Radiology
CI
ARRT Cardiac-Interventional Radiography (CI)

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Question: 1

Which of the following test measures sound waves as they project off the heart?

A. Transesophageal echocardiography (TEE)
B. Tissue plasminogen activator (TPA)
C. Transient ischemic attack (TIA)
D. Percutaneous transluminal coronary angioplasty (PTCA)

Answer: A

Explanation:
A transesophageal echocardiography (TEE) is classified as an echocardiography imaging test. With the TEE, a transducer attached to an endoscope is inserted into the body through the esophagus. The transducer sends sound waves to the heart. As these sound waves (ultrasound) bounce off the heart, a computer captures them and changes the sound waves into an image which gives information regarding heart functioning.
The remaining answer choices, tissue plasminogen activator (TPA), transient ischemic attack (TIA), percutaneous transluminal coronary angioplasty (PTCA), are not the best answer options. First, tissue plasminogen activator (TPA) is classified as a drug and not a test. This drug dissolves blood clots.
Then, a transient ischemic attack (TIA) is a disorder, and not a test, that originates from a blockage in the blood vessel. A TIA mimics the symptoms of a stroke.
A percutaneous transluminal coronary angioplasty (PTCA) is an angioplasty procedure of the coronary arteries that produces increased blood flow to the heart. A PTCA is often indicated for chest pain and heart disease treatment.

Question: 2

An intra-aortic balloon pump is used for all of the following reasons, except:

A. For a patient waiting heart surgery.
B. To increase heart tissue.
C. A person that has just had a heart attack.
D. A person that has severe heart failure.

Answer: B

Explanation:
The intra-aortic balloon pump (IABP) is a mechanical device that supports the heart and improves blood circulation but does not directly cause an increase in heart tissue. It operates by inflating and deflating a balloon within the aorta, the main artery of the body, in sync with the cardiac cycle. The primary functions of the IABP are to decrease the workload of the heart by reducing afterload and to enhance

coronary artery blood flow by increasing aortic diastolic pressure. This helps to improve the oxygen supply to the heart muscle and reduce myocardial oxygen consumption.
The IABP is typically used in critical care situations such as acute myocardial infarction (heart attack), cardiogenic shock (where the heart fails to pump enough blood), or in patients with heart failure where temporary support is imperative. Additionally, it is employed as a bridge therapy for patients awaiting more definitive treatments such as heart surgery. The use of IABP in these scenarios aims to stabilize the patient's hemodynamic status and improve survival chances while awaiting or recovering from surgery.
However, the IABP does not contribute to an increase in heart tissue. It does not stimulate myocardial growth or repair damaged heart tissue directly. Instead, its role is purely supportive, ensuring that the heart muscle receives sufficient blood supply and is not overburdened during periods of acute stress or dysfunction. Any growth or increase in heart tissue that may occur in patients would be due to natural healing processes or other medical interventions aimed specifically at tissue repair and growth, such as certain medications or surgical procedures, not the action of the IABP itself.
Therefore, the correct answer to the question is that an intra-aortic balloon pump is used for all of the following reasons, except to increase heart tissue. This option is not applicable to the functions or outcomes associated with the use of an intra-aortic balloon pump.

Question: 3

Pericardiocentesis checks for which of the following?

A. Infection.
B. Cancer.
C. Inflammation.
D. All of the above.

Answer: D

Explanation:
Pericardiocentesis, also known as a pericardial tap, is a medical procedure primarily aimed at diagnosing and treating pericardial effusion, where excess fluid accumulates in the pericardial cavity — the sac surrounding the heart. This procedure is crucial as the accumulation of fluid can restrict the heart's functionality, potentially leading to complications like cardiac tamponade, where normal heart function is impaired due to increased pressure on the heart.
The process involves the use of a needle and sometimes a catheter to penetrate the chest and pericardial sac carefully to aspirate fluid. This fluid is then analyzed in a laboratory to determine the underlying cause of the effusion. The analysis typically includes checking for various conditions that might lead to fluid buildup around the heart.
One primary condition checked during the analysis of the fluid is infection. Pericardial fluid can become infected due to various bacterial, viral, or fungal agents, leading to purulent pericarditis. Identifying infectious agents can help guide appropriate antibiotic or antifungal therapy.
Another critical condition that pericardiocentesis helps diagnose is cancer. Malignancies such as lung cancer, breast cancer, or lymphoma can metastasize to the pericardial space. The presence of cancer cells in the pericardial fluid can be a critical indicator for the diagnosis of cancerous involvement in or around the heart.
In addition to infection and cancer, the procedure also checks for signs of inflammation. Conditions like autoimmune disorders or post-myocardial infarction syndrome can cause inflammatory changes in the

pericardial sac, leading to fluid accumulation. The fluid analysis includes tests for inflammatory markers that help in diagnosing these inflammatory conditions.
Given these applications, when answering the question, "Pericardiocentesis checks for which of the following?" the correct response is "All of the above." This includes checks for infection, cancer, and inflammation, making pericardiocentesis a comprehensive diagnostic tool for assessing various serious conditions affecting the pericardium and overall cardiac health.

Question: 4

Which of the following is a common risk of a thrombectomy?

A. Puncture of artery.
B. Seizure.
C. Torn muscle.
D. Puncture of the lungs.

Answer: A

Explanation:
A thrombectomy is a medical procedure designed to remove blood clots from within the blood vessels. This intervention is crucial for patients who are experiencing vascular blockages which, if left untreated, could lead to severe complications such as strokes or limb loss due to inadequate blood flow. Thrombectomies can be performed on both veins and arteries and are instrumental in restoring normal blood circulation in the affected areas.
One common risk associated with thrombectomy is the puncture of an artery. During the procedure, healthcare professionals use medical instruments to access and remove the clot through the vascular system. Given the invasive nature of the technique and the delicate structures involved, there is a risk of accidentally puncturing an artery. An arterial puncture can lead to bleeding or hematoma formation, where blood collects outside of the blood vessels. This complication may require additional interventions to repair the punctured artery and manage the bleeding.
Other potential risks of a thrombectomy include the tearing of an artery, which can occur if the instruments damage the vessel walls during the procedure. This can lead to serious complications, such as arterial dissection or even more severe bleeding than a simple puncture. Additionally, the procedure might lead to the occlusion of more distal arteries, where small fragments of the clot break away and block smaller downstream vessels, potentially causing new areas of reduced blood flow or ischemia.
Infection is another risk, as with any surgical procedure that involves incisions or insertion of foreign objects into the body. Proper sterile techniques and post-operative care are critical to minimize this risk.
Lastly, performing a thrombectomy, especially in arteries supplying the heart or brain, carries the inherent risk of triggering a heart attack or stroke during the procedure, although these are rare outcomes.
Each of these risks requires careful consideration and discussion between the patient and healthcare provider before undergoing a thrombectomy. The decision to proceed with the procedure typically considers the potential benefits of removing the clot against the risks of complications from the procedure itself.

Question: 5

How many atriums are there?

A. 4.
B. 3.
C. 2.
D. 1.

Answer: C

Explanation:
The human heart is divided into four primary chambers, which are critical for its function as a pump in the circulatory system. These chambers are classified as either atria or ventricles, each type serving a distinct purpose in the heart's operation. The atria (plural of atrium) are the two upper chambers of the heart, specifically named the right atrium and the left atrium.
The main function of the atria is to receive blood from different parts of the body and then send this blood to the lower chambers of the heart, known as the ventricles. The right atrium receives deoxygenated blood from the veins of the body, which it then passes to the right ventricle. The right ventricle pumps this deoxygenated blood to the lungs for oxygenation. Similarly, the left atrium receives oxygenated blood from the lungs and transfers it to the left ventricle, which then pumps it out to the various organs and tissues of the body.
It is important to note the distinction between the terms 'atria' and 'atriums.' Both are correct for the plural of atrium, but 'atria' is more commonly used in medical contexts. Regardless of the terminology, the heart has two atria - the right atrium and the left atrium. Thus, when asked how many atriums (or atria) there are in the heart, the correct answer is two. This precise understanding of the heart's anatomy helps in comprehending its complex mechanisms of pumping blood throughout the body.

Question: 6

One of the most common conditions an external defibrillator can treat in an emergency situation is called V-fib, which is short for what?

A. Ventral fibrillation.
B. Vicerous fibrillation.
C. Ventricular fibrillation.
D. Virtual fibrillation.

Answer: C

Explanation:
The correct answer to the question regarding the most common condition an external defibrillator can treat is "Ventricular fibrillation." This condition is commonly abbreviated as "V-fib."
Ventricular fibrillation (V-fib) is a severe cardiac rhythm disturbance where the lower chambers of the heart, the ventricles, quiver ineffectively instead of pumping due to disorganized electrical activity. This disruption in the normal rhythm of the heart prevents it from pumping blood effectively, which can be fatal if not treated promptly.

In a case of V-fib, the heart's electrical activity becomes chaotic, causing the heart to stop pumping blood, leading to cardiac arrest. This is why immediate intervention with an external defibrillator is crucial. The defibrillator works by delivering a controlled electric shock to the heart, which can potentially stop the chaotic activity and allow the heart's natural pacemaker to restore a functional rhythm.
If not treated immediately, ventricular fibrillation can lead to severe brain damage or death within minutes due to the lack of blood flow and oxygen to the organs. This emphasizes the importance of rapid response and the critical role that external defibrillators play in emergency cardiac care.
External defibrillators are commonly found in public places and are designed to be used by anyone, even those without medical training. Instructions provided by the device guide the rescuer through the process, making it possible for bystanders to provide potentially life-saving treatment before professional medical help arrives.

Question: 7

Which of the following components of a complete blood cell count test will most likely indicate congenital heart disease if the blood test is elevated above normal?

A. Hemoglobin
B. Respiration
C. Arteriole
D. Hemostatic

Answer: A

Explanation:
When evaluating an elevated hemoglobin level in the context of a complete blood count (CBC) test, it is crucial to consider its implications for various health conditions, including congenital heart disease. Hemoglobin, a protein in red blood cells, is responsible for transporting oxygen throughout the body. Typically, the hemoglobin level is measured as part of the CBC to assess the blood's capacity to carry oxygen.
In individuals with congenital heart disease, particularly those conditions that cause cyanosis (a bluish discoloration of the skin due to low oxygen levels in the blood), the body may respond by producing more red blood cells to increase the oxygen-carrying capacity of the blood. This compensatory mechanism leads to an increase in hemoglobin levels, a condition known as secondary erythrocytosis or polycythemia. Consequently, if a CBC reveals elevated hemoglobin levels, this can be an indicator of an underlying heart problem, warranting further investigation into possible congenital heart disease.
It is pertinent to note that while elevated hemoglobin can be indicative of congenital heart disease, it can also be caused by other conditions such as polycythemia vera (a bone marrow disorder that causes excessive production of red blood cells), dehydration (where reduced plasma volume makes blood components more concentrated), or other forms of heart and lung diseases. Therefore, while a high hemoglobin level can signal the presence of congenital heart disease, it is not solely diagnostic of this condition. Comprehensive clinical evaluation and additional diagnostic testing are essential to determine the precise cause of the elevated hemoglobin level.
In summary, an elevated hemoglobin level in a CBC test can indeed indicate the presence of congenital heart disease among other conditions. It is a critical marker that prompts further diagnostic exploration

to confirm the nature and cause of the elevation, ensuring that appropriate medical management can be provided to address the underlying health issues.

Question: 8

Thrombolysis is not recommended for whom?

A. One who has severe high blood pressure.
B. One who had recent surgery.
C. One who has active bleeding.
D. All of the above.

Answer: D

Explanation:
Thrombolysis is a medical treatment used primarily to dissolve problematic blood clots in blood vessels to prevent damage to organs and restore proper blood flow. This procedure can be critical in the management of various thrombotic conditions such as pulmonary embolism, deep vein thrombosis, and certain types of strokes. The treatment involves the administration of thrombolytic drugs, which can be delivered intravenously or directly to the site of the clot through a catheter.
Despite its benefits, thrombolysis is not suitable for everyone. There are specific contraindications that must be considered to avoid serious complications. These contraindications include: 1. **Severe High Blood Pressure:** Patients with uncontrolled hypertension are at a higher risk of developing bleeding complications, particularly intracranial hemorrhage, when given thrombolytic therapy. The elevated pressure can cause ruptures in the vascular system when the clot dissolves and normal blood flow is suddenly restored. 2. **Recent Surgery:** Individuals who have undergone surgery recently are at heightened risk for bleeding because surgical sites are vulnerable to reopening, particularly under the influence of thrombolytic agents that disrupt the blood clotting process. 3. **Active Bleeding:** If a patient is currently experiencing active bleeding, administering thrombolytic therapy can exacerbate the situation, leading to more severe blood loss and complications associated with it. 4. **Severe Kidney Disease:** Patients with severe kidney disease often have altered metabolism and excretion of drugs, including thrombolytics, which can lead to inappropriate drug levels and increased risk of adverse effects. Additionally, kidney disease often comes with coagulation abnormalities that can be worsened by thrombolytic therapy.
Given these contraindications, the answer "All of the above" is correct when identifying who should not receive thrombolytic therapy. This underscores the importance of a thorough medical evaluation and consideration of all potential risks and benefits before proceeding with thrombolysis. It is crucial for healthcare providers to assess each patient's individual health status and history to determine if thrombolytic therapy is a safe and appropriate treatment option.

Question: 9

A PT time that is over _____ contraindicated for angiography or catheterization?

A. 18 seconds.
B. 10 seconds.

C. 15 seconds.
D. 12 seconds.

Answer: A

Explanation:
When considering procedures like angiography or catheterization, it is crucial to assess the patient's coagulation status to minimize the risk of bleeding complications. One of the key tests to evaluate coagulation is the Prothrombin Time (PT), which measures the time it takes for blood to clot.
A PT time that exceeds certain thresholds can indicate an increased risk of bleeding. Specifically, a PT time over 18 seconds is generally considered a contraindication for performing invasive procedures such as angiography or catheterization. This extended PT time suggests that the blood's clotting ability is significantly impaired, which can lead to excessive bleeding during or after the procedure.
In clinical practice, the normal range for PT is typically around 11 to 13.5 seconds, depending on the specific reagents and equipment used in the lab. When the PT time exceeds 18 seconds, it implies that the clotting factors are sufficiently abnormal, thereby increasing the procedural risks. Physicians must consider this factor seriously when planning for any procedure that involves vascular puncture or manipulation, as the integrity of the blood clotting mechanism is essential for patient safety.
Before proceeding with angiography or catheterization in patients with a prolonged PT, medical professionals often take steps to correct the coagulopathy. This may involve administering vitamin K, fresh frozen plasma, or other clotting factor concentrates to stabilize the patient's coagulation status. Only when the PT is brought within a safer range, typically less than 18 seconds, do physicians proceed with such invasive procedures.
Thus, a PT over 18 seconds serves as a critical threshold, beyond which the risks associated with angiography or catheterization significantly increase. Adhering to this standard helps prevent serious bleeding complications, thereby enhancing the overall safety and effectiveness of the procedure.

Question: 10

Of the following, which is defined as a loss of phasic pulse wave form, followed by recovery in 2 minutes, using the Barbeau classification?

A. Type A.
B. Type B.
C. Type C.
D. Type D.

Answer: C

Explanation:
The question refers to the Barbeau classification, which is a system used to classify the arterial waveform responses monitored during procedures such as radial artery cannulation. This classification is particularly relevant in assessing the adequacy of collateral circulation to the hand when the radial artery is occluded, helping ensure the safety and viability of the procedure.
In the Barbeau classification, four types (A, B, C, and D) describe different responses of the arterial waveform after radial artery occlusion: - **Type A**: Characterized by no change in the pulse wave

form. This indicates that there is good collateral circulation, and the artery can likely be occluded without significant risk to hand perfusion. - **Type B**: Identified by a damped but still distinct pulse wave form. This suggests that although the pulse amplitude is reduced, adequate collateral flow is probably still present. - **Type C**: Defined by a loss of the phasic pulse wave form, which then recovers within 2 minutes. This temporary loss followed by recovery indicates that there might be initial inadequate collateral circulation which then compensates, allowing the pulse wave form to return. - **Type D**: Marked by no recovery of pulse tracing within 2 minutes of occlusion. This is the most concerning pattern, suggesting poor or absent collateral flow, which could compromise hand perfusion if the radial artery is used.

Based on the definitions provided: - **Type A** shows no change, indicating robust collateral circulation. - **Type B** shows a dampened but present waveform, suggesting moderate collateral flow. - **Type C** involves a complete but temporary loss of waveform, with recovery within 2 minutes, indicating initial failure but rapid compensation of collateral circulation. - **Type D** demonstrates an absence of waveform recovery, indicating inadequate or absent collateral circulation.

The question specifically asks about a pattern where there is a "loss of phasic pulse wave form, followed by recovery in 2 minutes." According to the descriptions in the Barbeau classification, this scenario corresponds to **Type C**. Thus, the correct answer to the question is **Type C**. This type reflects a transient compromise in blood flow that is quickly compensated by collateral circulation, critical information when considering the safety of radial artery occlusion in medical procedures.

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