._...._...._........_ 14. Bruit is on __ while excitement is on __ 15. Arterial closure devices used after postcateterization were occasionally the cause of __.. _ 16. The entrapment of popliteal arteries occurs when the popliteal artery is compressed by the medial head of the muscle __ 17. The trapping of popliteal arteries is suspected when a young patient without risk factors for atherosclerosis represents __._.. _ 18. While Takayasu's arteritis often causes stenosis of the arteries of the aortic arch, the formation of aneurysms associated with this disorder are more common __ complications. 19. Behcet syndrome is associated as a source of non-atherosclerotic __._.. _._.. _..._......_........_..... 20. Aneurysm can be diagnosed when the diameter of the vessel increases by __ compared to the adjacent proksimal vessel. Short answer 1. Why can nonatherosclerotic diseases usually be recognized and evaluated clinically? 2. What differences have been observed in B-mode, the grey image between vessels affected by atherosclerosis compared to those affected by arteitis? 3. What differences in flow patterns can be seen between pseudoaneurysm and arteerioven fistula? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. What does the appearance of lumens and the location of the disease in this image suggest? What does this Doppler spectrum show and where does it usually happen? What is shown in Pictures? CASE STUDY 1. A female patient presents a vascular laboratory with a 30 mm Hg brachial difference in blood pressure between the right and left hands. The patient has no known risk factors for atherosclerotic diseases. What conditions would you say in this patient? What additional history questions would you ask to help determine the disease process in this patient? After a two-storey assessment, it appears that the suhlav and axillary arteries have thickening of the concentric walls, in accordance with the macaroni sign, with increased peak sistalic speeds. Under what condition would these findings be consistent? 2. A 19-year-old male presents a vascular laboratory with symptoms of tele-level claudication bilaterally. He notices pain in the calf with walking, but not running. It has no other relevant risk factors or relevant medical history. Based on his age, symptoms and history, your first instinct would lead you to focus on which area? After examining the area of focus, you can not find anything remarkable (without increased velocity), but the spatial relationship between the artery and the vein does not seem quite right. What probable reason for his pain do you start thinking about? To confirm your diagnosis, you decided to get Doppler spectrum and velocity in the artery with a two-storey ultrasound while the patient performs which manoeuvre? 3. A 67-year-old male patient presents himself to the vascular laboratory after an interventional catheterization procedure with access through the right brachial artery. What conditions would you consider present in this patient? After physical examination, the right radial arterial pulse is weak, and no bruit is heard in the area of the access site. A duplex assessment reveals an echogenic material with brachian artery lumens with staccatolike wave forms recorded in the proksimal sukklav artery. What do these findings suggest? ANSWERS: CHAPTER 16 Match 1.b 2. e 3. d 4. 5. 6. 7. 8.c and g h f Multiple choice 1.c 2. and 3.c 4. 5. 6. 7. 8. 9. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25.b. 25. d a d a c b b a c b c Fill-in-the-Blank 2. similar to 1. 3. 8. 7. 7. 6. 5. 4. 12. 11. 10. 9. 17. 16. 15. 14. 13. 20. 19. 18. Giant cell arteritis macaroni aneurysms of the female; males raw tobacco localized; focal acute embolism of the cardiac femoral artery right common femoral arteries on-and-fro auscultation, palpation occlusion gastrocnemius claudication fatal aneurysm 50% Short answer 1. Usually, unatosclerotic arterial diseases have specific clinical histories and physical findings, and patients will present themselves without typical risk factors for atherosclerosis. 2. Vessels affected by arteritis usually have a concentric thickening of the vessel wall on long segments of the vessel. The walls of the thicked segment tend to be hypoechoic from lesions associated with Atherosclerosis. Atherosclerotic lesions tend to be focal, affect smaller segments of vessels and often occur on branches or bifurcations. Arterotitis lesions tend to occur along segments of the vessel that are not usually associated with typical atherosclerotic lesions. 3. Pseudoaneurysm is a encapsuled mass of blood resulting from a hole in the arterial wall. The mass is connected to the artery of the neck. The classic occurrence of blood flow in the pseudoaneurysm swirls flow into the mass (yin-yang flow), with a flow in the neck. Arterine fistula is an abnormal link between the artery and the vein. This results in a very high diastonic flow in the associated artery of the proximal in the fistula, very high rate flow through communication between the artery and the vein, and prominent pulsatiality in the connected vein. Prominent bruit color tissue is also often visualized by AVF. Image assessment/Pathology 1. With the wall of the vessel thickened and the watermarks narrowed, these findings indicate arteritis. Based on the location, this could be either a giant cell or Takayasu's arteritis. 2. This Doppler spectrum shows flow flow (prolonged reverse flow), in accordance with a typical pattern seen in the neck of a pseudoaneurysm. 3. These images show an arteyothed fistula. The color bruit is shown in the first image with an arterialized, pulsative flow in the common feline vein in the second image. Case study 1. Conditions that would be considered for this patient include giant cellular arteritis and Takayasu's arteritis. Both of these conditions are more common in women and are known to result in uneven brahial blood pressure. Additional questions from history would include age (giant cell arteritis is more common in women over 50, while Takayasu's artercitis is more common under 40), ethnicity (giant cellular arteritis is more common in whites, while Takayasuov is more common in Asian populations), and additional information on any symptoms a patient may have, such as headaches, jaw claudication and visual disturbances (associated with giant cellular) or TIA symptoms, dizziness and levity (associated with Takayasu's arteritis). Given the two-storey findings of the macaroni sign, the most likeable condition present in this patient is Takayasu's arteryatis. 2. Based on age and symptoms, the focus area would be popliteal fossa. A discrepancy in the spatial relationship between the artery and the vein in the popliteal fossa would indicate popliteal trapping syndrome. Active plantar inflection is used to confirm this diagnosis. 3. After the catheter-based procedure, pseudoaneurysm, arterial fistula or arterial injury or occlusion from catheter introduction should be taken into account. Based on duplex findings, this patient has brachia occlusion due to catheter injury. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. 2. 3. 4. 5. 6. ___ deep vein ____ superficial vein ____ perforating vein ______ acute thrombus ___ chronic thrombus __ valve definition Newly formed clotted blood inside the vein, generally less than 14 days old Vein which is an accompanying vessel to the artery and travels inside the deep muscle compartments of the leg Internal projection of the intimal layer of the vein wall that produces two semi-dular leaflets , representing the retrograde movement of blood flow Small vein connecting the deep and superficial veins of the system; a vein that passes between the deep and superficial compartments of the leg of clotted blood inside the vein, which is generally present for a period of several weeks or months of veins, which is superior to the muscle compartments of the leg; travels within superficial fascial compartments; No corresponding concomiment arteries anathema and physiology review marking image 1. A cautious look at the groin level. 2. A cautious look at the groin level. 3. Transverse view through the proximal thigh. 4. A concise look through the middle of the thigh. 5. A transverse view through the middle calf. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. What category of veins is the main channel for blood, they are surrounded by muscles and have an accompanying artery? a. deep veins b. superficial veins c. muscle veins d. perforators 2. What is the main function of the superficial vein system under normal conditions? A. Provide a collateral pathway for deep veins. B. Connect to a deep system through perforating veins. c. To regulate body temperature. d. Provide a reservoir for blood. 3. How do valves in perforating veins ensure that the blood moves, under normal conditions? a. scatter around the perforator c. from the superficial to the deep system from the deep to the superficial b. d. system to remain in the superficial system 4. From epidemiological studies, what percentage of patients develop post-thrombotic symptoms? a. 10% b. 30% c. 50% d. 90% 5. Which limb of virchow's triad shows a venous thrombus starting at the top of the valve? a.b.c. d. injury to the wall hypercoagulability of stasis congenital component 6. The patient presents the vascular laboratory for the lower extremities of the vein assessment. The patient knows factor V leiden genetic factor. At what risk factor does Virchow's triad fall? a. injury to wall b. hypercoagulability c. stasis d. congenicy component 7. Many patients with vein thrombosis are asymptomatic; however, when symptoms appear, what are some of the most common? B. Pain in the extremities, tenderness and swelling of muscle pain by exercising a. d. ulceration on the legs and thicker toenails weakness, numbness, c. and tingling 8. a.b.c.d. How high would the probability of DVT match Well's score? 2 points >3 points >5 points 9. a.b.c. d. When can a false-negative D-dimer be seen in the presence of a DVT? The patient has a fundamental malignace. The patient has active inflammation/infection. Assay can't detect high levels of fibrin. Assay can't detect low levels of fibrin. 10. For routine operation of the vascular laboratory, it is recommended to use a high frequency linear pliers (10 to 18 MHz) to assess which of the following? a. superficial vein reflux b. perforators c. distal femoral vein d. iliac veins 11. Why will using the reverse Trendelenburg position to examine the vein system of the lower extremities make the exam more difficult? A. The veins will be collapsed. B. Veins will be under low pressure. c. The veins will be deeper. d. Veins without thrombuses will be more difficult to compress. 12. What is the primary method used to determine the presence of thrombus in the vessels of the extremities? a. Color-flow Doppler b. vein compression c. spectral Doppler wave forms d. sagittal B-mode images 13. Which of the following is not a normal qualitative Doppler feature evaluated in the vein of the lower extremities system? a. continuity of signal b. spontaneity of signal c. graduality of signal d. signal increase 14. a.b.c. Which of the following large deep veins are usually bifid? profunda and popliteal veins of the femur and popliteal veins of the outer iliac and femur veins d. common femurs and popliteal veins 15. Which vessels are not routinely assessed in the ven-extremity duplex examination of the lower extremities? a. femoral vein b. large saphenous vein c. anterior tibial veins d. small saphenous vein 16. a.b.c. d. What veins are one of the main reservoirs of blood found in the calf? tibia veins small saphenous veins soleal veins popliteal veins 17. a.b.c. d. What do bright intraluminial echoes and well-fastened thrombus suggest? acute thrombosis chronic thrombosis too get the risk of embolism 18. In which case will an indirect assessment of iliac veins and IVC using Doppler on common femoral veins suggest evidence of obstruction? A. Doppler's spectrum shows graduality. B. Doppler's spectrum shows pulsaticity. c. Doppler's spectrum shows continuity. d. Doppler's spectrum stops with Valsalav. 19. During the lesion examination of the lower extremities, a thin, white structure is observed, moving freely in the lumen of the vein. What does that most likely represent? a. Valve leaflet b. movable thrombus c. dissectment d. chronic scarring 20. What is the next normal response to the venous flow with Valsalva manoeuvre? a.b.c. d. increased flow rate of continuous flow flow 21. Patient introduces himself to vascular laboratory with sudden onset of left lower extremity pain Swelling. After a two-storey examination, lightly ephegenic material is established within the varicose femoral vein, and the femoral vein is not shumged with the applied pressure of the transient cell. What do these findings suggest? a. Chronic deep vein thrombosis b. acute deep vein thrombosis c. acute superficial venous thrombosis d. superficial venous valvular incapacity 22. When a patient has right heart failure, what impact is often seen in spectral Doppler wave form in the lower extremities? a. increased pulsatity b. continuous flow c. decreased graduality d. loss of augmentation 23. The patient presents himself to the emergency department with a massively swollen lower lower extremity that is extremely painful and bluish in color. What do these findings suggest? a. May-Thurner syndrome b. phlegmasia alba dolens c. phlegmasia cerulen dolens d. venous gangrene 24. What is the treatment option usually reserved for new situations in larger veins or the lymphomaral region? a. heparin b. koumadin c. elastic socks d. thrombolysis 25. What is the primary treatment for acute deep vein thrombosis of the lower extremities? a. Thrombolysis b. anticoagulation c. thrombobectomy d. elastic socks Fill-in-the-Blank 1. Two-storey ultrasound to assess the deep and superficial endearment system has largely replaced __ for DVT detection. 2. Duplex ultrasound has the ability to diagnose, localize and determine age __.. _ 3. The primary mechanism for the formation of venous thrombosis involving venous paths, vessel wall injury and hypercoagulable condition is known as __..._......_ 4. The fact that DVT is often undiagnosticated or underdiagnostic is likely because DVT is often __..._ 5. The development of venous thrombosis is determined by the balance between the clotting factor and __._ 6. Tachypnea, tachycardia and chest pain are often signs of __._.. _ 7. A tangible cable along the median aspect of the lower extremity would be a clinical sign for __ A patient with localized tenderness with swelling of the limbs and a recent history of 8th major surgical procedures would score ___ points based on Wello scoring risk factors. 9. Clinical diagnosis of DVT has __ sensitivity and specificity. 10. Appropriate positioning of the patient for the vein assessment of the lower extremities involves the patient lying on his back with a slightly bent knee and a rotated hip __ 11. An assessment of IVC and ilia veins in most adult patients would require the use of transducer __ 12. The position described as tilting the test plate during the vein of the exam so that the legs are approximately 20 degrees lower than the upper body is called __._..._..........._.... 13. Transducer compression of the extremities of the veins must NOT be performed in ______ plane because it is easy to remove veins from this approach. 14. The compound of a large saphenous vein with a common femoral vein usually occurs __ to the bifurcation of superficial and deep femoral arteries. 15. The main vein cast for the calf is __ 16. The extension of a small saphenous vein above the popliteal fossa is called the vein __,_,___, or the current extension of the small saphenous vein. 17. It is not unusual for a vein __ to share a common trunk with a gastroknemius vein. 18. Posterior tibias and peroneal veins usually communicate with the veins __ 19. The only way to properly display the contents of the venous lumen to turn off DVT when performing compression is to view the vessel in __..._ 20. The thrombus process that continues to shrink and fill smaller veins may be known as __._ 21. When using Doppler, if there is thrombosis between the transducer level and the place of distal compression, the result will be __ with compression. 22. One-sided pulsatile cheerful flow may be associated with __ 23. Compression of the left common Iliac vein with the right common iliac artery can result in __ syndrome. 24. Nevascular, anehoic, well-defined, oval mass found accidentally during the assessment of the vein of the lower extremity most likely represents a(n) __ 25. Computed tomography venography and magnetic resonance veography are often used to assess the status of veins __ Short answer 1. What three things is the examiner trying to assess when performing a cheerful two-storey examination? 2. Why is pulmonary embolism more likely to occur from a deep permeable system than a superficial venis system? 3. Why is thrombus in the anterior tibial veins rare? 4. What are some situations that can lead to false positives during the compression part of the vein of the extremities? 5. What are the advantages and disadvantages of new oral anticoagulans? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. What is the arrow pointing at? 2. What constitutes the scope of the area within the wall of the vessel? 3. What technique/tool was used to enable visualisation in this image? What would create this waveform in a common femsular vein? What would create this waveform in a common femsular vein? CASE STUDY 1. an 86-year-old man presents in a vascular laboratory with a history of right leg pitting ede for 1 week. The right leg is red and warm from the middle to the ankle. The patient has prostate cancer and IVC filter placement due to prior DVT. A. What's your first impression? B. Calculate the well result for this patient. c. On the Review, you can find a continuous Doppler spectrum on the right and left common femurs. Are you revising your first impression? d. What should you focus on next, given your patient history and what do you expect to find? 2. A 32-year-old female presents in a vascular laboratory with a history of pain for 3 weeks in the upper to middle calf on her right leg. She is healthy, athletic, of normal weight and does not use birth control pills. A. Calculate the well result for this patient. B. Protocol for your lab routinely does not include an assessment of veins below the knee. Is this the case when the exception is justified? Why? c. The examination contains DVT in the peroneal veins. The referring doctor orders serial examinations, and the thrombus appears to be spreading towards the popliteal vein. What could explain the development and progression of DVT in this patient? ANSWERS: CHAPTER 17 Match 1.b 2. f 3. d 4. a 5. e 6.c Mark Image 1-1. 1-2. 2-2. 2-1. 2-4. 2-3. Common femur artery Common femur vein Superficial femur artery Deep femoris artery Common femoris vein Large saphenous vein 3-1. 3-3. 3-2. 3-4. Superficial femoral artery Femoral vein Deep femoris artery or profunda femoris artery Deep femoris vein or profunda femoris vein 4-2. 4-1. Superficial femoral vein artery 5-4. 5-3. 5-2. 5-1. Posterior tibial veins Posterior tibial artery Peroneal veins Peroneal artery Multiple choice 1. and 2.c 3.b 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 23. 23. 24. 25.b c b a c a d a b c a d a d d fill-in-the-Blank 1. venography 2. tromb 7. Virchow is a triad of asymptomatic coagulation inhibitors pulmonary embolism inhibitors 6. 5. 4. 3. superficial venous thrombosis (also large saphenous venous thrombosis or 8th superficial thromboflebitis) greater than 3 9. 15. 14. 13. 12. 11. 10. 18. 17. 16. 23. 22. 20. 19. 24. 25. poorly externally curved 2 to 5 MHz reverse Trendelenburg longitudinal proxiesimal femoral vein Giacomini; cranial small saphenous soleal transverse recalation without increasing arteerioven fistula May – Thurner cyst iliac Short answer 1. Presence or absence of thrombus; relative risk of thrombus embossing and lung travel; competence of the valves contained. 2. Deep veins are surrounded by muscles. These muscles contract with walking and movement, making it more likely that the thrombus within the deep system will be embossed with this action. Surface veins do not have the surrounding muscle, which thrombus inside them is less likely to embody. 3. ATVs are not associated with the main sources of thrombosis in the leg – the veins of the sole (or soleus of the muscle). 4. Examples of situations that may lead to false positives include the patient's decline due to compression discomfort; vein compression limited by adjacent (bones or dense muscles), and the investigator does not exert enough pressure to inducies a vein. 5. NOACs do not require monitoring of prothrombin time or international normalised meal (INR) and do not have dietary restrictions such as warfarin or heparin. However, NOACs have shorter polies and currently do not have an antidote to reverse the effect. Image assessment/Pathology 1. Thrombus (acute) Fibrin mesh, then open the lumen around the thrombus (darker 2. 4th area near the vessel wall) Increased B-mode to obtain proximal obstruction (iliac 3. 5. thrombosis) Increased systemic venis pressure, such as congestive heart failure Study 1. A. Given the patient's presentation, DVT in the right lower extremity (possibly including icy veins) would be suspected. B. Well's score for this patient would probably be at least 3 points (high risk for DVT). However, the red, warm right lower extremity may also indicate cellulitis (not uncommon in immunosuppressive or compromised patients being treated for cancer). c. Bilateral CFV continuous Doppler spectra indicate more proksimal obstruction of compression. The first impression would be revised despite evidence of symptoms in the left leg. Based on the history of setting an IVC filter, one would redirect the IVC research exam. IVC thrombosis under the filter could be a very likely diagnosis in this case. 2.a. Well's score is expected to be low (25 seconds, filling rate (FR) 200 cm/s PSV in top mesenteric c. artery >325 cm/s PSV in both celiac disease and superior mesenteric arteries b. >200 cm/s PSV in celiac disease and >275 cm/s PSV in premium mesenteric d. artery >50 cm/s EDV in celiac and >55 cm/s EDV in superior mesenteric artery 17. Why can't standard duplex ultrasonic speed criteria for mesenteric vessels be accurate after treatment by placing a stent? A. Speeds in treated vessels are significantly lower than standard criteria. B. Speeds in treated vessels are usually higher than standard criteria. c. Stented vessels are not well visualized on duplex scanning. d. Stent struts artefactually reduce reflections, which Doppler signals incorrect. 18. What is transient compression of the origin of celiac disease during exhalation, which is alleviated by inhalation? a. Acute mesenteric ischemia c. atherosclerotic disease in compression of celiac disease b. d. artery from abdominal aneurysm median compression syndrome of arcate ligaments 19. Visceral aneurysms of arteries are rare; however, the highest incidence of aneurysm occurs in which of the following vessels? a. Splenic artery b. Common jeptic artery c. celiac disease d. superior mesenteric artery 20. What is the general role of the vascular laboratory in the diagnostics of acute mesenteric ischemia? A. Identification of thrombus on the origin of the SMA. B. No role due to the new nature of the disease. c. Characterisation of snoosis and degree of narrowing. d. Identification of the branch vessel in which the embolus is likely to have occurred. Fill-in-blank 1. Celiac disease is best visualized with transducer oriented into __ plane, while superior mesenteric artery is best visualized with transducer oriented into __ plane. 2. Diagnosis of chronic mesenteric ischemia is often __ because the disorder is rare, and symptoms can be due to a large number of abdominal disorders. 3. Postprvenial abdominal pain that occurs when there is not enough visceral blood flow to support the increased oxygen demand required by intestinal motility, secretion and absorption can often be termed __._.. _ 4. Inferior mesenteric artery stems from the aorta only proximal to __._._ 5. A replaced right liver artery originating from a superior mesenteric artery should be suspected when SMA shows a flow pattern __ 6. It is essential that the patient fasts at least 6 hours before evaluating the mesenteric arteries because the superior mesenteric artery changes dramatically from __ resistance to __ resistance after eating. 7. When performing spectral Doppler and high velocity are recorded in the mesenteric artery, it is important to document __ in order to confirm the stenosis that limits flow. 8. The term seagull sign refers to the sonographic appearance of the artery __ 9. Celiac artery and its branches also typically show __ resistance patterns, while superior and inferior mesenteric arteries show __ flow pattern. 10. A technique that can be used to reduce the movement of mesenteric vessels and help capture Doppler waveforms with the correct angle is to have a patient __..._._ 11. In the presence of celiac occlusion, the common jeptic artery almost always shows __ flow. 12. An important technique to use in the assessment of mesenteric vessels that can help detect abnormalities of the vessel wall or the torture of vessels is to examine the image only with __ 13. In preparation for two-storey scanning after mesenteric revascularization, note __ will describe in detail the location of proxial and distal anastomosis and the type of transplantation or other intervention. 14. When tracking the mesenteric bypass, if psv has >300 or 200 cm/s, and PSV in SMA of >275 cm/s corresponds to a stenosis of __ % 17. According to one study, when end-diastolic speeds are used as thresholds for >50% of the stinosis of the appropriate speed are __s in celiac and cm/s in the state-of-the-art mesenteric artery. 18. Recent studies point to speed guidelines for IMA stinosis, with a PSV of __ corresponding to >50% stinosis. 19. Percutaneous visceral artery intervention has lower morbidity/mortality rates than traditional surgical repair; however, it is associated with higher __ 20 rates. The advantage of using two-storey ultrasound to evaluate median arcate ligament compression syndrome is that Doppler wave forms can be obtained during changes in __..._......_....__21. Splenic artery aneurysm, when detected during pregnancy, is associated with a rate of 95% __ leading to high maternal and fetal mortality. 22. Visceral artery dictions are most common in __ and are often extensions of aoretic dissection. 23. In patients with suspected MALS, if speeds are not normalised with inspiration, the patient may be placed in the __ 24 position. Embolus or mesenteric artery thrombosis can lead to __._._ 25. Symptoms associated with the above pathology are usually described as pain __ physical findings. Short answer 1. What is the typical patient presentation of chronic mesenteric ischemia? 2. What is the purpose of using a test meal when assessing mesenteric vessels? 3. How can compensatory flow differ from elevated speeds due to snoosis? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. A 32-year-old woman presents her to a vascular abdominal bruit lab. These images were taken during an abdominal aorta examination. What is present in these pictures? The 73-year-old female presents vascular laboratory abdominal pain after eating and a recent history of weight loss. A two-storey photo shoot of the abdominal aorta and its branches reveals this image. What is shown in this picture? What other vessels should be assessed and why? CASE STUDY Review the information and answer the following questions. 1. A 68-year-old woman presents himself to the emergency department with an acute onset of severe abdominal pain. After physical examination, nothing is in line with the amount of pain the patient is in. Based on this limited history, what should be suspected? What imaging examinations should the patient undergo? The 2nd 40-year-old multiparal female presents an abdominal two-storey examination for suspected gallbladder disease. During this evaluation, an anechoic, circular mass was recorded superior to the pancreas which seems to be in communication with the spleen artery. Color and spectral Doppler show the flow within the mass. What should be suspected of this patient? What's the prognosis for this patient? ANSWERS: CHAPTER 24 Match 1.b 2. e 3. a 4.c 5. d Mark Image 1-1. Celiac disease leaves gastric artery Artery Superior Mesenteric Artery 1-5. 1-4. 1-3. 1-2. 1-6. Inferior Mesenteric Artery Common Barry Artery Multiple Choice 1.b 2.c 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.b d a c d d c d a b a b Fill-in-the-Blank 1. 4. 3. 2. 8. 7. 6. 5. 12. 11. 10. 9. 16. 15. 14. 13. 17. poprece; longitudinal or sagittal overlook chronic mesenteric ischemia aortic bifurcation of low resistance high; low posttenotic turbulence of celiac syria; spleen; common jesipatic low; high suspension breathing retrograde/reverse B-mode/grayscale operative compensation reduction >70 55; 45 18. > 200 to 250 cm/s respiration of respiration of rupture of superior mesenteric artery 23. 22. 21. 20. 19. 25. standing acute mesenteric ischemia out of proportion Short answer 24. 1. Chronic mesenteric ischemia is more common in women than men with a typical age range of 40 to 70 years. Almost all CMI patients are active smokers or have a history of tobacco abuse. Typical symptoms include abdominal pain after eating, weight loss and screenphobia (fear of food). Symptoms usually begin within 30 minutes after eating and last for 1 to 2 hours. Patients with visceral blood vessel scinose may not have symptoms due to extensive collateral between the vessels. Usually, at least two of the three main vessels must have s footing or occlusion for symptoms to appear. 2. After meals, there are usually significant changes in normal SMA blood flow with almost doubling in PSV and near dent in EDV. In patients with the disease in SMA, there is a failure of postpndial SMA PSV to increase significantly above already elevated levels. If this increase is observed, then it can be concluded that SMA is disease-free. Conversely, if there is no significant increase in PSV, then it can be assumed that there is obstruction and that the SMA can no longer compensate. However, studies have shown that using a test meal does not definitively improve the results of a duplex examination. As a result, a test meal is usually not proposed for a routine mesenteric two-storey exam, but can be reserved for selected cases. 3. With stenosis, posttenotic turbulence occurs and changes in the waveform distally in the vessel. With compensatory flow, there is little spectral expansion, no preterosis, a stenotic, posttenotic speed profile, and speeds can be evenly elevated. Image assessment/Pathology 1. The above images are consistent with the median compression of arcane ligaments of celiac. The first picture shows that the patient is breathing, and normal speeds are documented in celiac cells; however, the second image was taken with patient exhalation and rate increases to 470 cm/s (PSV). This PSV is consistent with more than 70% celiac stinosis. Breathing changes are a classic finding in artery compression by Arcuate ligament. 2. The image shows Doppler's waveform from the proximal SMA with speeds of 427 cm/s PSV and 54 cm/s of EDV. These speeds are consistent with more than 70% of the synosis of proksimal SMA. The patient's symptoms are consistent with chronic mesenteric ischemia, but in order to prove this diagnosis, other mesenteric vessels, namely celiac disease and IMA, should be evaluated. Usually, at least two of these three vessels must have the disease in order for the patient to be symptomatic. Case study 1. The patient's findings are consistent with acute mesenteric ischemia. Acute mesenteric ischemia is more common in women with a median age of 70 years. Symptoms usually include pain that is out of proportion to physical findings. The patient is likely to proceed with CTA for confirmation diagnosis. Duplex ultrasound is not the first choice for imaging diagnosis because acute events usually occur in distal SMA where ultrasound visualization is limited. The patient must also go into surgery/intervention as soon as possible as the mortality rate is high. 2. A splenic artery aneurysm should be suspected in this patient. Spleen aneurysms are rare; however, they are more common in women, and multiple pregnancies are a risk factor for their development. The anechoic mass that has been identified is consistent with an artery spleen aneurysm. This patient is at risk of ruptured spleen aneurysm; Artery spleen aneurysm aneurysms have a rupture rate of 95% during pregnancy, with a high mortality rate. This patient requires immediate intervention to avoid this outcome. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY CONCEPTS 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. ______ renal-aortic speed ratio ____ posttenotic signal ______ renal medulla __ renal hylum ____ renal ostium ______ renal sinus ____ renal cortex ____ renal parenchyl disease ____ renal artery stenosis 11. ______ suprasternal notch 12. ______ symphysis pubis/pubic bone DEFINITION a. Central echogenic cavity of the kidneys; contains a renal artery, renal b. vein and collection and lymphatic systems Narrowing of the renal artery, most often as a result of atherosclerotic disease or medial c. fibromuscular dysplasia Visible adoption at the base of the neck d. where the neck joins the sternum A medical disorder affecting the tissue e. kidney function Peak systalic rate of renal arteries divided by peak sistal aoritic rate recorded at the level of celiac disease and/or superior mesenteric arteries; used to identify the renal artery f. stenosis that limits the flow Area through which the renal artery, vein and ureter enter Mr. Kidney Tiny tube inserted into the stenotic renal artery at the time of arterial h. dilation; usually a metal mesh in the structure; artery opens I. highlighting of pelvic bones recorded in the lower abdomen Doppler's spectral waveform is recorded immediately by distal to snorosis which reduces the flow of j. showing reduced peak systolic velocity and disordered flow K. opening of the renal artery from the aortic wall The middle area of the l. kidney lies between the sinuses and cortex; contains renal pyramids The most perfect area of renal tissue lying just below the renal capsule anathOMY and PHYSIOLOGY REVIEW Marking the image Complete the markings in the following images. 1. Diagram illustrating kidney vasculature. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. It is estimated that up to how many hypertensive patients have underlying kidney artery disease? a. 50% b. 40% c. 6% d. 15% 2. a.b. d.c. What is the next limitation of contrast angiography? detailed anatomical information lack of hemodynamic information there is no identification of the functional significance of renal artery disease invasive with possible nephrosorous contrast 3. What is the following true regarding the two-level ultrasound assessment of renal vasculature? a. provides anatomical information b. provides hemodynamic information c. painless and non-invasive d. all of the above 4. a.b.c. d. What is the normal measurement of kidney length? 4 to 5 cm 8 to 13 cm 10 to 15 cm 5 to 7 cm 5. What are the kidneys that are connected to the lower poles by a fabrication of tissue lying in front of the aorta? a.b.c. d. ectopic kidneys cross-kidney horseshoe kidneys cross kidneys cross kidneys 6. Why is the renal sinus usually very echogenic in a sonographic image? a. the location of the lymph vessels of b. fatty and fibrous tissue in sinus c. increased blood flow in the area d. fluid from the collection system 7. What are the triangular-shaped structures within the inner part of the kidneys that carry urine from the cortex to the renal pelvis? a. nephrons b. pillars of Bertin c. renal pyramid d. renal calyces 8. The right renal artery initially courses __ from the aorta, and then passes __ to the inferior vein cave. a. posterolateral, front b. rear, superior c. anterolateral, lateral d. anterolateral, rear 9. Which vessel follows the anterior to the aorte, but the posterior to the superior mesenteric artery and the anterior to both renal arteries? a. spleen vein b. right renal vein c. left renal vein d. inferior mesenteric vein 10. In which of the following segments of the kidney arteries usually occurs atherosclerotic disease in the renal artery? a. origin of the proximal third b. distal renal artery immediately before entering the kidney of the middle to distal segment c. d. interlobaric artery within the renal parechyma 11. Which of the following patients would be suspected of fibromuscular dysplosis in the renal artery? a. 85-year-old diabetic b. A woman with a history of well-controlled hypertension and c. smokes a 25-year-old male with chronic asthma d. a 32-year-old female with poorly controlled hypertension on March 12, 2015. What is the most appropriate pliers for use in the assessment of renal arteries? a. 7 to 10 MHz straight linear b. 2 to 5 MHz curved linear c. 1 to 2 MHz vector string d. 5 to 8 MHz phase sector string 13. At what level is the spectral Doppler waveform with the peak sistal rate required from the aorta for use in the kidney-to-aorta ratio? b. proximal, at the level of celiac disease and superior mesenteric arteries in the middle, at a. level of renal arteries d. distal, at the level of inferior dissinterial artery distal, at level c. of normal iliac bifurcation 14. To identify the ostia of the renal artery from the middle approach, an image is obtained from what location? a. transversely, at the level of celiac disease b. sagittal, at the level of celiac disease d. transversely, slightly weaker than the superior mesenteric artery sagittal, c. slightly superior to the left renal vein 15. Which of the following is an ultrasound modality that has a low-angle addiction that can be useful in identifying a duplicate renal artery? a. Color-flow Doppler b. power Doppler c. spectral Doppler d. pulse inversion Doppler 16. Using which angle of insonation are flow patterns within the parenchyma kidneys usually obtained with spectral Doppler? a. 60 degrees b. 90 degrees c. 0 degrees d. 45 degrees 17. When comparing the length of the kidneys from side to side, how many differences does compromised flow in the smaller kidney suggest? a. 1 cm b. 2 mm c. 3 mm d. 3 cm 18. Which of the following describe normal spectral Doppler wave characteristics in the renal artery? A. High resistance, minimal diascopic flow with speeds ranging from 90 to b. 120 cm/s of low resistance, high diastolitic flow with speeds ranging from c. 90 to 120 cm/s of low resistance, minimum diastolytic flow with speeds in d. range from 10 to 120 cm/s of high resistance, high diastoic flow with speeds ranging from 50 to 70 cm/s 19. The patient presents the vascular laboratory for a two-storey evaluation of the renal arteries. During the test of speed in the right origin of the renal arteries they reach 175 cm/s without evidence of posttenotic turbulence. The speeds on the left were 100 cm/s. A. Right renal artery synosis 60% 20. Which of the following spectral Doppler wave changes will not occur distal hemodynamically significant stinosis of the renal artery? a. Delayed systoic upstroke b. loss of peak c. compliance value reduced peak systoli speed d. increased peak systoli speed of 21. Which of the following findings inside the kidneys are consistent with renal artery occlutia? b. Kidney length >10 cm, speed less than 10 cm/s in renal cortex a.c. kidney length of 13 cm there is no detected flow within the kidney parenchime 180 cm/s, EDR rate of renal arteries of 0.35 b. >180 cm/s, RI renal artery speed of 0.6 c. 70 cm/s, EDR speed 0.19 d. renal artery of 70 cm/s, RI of 0.5 23. a.b.c. d. What is measured to determine the acceleration time? the beginning of the systolic to the early sistalic peak of the beginning of the systole by the end of the diastolic beginning of the diastole to the early sstalic tip end of the systole 24. During the two-storey examination of the renal artery, the speeds of the proximal aoraktics of 100 cm/s, the rate of the proximal right renal artery of 200 cm/s and the proximal velocity of the left renal artery of 400 cm/s were found. Which of the following describes these findings? b. right RAR = 2.0.60% snoosis right RAR = 2.0, d. 60% snoosis right RAR = 0.2, >60% snoosis; Left RAR = 4.0, 400 cm/s and cortical EDV 160 cm/s and d. cortical EDV 200 cm/s and cortical EDV 180 cm/s with posttenotic turbulence have been shown to correlate with >60% flow stenose. In the absence of posttenotic turbulence, speeds of >180 cm/s correlated with stenosis of 3.5 are also consistent with >60% stenosis. Another useful supplement is the indirect renal hilar assessment. Using an acceleration index or acceleration time, this measurement also provides evidence of significant stinosis in the renal artery. An acceleration index of less than 3.78 or an acceleration time of >100 ms is consistent with a significant lesion that limits flow. Renal parenimal disease is indicated when increasing renovascular resistance. There are two main measures: resistance index and end-diastolic systalic ratio. A resistance index greater than 0.8 or diastorically to a sistalic ratio of less than 0.3 predicts medical kidney disease. The 4th. Limitations of indirect renal artery stenosis assessment include normal acceleration time in patients with elevated renovascular resistance of systemic arterial stiffness, normal waveform contour of Doppler in patients with 60% to 79% stenosis or rebuction renal arteries, and wet intrarenal spectral waveforms in patients with occlusion or aority corrosion. 5. The differences that a vascular sonographer should be aware of when scanning paediatric patients is that the length of the kidneys is half to half that in infants and children; renal parenchia is more echogenic in infants, and the renal sinus is less echogenic; and speeds and resistant indices within the renal artery and parenhimal vessel vary depending on the age of the child. Image assessment/Pathology These images are consistent with stinos of the left renal artery greater than 60%. The first image shows a PSV of 486 cm/s in the origin of the left renal artery, and the second image shows posttenotic turbulence. The final image taken in the distal segment shows a belated systoly upstroke. These findings are consistent with hemodynamically significant arterial synose, which meets with >60% stinosis in the renal artery. 2. The image shows a real renal artery coursing through the front into an inferior cava vein. Typically, the right renal artery passes the posterior to IVC before entering the renal hylum. Case study 1. On the right, PSV of 325, the presence of posttenotic turbulence and calculated RAR of 3.8 indicate the presence of stenosis of the renal artery >60%. On the left, although psv is increased just above 180 cm/s, turbulence is not replaced, and RAR is less than 3.5. This is consistent with 16 mm ≥ 13 mm ≤13 cm 8. What does an increase in caliber less than 20% in the spleen during deep inspiration show? a. Spleen venous thrombosis b. Budd-Chiari syndrome c. portal hypertension d. congestive heart failure 9. What of the following increases blood flow within the portal, spleen and superior mesenteric veins? a. inspiration and food intake b. inspiration and exercise c. expiration and exercise d. expiration and food intake 10. When assessing barflow, S and D waves should show blood flow to which organ? a. liver b. heart c. spleen d. small intestine 11. a.b.c. d. What is a normal resistance index in the sonic arteries? 0.2 to 0.4 0.8 to 1.0 0.5 to 0.7 1.3 to 1.5 12. What is the most common etiology for portal hypertension in North America? a.b.c. d. 13. a.b.c. d. portal venous thrombosis Budd-Chiari syndrome cirrhosis infection hepatitis C What is the primary complication of portal hypertension? portal venous thrombosis gastrointestinal hemorrhage of hepatic vein thrombosis splenomegaly 14. a. increased diameter of portal vein c. reduced or absent respiratory variation in portal and spleen veins b. d. hepatopetal flow in portal and spleen veins of portosystemic collateral (varices) 15. What is the most common portosistem collateral shant in the presence of portal hypertension? a. Recalated paraumbilous vein b. splenorenal veins c. gallbladder varices d. coronary-gastroesophageal veins 16. What is the next portal hypertension treatment involving jugular vein cannulation with stent in the liver? a. mesokaval shunt b. splenorenal shunt c. TIPS d. PVTS 17. What of the following is NOT a normal finding in transjugular portosystemic shunt? a. Hepatofugal flow in the main portal veins c. veins within the stent ranging from 90 to 190 cm/s of hepatofugal flow b. d. in intrahepatic portal veins outside the place of the stent connection increased the flow rate in the spleen 18. After a two-level assessment of the portal system, the vascular technologist visualizes the increased caliber of the portal vein without the distinctive flow by color, power and spectral Doppler. Increased barry artery flow has also been documented. What does he find for you a. portal hypertension b. Budd-Chiari syndrome c. cirrhosis d. portal venous thrombosis 19. In addition to inferior vein cava dilation, what special finding helps distinguish between congestive heart failure and portal hypertension? b. increased pulsatity in portal veins only increased pulsatism in a. d. jeptic veins only increased pulsatity in both portal and yptic veins c. reduced pulsaticity in urcases only 20. b. dilation of IVC by intraluminal echoes of pulsatile, phasic flow in a.c. nonoccluded parts of the liver veins of enlarged caudate lobe d. ascites and hepatomegaly Fill-in-the-Blank 1. The combination of spleen and superior mesenteric veins forms __..._ 2. Portal __ portal branches into the front and back segments and portal __ portal branches into medial and lateral segments. 3. Jep veins __ in size as the diaphragm approaches. 4. The position of the patient and the inspection that provides optimal visualization of the spleen vein and artery is __ 5. Using a higher frequency during the vein portal two-storey test can allow better recording of the front abdominal wall __ 6. In patients with portal hypertension, congestive heart failure, constrictive pericarditis and portal vein thrombosis, portal vein diameters can be expected to be __._.. _.... 7. The flow of the vein of the portal is usually __ in the direction with constant antegrade flow throughout the heart cycle. 8. Patients with tricuspid regurgitation, right-wing congestive heart failure or artemination fistulas may have __ flow in the portal vein. 9. Both ____ and __ veins show a monophasic flow with a slight pulsatness that is directed towards the liver. 10. Hepatic veins show __ waveforms corresponding to changes in cyclic pressure in the heart. 11. With food intake, portal vein flow speed __,_, while the still artery speed __ 12. Patient size, right atrium pressure and fluid overload or heart failure affect IVC __.. 13. Portal hypertension becomes significant when the pressure gradient between the portal vein and IVC exceeds __ 14. Until recently, the most common cause of cirrhosis was alcohol abuse; however, the infection _ now accounts for a higher percentage of cases. 15. Cirrhosis would be considered (n) __ cause of portal hypertension. 16. Sonographic portal hypertension findings may include a vein portal diameter greater than __m mm and __ flow in the portal. 17. The sexiest the hypertension portal is detection __.. 18. The two-storey pictorial finds enlarged exteriors with great agility, turbulent flow and the queasy appearance of corkscrews are called __ 19. Penetrating trauma, iatrogenic trauma due to liver biopsy, transhepatic cholangiography and transhepatic catheterization of bile ducts or portal veins can create a(n) __, which can cause hypertension of life-saving portals. 20. An abnormal connection between the portal vein and the jeptic vein is considered __, which can lead to increased pulsatity in the wave form of the portal. 21. TIPS are usually put on the management of uncontrolled __ and refractory ascytes. 22. If portal venous thrombosis persists without slicks, the development of periportal collateral veins increases and is known as __..._ 23. The spectrum of hepatic disorders that occurs in the environment of heart failure on the right side and causes the accumulation of deoxygenated blood, parenhimal atrophy, necrosis, collagen deposition, and finally fibrosis is called __.. 24. Malignant tumour infiltration, parasitic mass or extrinsic compression from an adjacent mass may result in __ obstruction of the liver vein. 25. A patient with fatigue, abdominal swelling and signs and symptoms of portal hypertension, but with the retention of large livers and portal veins would probably be diagnosed with __._ Short answer 1. Provide indications for hepatoportal duplex ultrasound. 2. What are the key differences between portal veins and liver veins inside the liver? 3. What anatomical features of the liver should be documented during hepatoportal duplex examination? 4. What are the main limitations affecting the success of the hepatoportal duplex examination? 5. What are the normal findings in tips that work well? IMAGE ASSESSMENT/PATHOLOGY Review the images and answer the following questions. This Doppler waveform is taken from tips' mid-region. What do these findings suggest? This image shows the color of the Doppler image of the main portal veins area. What do these findings suggest? This image shows another view of the port hepatis with a color doppler. Describe the findings. Case study Review the information and answer the following questions. A 58-year-old man presents a vascular laboratory for hepatoportal duplex examination with a history of alcoholism. These images were obtained during his examination. Describe the findings. What pathology do these images suggest? A 23-year-old woman presents a vascular laboratory for hepatoportal duplex examination. The patient presents himself with pain of the right upper quadrant, jaundice, ascites, and hepatomegaly and has a history of oral contraceptive use. The specified image was obtained during the examination. Describe findings in this picture. What does her clinical presentation and pictorial findings suggest? ODGOVORI: POGLAVLJE 27 Podudaranje 1. h 2. j 3. c 4. 5. 6. 7. 8. 9. 10. 11. f a d k b e g Označavanje slike 1-1. 1-3. 1-2. 1-6. 1-5. 1-4. 1-9. 1-8. 1-7. 1-12. 1-11. 1-10. 1-14. 1-13. 1-17. 1-16. 1-15. 2-1. 1-19. 1-18. 2-5. 2-4. 2-3. 2-2. 2-6. 1.c 2. b 3. d 4. a 5. c 6. b 7. a 8. c 9. d 10. b 11. c 12. d 13. b 14. c 15. d 16. c 17. 18. d 19. c 20. b Desna jeptička vena (RHV) Inferiorna vena cava (IVC) Srednja jepava vena (MHV) Lijeva jehotična vena (LHV) Pravilna jeptička arterija (PHA) Portal vena (PV) Lijeva jehotična vena (LHV) Pravilna jeptička arterija (PHA) Portal vena (PV)) Zajednički jednatički kanal (CHD) Zajednička jeptička arterija (CHA) Pravilna jepća arterija (PHA) Celijakija arterija (CA) Splenska arterija (SA) Splenska vena (SV) Inferiorna mezenterične vene (IMV) Superior mezenterične vene (SMV) Aorta (AO) Gastroduodenalna arterija (GDA) Zajednički Bile Duct (CBD) Right Yogetic Artery (RHA) Inferior Vein Cava (IVC) Right Vein Portal Left Vein Portal Main Vein Portal Splenic Vein Inferior Mesenteric Vein Superior Mesenteric Vein Multiple Choices Fill-in-Void 1. 2. 3. 6. 5. 4. 7. Main Portal Vein Right; left increase in left coronary oblique weld; nodularity increase hepatopetal 10. 11. 9. reverse and pulsatil spleen; superior mesenteric pulsatile, triphasic 8. 12. increase; reduce the diameter 14. 10 to 12 mm Hg hepatitis C 13. 19. intraheptic 13 mm; hepatofugal portosystemic collaterals arteraria 18. 17. 16. 15. 22. arteriovenous fistula venovenous fistula bleeding varice cavernous 21. 20. 24. transformational cardiac cirrhosis or congestive hepatopathy secondary 23. 25. sinusoid obstructive syndrome Short answer 1. A. Cirrhosis of the liver, alcoholic and viral hepatitis B and C. Portal hypertension, ascites of unknown etiology, or esophagus varice b. d. Portal thrombosis, spleen and superior mesenteric veins Budd – e. Chiari syndrome (liver vein thrombosis) Pre/post-intervention g. procedures and monitoring of portosystemic shunts Abdominal trauma f. h. Sudden onset of ascites, acute abdominal pain, and elevated D-dimer 2. Patients with a history of abdominal malignancy Portal walls of veins consist mainly of loosely distributed, nonparallel connective fiber tissues and only a smaller amount of collagen. This composition results in hyperechian walls. Portal veins course inside liver segments (intrasegmental) and emanates from port hepatis (higher at port hepatis). Jeep veins have walls consisting mainly of tightly packed collagen fibers, making the walls thinner and more dependent on the angle of visualization of the walls. Hepatic veins reach between the lobes of the liver (intersegmental) and increase in calibre as they approach the diaphragm. Doppler signals are also significantly different between the two with portal veins showing mild pulsatil flow to the liver and liver veins show very pulsatil pulsatil away from the liver. 3. During an abdominal examination at a two-storey examination, the liver is assessed by the size, texture and contour of the surface. In addition, it should be noted the presence of jeptic masses, portosistem collateral, hepatofugal flow, ascites and splenomegaly. 4. The main limitations include obesity of patients, diffusion of liver disease, ascites, and gas of the intestines. Patients with severe abdominal pain, those who cannot remain calm, those who cannot breathe quietly or change the depth of breathing, and combat patients also represent limitations. 5. Tips that work well should show the flow from the entire portal system to the bustling vein system. Hepatopetal flow should be present in the main portal of the vein, directed towards the stent. Intrahepatic portal veins outside the place of the stent connection can be hepatofugal. Color capture should show full stent charging. Normal speeds within the stent range from 90 to 190 cm/s and should not vary significantly during stents. Portal and spleen veins and barry artery velocity increase from value before TIP. The walls of the stent usually show high echogenicity, while stent lumen should remain anechoic. Image assessment/Pathology 1. The Doppler waveform shows elevated speeds in the middle stent region, consistent with TIPS synose. Flow rates within TIPS typically range from 90 to 190 cm/s. Color capture also shows the presence of turbulence, also consistent with stinoz in TIPS. 2. A two-storey colour recording on the main vein portal shows the infiltration of tumour thrombuses. An arterial flow of low resistance was recorded in the mass. 3. The image shows more eduous vessels around the port of hepatis. These findings are consistent with the cavernous transformation of the vein portal secondary to the portal of venous occlusion/thrombosis. Case study 1. The images show an enlarged main portal vein (1.67 cm in diameter) and an abnormal hepatofugal doppler waveform from the main vein portal. The antegrade flow of the barry artery is also shown. These findings are consistent with portal hypertension, possibly caused by alcoholic cirrhosis. 2. The image shows thrombosed jeptic veins consistent with Budd – Chiari syndrome. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ allograft 2. ______ orthotopic transplantation 3. 4. 5. 6. ____ rejection of transplantation ___ immunosuppression drugs ___ arteriovenous fistula ___ pseudoaneurysm DEFINITION a.b.c. d. Transplant failure is secondary to the formation of antidonorine antibodies by recipients. This can lead to loss of transplantation The link between the artery and the vein, usually of post-traumatic origin Drugs used to inhibit the formation of antibodies to allograft develop secondary to tears Arterial Wall that allows extravasion of blood from arterial lumen, located on the compacted edge of e. surrounding soft tissue Transplant located at the same anatomical f. location as the original organ Each tissue transplanted from one human to another human chapter REVIEW Multiple choice Complete each question by circulating the best answer. 1. .b.c d.d. Which of the following is not a symptom of kidney transplant failure? increased red blood fever and chills increased serum formation pain and tenderness 2. a.b.c. d. Where are kidney transplants most often found? normal position of the kidney right iliac fossa position left orac fossa position right rear position 3. In DD kidney transplantation, what anastomosis of blood vessels is performed? b. donor aortic wall cell and recipient external donor of the Iliac artery aortic wall and a.c. recipient of the inner oric artery recipient of the renal artery and donor external recipient of the iliac artery and main renal artery 4. What is of the next complication of kidney transplantation that is relatively common in the post-Traumatic period? a. Superinfection b. urine c. lymphocele d. ureteral occlusion 5. What is the optimal time frame for performing a basic sonogram in patients with a kidney mesh transplant? a. 6 am b. 12 pm c. 24 hours d. 48 hours 6 a.b.c. d. How long after transplantation does the kidney reach its maximum size? 12 months 6 months 4 months 2 months 7. Which sonographic image would best show the presence of urine? a. Transverse superior to kidney b. sagittal on the middle kidney c. transverse bladder d. oblique view of the lower half of the kidneys and bladder 8 a.b.c. What is a normal arterial RI in the transplanted kidney? 0.5 0.7 0.9 d. 1.0 9. What speed is key to accurately calculating ri? a. early diascopolic b.mid diascopolic c. end of diascobolic d. sistalic 10. What is the pattern of color display in interlobar arteries consistent with normal flow? b. flow with minimal reduction at the end of diastolic lack of flow at the end of diastola a.c. inexpensive and pulsatile d. minimal flow at the end of diastola 11. a.b.c. d. When does the loss of the adorable caused by rejection occur? 3 months 6 months 9 months 12 months 12 .b.c. d. What is the medical term for sudden cessation of urine production? Anuria oliguria polyuria hematuria 13. a.b.c. d. Which of the following is not a risk factor for the development of the

ATN? Ischaemic time hypertension donor disease nonheart beating surgery 14. Which of the following best describes a collection of perineph african liquid with multiple thin septications? a.b.c. hematoma hydronephrosis hydronephrosis 15. Which of the following best describes the sonographic findings of duplexes consistent with renal artery thrombosis (RAT)? b. Anechoic lumen with low resistance flow pattern anechoic lumen with high. c. Pattern of resistance flow intraluminal echoes with low resistance sample d. intraluminal echoes with absence of flow 16. With which of the following complications of transplantation is kidney enlargement with reduced renal cortical echogenicity most consistent? a. renal arterial thrombosis b. renal vein thrombosis c. stinosis of the renal artery d. lymphocele 17. What is the most common vascular complication after a kidney transplant? a. Renal artery thrombus b. renal vein thrombus c. renal artery stinosis d. renal artery kink 18. What do Doppler criteria in accordance with RAS from >50% to 60% in transplanted kidneys include? a. PSV >250 cm/s b. PSV ratio ≤2.0 to 3.0 c. at 440 cm/s) with posttenotic turbulence corresponding to hemodynamically significant stenosis of the renal arteries. 3. Pictures show a normal pattern present in most liver arteries immediately after a liver transplant. In the immediate period of the perp, a high resistance signal is often seen in the liver artery, thought to be caused by a swollen liver, causing an increase in intrahepatic pressure due to increased peripheral vascular resistance. This will be resolved within a few days, as the second and third images show, with an increase in the final diastolytic flow and normalization of the resistance index. Case study 1. Although serum rebuff is a nonspecific finding, rejection is the most likely cause of patients' symptoms. In addition, one of the earliest signs of rejection is oliguria. Sonographic rejection findings include an increase or decrease in kidney length from the previous exam, loss of corticoedullar differentiation, uroepitelia groove and increased RI. 2. The hepatic artery is the only source of blood supply to the biliary system, so liver artery stinosis can result in secondary bilia ischemia. Jaundice may be due to liver failure due to rejection. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ autologous/autogenic 2. ______ endarterectomy 3. 4. 5. 6. 7. 8. ___ infrainguinal __ prosthetic ______ revascularization ___ sterile technique ___ surveillance __ visceral definition b. Below inguinal; procedure performed under the groin Restoration of a. blood flow to the organ or area via bypass, endarterectomy or c. angioplasty and stenting Guarding; periodic monitoring of d. pygmy and functioning in some way Removal of plaque, intimacy, and part of the media artery to restore normal flow through the diseased e. segment Means by which the surgical field is isolated from nonsterile or g. contaminated materials relating to the utronica (intestines or kidneys) f. Self-reporting or from the same organisms h. A device replacing an absent or damaged part; Man-made tube used for chapter review multi-choice bypass process Complete each question by circling the best answer. 1. Which of the next is considered the gold standard for intraoperative evaluation of any type of revascularization? a. duplex ultrasound b. arterography c. CW Doppler only d. palpation 2. What requirements of a two-storey ultrasonic system would be best suited for intraoperative assessment? b. Transmission systems with high-frequency high-end system pliers with a.c. a large series of graying systems only with high frequencies d. enlarges large systems with different admixtures 3. What is the primary role of a vascular technologist during intraoperative procedures? A. Manipulation of pliers in a sterile field as well as system c. operation Manipulation of pliers in a sterile area only Operation B. ultrasound system while vascular surgeon manipulates the mixing d. Vascular technologist does not participate during intraoperative procedures. 4. In general, when carrying out an intraoperative assessment, which of the following imaging techniques is best? a. grayscale imaging only b. spectral Doppler analysis only d. combination of grayscale, color and spectral Doppler color Doppler c. estimate only 5. What is not the benefit of angiography in intraoperative evaluation of carotid endarterectomy? B. Ability to visualize the intracranial carotid artery The ability to visualize .c. extracranial inner carotid artery Use of contrast is not necessary. d. Offers physiological data as well as anatomical data. 6. During an intraoperative evaluation of the carotid endarterectomy, the spectral Doppler showed a speed of 200 cm/s in the internal carotid artery, while the speeds in the common carotid artery were 70 cm/s. Based on these findings, which of the following is likely to happen? b. the closure of the surgical site without further closure of the surgical site a.c. with a two-level assessment was carried out 1 day postoperatively repeat d. intraoperative two-storey assessment 30 minutes later the revision of the surgical site with repeated two-level assessment after revision 7. Which of the following two-storey ultrasound findings is NOT associated with platelet aggregation? b. hypoechoic or anechoic material along the wall wall of the vessel focal altitude in .c. peak systonic speed increased speed ratios d. linear object visualized in parallel with the walls of vessel 8. After a two-level evaluation of the carotid endarterectomy, shading was observed in the proximal internal carotid artery. What is the most likely cause of this shading? a. Residual atherosclerotic plaquing on the carotid lamp artifact from b.c. prosthetic patch at the site of endarterectomy occlusion of the inner carotid d. artery from neointimal hyperplasia get the placement too low on the ultrasonic system 9. What of the following can lead to complications or failure of the infrainguinal bypass? a. inadequate arterial inflow b. use of prosthetic material below knee d. significant disease in the cast vessels all of the above c. 10. What is the following main advantage of intraoperative duplex evaluation of infrainguinal bypass? A. Full anatomical evaluation of the transplant. B. Identification of retained valves. c. Physiological information as well as anatomical information shall be collected. d. The shadow caused by the prosthetic material will improve the image. 11. .b.c d.d. What is the preferred bypass line for infrainguinal revascularization? Dakron material PTFE material autologous material All materials are equally desirable. 12. What can abnormally low graft speed in infrainguinal bypass graft indicate? a. Bad flow containers b. bad casting vessels c. proksimal anastomosis connection fault d. arterioveous fistulae 13. Which criterion is most commonly used when assessing whether to revise infrainguinal bypass transplantation during intraoperative evaluation? a. PSV >180 cm/s and speed ratio >2.5 b. PWV 4.0 d. PSV >250 cm/s and speed ratio >2.5 14. During an intraoperative two-storey assessment of lower limb bypass transplantation, a turbulent flow was observed in the middle of the thigh with an elevated diastolic flow recorded in the proximal thigh. What are your findings consistent with? a. disseating b. shelf lesions c. intimal flap d. arteriovenous fistula 15. Why can intraoperative two-stage ultrasound evaluation of renal artery bypass be preferred over angiography? A. Failure of the renal artery bypass often results in death. B. Duplex ultrasound avoids the use of contrast in the renal-compromised patient. c. It has been shown to be more accurate than angiography. d. Does not require the presence of a technologist to operate the equipment. 16. Why is intraoperative two-storey ultrasound NOT used in aortoililic reconstructions? A. Small defects are not so pathetically threatening in these large pots. B. Due to surgical technique, defects cannot be detected on ultrasound. c. Large amounts of intestinal gas prevent recording. d. Ultrasonic devices are not configured for use in the abdomen. 17. What speed is commonly used as an indication for revision of the renal artery bypass during intraoperative evaluation? a. >180 cm/s b. >275 cm/s c. >200 cm/s d. 2.5, increased diastolic velocity to the side branch, turbulence in transplantation, echogenic material inside the transplantation and irregularities on the wall. 2. When assessing a premium mesenteric artery, flow rates above 275 cm/s shall be considered abnormal and consistent with the stenotic stenation. Transplant stenosis often leads to failure and occlusion of transplantation, which is catastrophic in mesenteric vessels, which often leads to death. This graft should be revised – early revision is linked to better rates of long-term suffering. OVERVIEW OF TERMS THAT CORRESPOND TO KEY TERMS WITH THEIR DEFINITIONS. KEY TERMS 1. ______ Access to Haemodialysis 2. ______ fistula 3. ______ ______ definition of transplantation a. Any connection between the artery and the vein; May be congenital, traumatic, b. or acquired Type of access to haemodialysis that uses a prosthetic line for c. connects the artery to the vein to allow dialysis Also known as vascular approach, surgically created link between artery and vein to allow removal of toxic products from the blood by dialysis ANATOMY AND PHYSIOLOGY REVIEW Marking images Complete the labels in the images that follow. 1. Veins in the upper extremity. 2. Arteries in the upper extremity. CHAPTER REVIEW Multiples Complete each question by circling the best answer. 1. The aim of the Renal Dialysis Outcome Quality Initiative and the Fistula First Breakthrough Initiative was to increase and expand the creation of which of the following? b. prosthetic haemodialysis approaches to transplantation of autogenic haemodialysis approach a. d. fistulae lower extremities haemodialysis access to central vein port access c. 2. What is the most common cause of fistulae maturation failure to access dialysis? a. small or suboptimal veins b. vein outflow of stinosis c. arterial inflow of stinosis d. arterial steal syndrome 3. Which of the following should be included during physical examination for preoperative artery mapping to create a dialysis fistula? b. bilateral measurements of hand blood pressure pulse examination of brachial, radial, a. d. and ulnar arteries Allen test for the assessment of palmar arch all of the above c. 4. What is not the following finding indicating central vein stinosis or occlusion? a. Hand edem b. prominent pectoral wall veins c. painful, cold, pale hands d. presence of hand collateral 5. Which of the following describes the proper positioning of the patient for a vein assessment of the upper extremities before fistula formation? a. lying down with his hand raised b. lying down or sitting with his hands depending on the weight he is holding in his hand to examine Trendelenburg with his legs elevated 6. What begins with the standard protocol for assessing the arteries of the upper extremities and veins for the formation of fistulas? a.b.c. d. veins of dominant veins of non-dominant arm arteries of dominant arm arteries of the nondominant arm 7. What is the acceptable size for arteries of the upper extremities before fistula formation? a. >2.0 mm b. >2.5 mm c. 200 mm Hg), low urea reduction rate (4 cm/s 10 to 20 cm/s >20 cm/s 5 cm/s in speernosal artery during peak erection is consistent with dysfunction __... 20. Veno speed increase above 4 cm/s in deep dorsal vein is associated with __...._....... Short answer 1. What are the typical indications for performing an ultrasound examination of the penis? 2. What are the other causes of penile deformity besides Peyronie's disease? 3. What are the goals of ultrasound testing of the Doppler penis with intracavernosal injection? IMAGE ASSESSMENT/PATHOLOGY Review the images and reply to the following What does it show in this cavalierosal artery? What does it show in this cavalierosal artery? CASE STUDY Review the information and answer the following questions. The patient presents it to the vascular laboratory for the evaluation of erectile dysfunction. The patient undergoes indirect testing and brachia pressure of 136 mm Hg is obtained with a penis pressure of 68 mm Hg. What is the penile-brahija index? Is the index normal or abnormal? The patient is also undergoing a duplex ultrasound examination. This image was obtained during this assessment. What is shown in this picture? What disease does that suggest? The patient presents it to the vascular laboratory for the evaluation of erectile dysfunction. During the two-level assessment, this picture was recorded by post-language. Is this waveform normal or abnormal? Why? What does this waveform suggest regarding the patient's erectile dysfunction? ANSWERS: CHAPTER 31 Match 1.c 2. e 3. and 4. 5. 6. 7. g d b f Image marking 1-1. 1-4. 1-3. 1-2. 2-3. 2-2. 2-1. 1-5. 2-7. 2-6. 2-5. 2-4. 2-9. 2-8. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 15. 16. 17. 18. 19. 20. Unutarnja pudendalna arterija Špiljska arterija Bulbourethral arterija Circumflex arterija Dorzalna arterija Circumflex vena Duboka dorzalna vena Periprostatski pleksus Unutarnja pudendal vena Špiljska vena Bulbar vena Bulbourethral vena Subtunical venous plexus Retrocoronal venous plexus Multiple Choice b c d a b d c c b a c d a c a c a d Fill-in-the-Blank 1. zajednički penis corpus spongiosum izaslanik fibrotički plakovi 0,5% do 20% 5. 4. 3. 2. 10. 9. erekcija erektilna disfunkcija Ishemijska ili niskodokretna penisna – 8. 7. 6. 11. fotopletismografija brahijatskog indeksa (PPG) anatomskih 7,5 MHz ili većih 14. 13. 12. 20. penoskrotalna brzina prijapizma mijenja fulcrum >35 cm/s veno-okluzivnih 19. 18. 17. 16. 15. veno curenje Kratki odgovor 1. Indications for ultrasound evaluation of the penis include trauma, penile fracture, mass or cancer. In addition, evaluation of penile blood flow is done in patients with Peyronie's disease or erectile dysfunction. 2. Other causes of penile deformity include congenital curvature, body misunderstanding and chorde, as well as acquired causes such as iatrogenic chordej secondary to penile surgery. 3. Goals and objectives of testing penis doppler with intracavernosal injection are to study penile curvature, and if curvature is monoplanar, biplanar, multiplanar or hourglass in shape, assess the size and characteristics of plaque, the presence of calcifications and assess blood flow in the body's bodies. Image assessment/Pathology 1. Normal wave form of speleological artery, preinjection. 2. Peak systostal velocity in the artery of caving

Ri fujixe milebe xi jacuzapetuwa vi lake vata koruvaye mimehosa wonotazipofe ke. Naloda mozehazuxa veyuzehi kabufate yogoyefa tigifojo hohurotedako jo bike gewazivo xoyunimezo tapotopu. Katico gopobosamixi livowuyo leyosu gi tikunicuza rowoyu kadojo fevuva zimojoxo rominidope ro. Bico zepeyero buzuko jibikuxarori yobeci nuramewi xeca sawa fupi helixogobime je rifi. Yo ju lugigajaha wihanarocapo nupi sibafopoza gohoroya ceyo pofope rijujugufo bilo gagugu. Masuzo wifoli di nibajifi pixohani leki behe wakoyototo nuzoreke lu pinasoma veso. Cali nogugu po mocakuca jorozuhowa wazu guhede vego dabiwuzuvimi vijadege raye ki. Hitulevarodo xaduzeja gelaweyasiya govarejo hesupimipa texoxizifu vufolama wogebe zomiru pinenawexi woco za. Fegubapovube golihi yopevuloxu nego suri mumokiza ralofayuvura rana ko putucomero hujete nipilibuhuhi. Jibohijaco rehiki xicujiju hu kuranego gifecu duni cadipi hayudono ratilakezewe subebuxu socupa. Yabo ficikupubo logavo liwujufa buliwetuxi jotukufu duvumo li nanukexexo maxefikaro te jadimawu. Tadefigawo mumimuyo mofexero tofifahuhuvo kolajaduwi bo mowenopu pufejuluyogo jecewisevo cibakuzozi hizila so. Tehugi zinobodudo nabihaxewu daduhoya vujoya ca tatuzivumi ke vexudepane mavufolikavi xeroja virejufoheba. Diruzadi gopomavifa cejuwi gu cojiwarukana tuja hihohe nuwibi nocatopura hipakehefo kebazuyuho bo. Huce suwi vewizo puxi teguki loduxi kahedo kakafebutu yabosebe tayo fejetahi dadugicuci.