Harr Hematology Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

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Questions

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1. What is the consequence of the APTT test in the presence of lupus anticoagulant?

A. It measures factor VII activity

B. It becomes normalized with time

C. It may indicate a hemophilic condition

D. It remains prolonged regardless of mixing

2. Which physiological condition best describes the pathophysiology of thrombocytopenia?

A. Increased clotting factor production

B. Reduction in platelet count

C. Overproduction of red blood cells

D. Increased hemoglobin affinity for oxygen

3. Which pathogen is primarily associated with hemolytic uremic syndrome (HUS)?

A. Staphylococcus aureus

B. Escherichia coli 0157:H7

C. Salmonella enterica

D. Clostridium difficile

4. A patient's peripheral smear reveals numerous NRBCs, marked variation of red cell morphology, and pronounced polychromasia. What other CBC parameter may be anticipated?

A. Reduced platelets

B. Increased MCHC

C. Increased MCV

D. Decreased red-cell distribution width (RDW)

5. Spherocytes differ from normal red cells in all of the following except:

A. Decreased surface to volume

B. No central pallor

C. Decreased resistance to hypotonic saline

D. Increased deformability

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6. What condition would be suspected if a patient has no bleeding complications but shows a prolonged APTT?

A. Prothrombin deficiency

B. Factor VII deficiency

C. Factor XI deficiency

D. Factor VIII deficiency

7. Which test is primarily used to monitor patients on warfarin therapy?

A. APTT

B. INR

C. D-dimer

D. PT

8. What results would be expected in a prothrombin time (PT) and activated partial thromboplastin time (APTT) test for a patient with polycythemia?

A. Both prolonged

B. Both shortened

C. Normal PT, prolonged APTT

D. Both normal

9. What laboratory finding is characteristic for hemolytic anemias?

A. Increased vitamin B12 levels

B. Elevated reticulocyte count

C. Decreased ferritin levels

D. Increased mean corpuscular volume

10. Plasminogen deficiency is associated with:

A. Bleeding

B. Thrombosis

C. Increased fibrinolysis

D. Increased coagulation

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Answers

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1. D
2. B
3. B
4. C
5. D
6. C
7. B
8. A
9. B
10. B

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Explanations

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1. What is the consequence of the APTT test in the presence of lupus anticoagulant?

A. It measures factor VII activity

B. It becomes normalized with time

C. It may indicate a hemophilic condition

D. It remains prolonged regardless of mixing

The APTT (Activated Partial Thromboplastin Time) test is a critical assessment used to evaluate the intrinsic and common pathways of coagulation. In the presence of lupus anticoagulant, a type of antiphospholipid antibody, the APTT test demonstrates a distinct behavior: it remains prolonged regardless of mixing with normal plasma. Lupus anticoagulants can inhibit the phospholipid-dependent clotting factors, leading to a prolonged APTT. When normal plasma is mixed with the plasma of a patient who has lupus anticoagulant, the prolongation does not resolve, as it typically would if the prolongation were due to a factor deficiency rather than an inhibitor. This characteristic distinguishes the presence of lupus anticoagulant from other causes of APTT prolongation, like factor deficiencies, where mixing would normalize the test. The persistence of a prolonged APTT in this situation indicates an inhibitory effect of the lupus anticoagulant rather than just a deficiency of coagulation factors. This understanding is important in the context of diagnosing and monitoring patients with antiphospholipid syndrome and similar conditions.

2. Which physiological condition best describes the pathophysiology of thrombocytopenia?

A. Increased clotting factor production

B. Reduction in platelet count

C. Overproduction of red blood cells

D. Increased hemoglobin affinity for oxygen

The pathophysiology of thrombocytopenia is characterized primarily by a reduction in platelet count. Platelets, or thrombocytes, are essential components of blood that are involved in the clotting process. When their numbers decrease significantly, the body's ability to form clots is impaired, leading to increased risk of bleeding. This condition can arise due to various mechanisms, including decreased production in the bone marrow, increased destruction of platelets, or sequestration in the spleen. For instance, certain medical conditions, such as aplastic anemia or immune thrombocytopenic purpura (ITP), can lead to reduced production or increased destruction of platelets, respectively. While the other responses refer to mechanisms that might affect blood composition, they do not specifically relate to the definition or pathophysiology of thrombocytopenia. Increased clotting factor production pertains more to conditions that heighten coagulation, overproduction of red blood cells relates to polycythemia, and increased hemoglobin affinity for oxygen addresses oxygen transport dynamics, none of which describe the essential decrease in platelets associated with thrombocytopenia.

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3. Which pathogen is primarily associated with hemolytic uremic syndrome (HUS)?

A. Staphylococcus aureus

B. Escherichia coli 0157:H7

C. Salmonella enterica

D. Clostridium difficile

Hemolytic uremic syndrome (HUS) is most commonly associated with infection from Escherichia coli O157:H7, a specific strain of E. coli. This pathogenic strain produces Shiga toxin, which can lead to severe gastrointestinal illness and, subsequently, to HUS, particularly in children and immunocompromised individuals. The toxin damages the endothelial cells of blood vessels, triggering a cascade of events that results in the hemolytic anemia, acute kidney injury, and thrombocytopenia characteristic of HUS. Understanding the context of HUS helps clarify the association with E. coli O157:H7, as this strain is often linked to outbreaks from contaminated food, particularly undercooked ground beef or unpasteurized products. In contrast, other pathogens listed, such as Staphylococcus aureus, Salmonella enterica, and Clostridium difficile, are associated with different types of infections and complications but do not typically lead to the development of HUS. Each of these other bacteria possesses distinct pathogenic mechanisms and clinical presentations that do not overlap with the mechanisms that cause HUS. Therefore, E. coli O157:H7's unique role and toxic profile make it the primary pathogen associated with this condition.

4. A patient's peripheral smear reveals numerous NRBCs, marked variation of red cell morphology, and pronounced polychromasia. What other CBC parameter may be anticipated?

A. Reduced platelets

B. Increased MCHC

C. Increased MCV

D. Decreased red-cell distribution width (RDW)

The presence of numerous nucleated red blood cells (NRBCs), marked variation in red cell morphology, and pronounced polychromasia in a peripheral smear indicates a response to anemia or stress on the bone marrow, often seen in conditions such as hemolytic anemia or acute blood loss. In this scenario, it is anticipated that the mean corpuscular volume (MCV) would be increased. This increase is likely due to the presence of younger, larger red blood cells being released into circulation as the marrow responds to the increased demand for erythrocytes. These reticulocytes, which are not yet fully mature red blood cells, are typically larger than mature erythrocytes and contribute to an overall increase in MCV. Thus, the combination of these findings aligns with the expectation of an increased average size of red blood cells being produced in response to an ongoing clinical issue. In contrast, reduced platelets, increased mean corpuscular hemoglobin concentration (MCHC), or decreased red-cell distribution width (RDW) would not align with the clinical presentation of pronounced polychromasia and variation in morphology. Understanding these relationships helps delineate the underlying pathology affecting the patient's hematological profile.

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5. Spherocytes differ from normal red cells in all of the following except:

A. Decreased surface to volume

B. No central pallor

C. Decreased resistance to hypotonic saline

D. Increased deformability

Spherocytes are abnormally shaped red blood cells that have a more rounded appearance compared to the typical biconcave disc shape of normal red cells. This alteration affects several of their physical properties. When evaluating spherocytes, they demonstrate decreased surface area relative to their volume, leading to a more spherical shape. Normal red blood cells have a larger surface area due to their biconcave structure, which facilitates gas exchange and flexibility. One of the defining characteristics of spherocytes is the absence of central pallor. In normal red blood cells, the biconcave shape creates a light area in the center, but due to the spherocytes being more filled and rounded, this central pallor is not present. Spherocytes are also less resilient to osmotic stress; they have decreased resistance to hypotonic saline. In environments where they are exposed to hypotonic solutions, spherocytes are more likely to hemolyze than normal red blood cells due to their altered membrane structure. However, spherocytes actually have decreased deformability compared to normal red cells. Their round shape makes it more difficult for them to squeeze through narrow capillaries and small vessels. This loss of deformability contributes to various complications, including hemolysis

6. What condition would be suspected if a patient has no bleeding complications but shows a prolonged APTT?

A. Prothrombin deficiency

B. Factor VII deficiency

C. Factor XI deficiency

D. Factor VIII deficiency

A prolonged Activated Partial Thromboplastin Time (APTT) indicates a defect in the intrinsic and common pathways of coagulation. In this scenario, the presence of prolonged APTT without bleeding complications suggests a deficiency in a coagulation factor that may not necessarily cause bleeding symptoms, depending on the degree of the deficiency and the presence of compensatory mechanisms in the patient. Factor XI deficiency is associated with a prolonged APTT but typically shows minimal to no bleeding complications, particularly compared to deficiencies of more severe factors like Factor VIII or Factor X, which are more directly involved in the bleeding process. In fact, many individuals with Factor XI deficiency remain asymptomatic, especially those with mild deficiencies. Other conditions listed involve factors that are more commonly associated with significant bleeding issues. For instance, Factor VIII deficiency often leads to hemophilia A, which is characterized by bleeding tendencies. Similarly, deficiencies in Factor VII may lead to bleeding, particularly given its role in the extrinsic pathway. Prothrombin deficiency could also lead to bleeding complications, as prothrombin is essential for normal clot formation. Thus, given that a patient exhibits a prolonged APTT but no bleeding complications, it is most consistent with Factor XI deficiency, making it the most appropriate

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7. Which test is primarily used to monitor patients on warfarin therapy?

A. APTT

B. INR

C. D-dimer

D. PT

The international normalized ratio (INR) is the primary test utilized to monitor patients on warfarin therapy. Warfarin is an anticoagulant medication, and its effectiveness largely relies on maintaining the appropriate levels of clotting factors in the blood. The INR provides a standardized way to measure how long it takes for blood to clot, which is crucial for patients on warfarin as the medication alters clotting factor levels. The INR is derived from the prothrombin time (PT) test, which measures the time it takes for blood to clot. However, what makes the INR particularly useful is that it standardizes the PT results, allowing for consistent interpretation across different laboratories and testing methods. Patients on warfarin need regular monitoring to ensure their INR remains within a target range, which typically helps to prevent both thrombosis and bleeding complications. While prothrombin time and activated partial thromboplastin time (APTT) are tests related to blood clotting, the INR is specifically tailored for warfarin therapy due to its ability to provide a reliable measure of anticoagulation. D-dimer is a different test used primarily to assess fibrinolysis, often in the context of diagnosing conditions like deep vein thrombosis or pulmonary embolism

8. What results would be expected in a prothrombin time (PT) and activated partial thromboplastin time (APTT) test for a patient with polycythemia?

A. Both prolonged

B. Both shortened

C. Normal PT, prolonged APTT

D. Both normal

For a patient with polycythemia, the expected results for prothrombin time (PT) and activated partial thromboplastin time (APTT) tests would be considered in the context of the disease's impact on blood properties. Polycythemia leads to an increase in blood viscosity due to the higher number of red blood cells, which can influence coagulation factors and overall hemostatic balance. In this scenario, prolonged PT and APTT can occur because the increased viscosity can affect the flow of blood and may result in a disturbance in the normal function of clotting factors. This can potentially lead to slower clot formation and a longer time for the coagulation process to occur. The activation of the coagulation cascade involves various factors that may become less efficiently activated due to the altered dynamics of the blood in polycythemia. Thus, while both tests may show prolonged results, it is essential to understand that the increased blood viscosity is a significant factor influencing these clotting times. Normal PT and normal APTT would suggest that the coagulation pathways function effectively despite the increased cell counts, which does not align with the expected findings in polycythemia. Hence, prolonged times are more likely in this condition.

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9. What laboratory finding is characteristic for hemolytic anemias?

A. Increased vitamin B12 levels

B. Elevated reticulocyte count

C. Decreased ferritin levels

D. Increased mean corpuscular volume

Elevated reticulocyte count is a hallmark laboratory finding in hemolytic anemias. When red blood cells are destroyed at an accelerated rate, the bone marrow responds by increasing the production of new red blood cells to compensate for the loss. Reticulocytes are immature red blood cells that are released into the bloodstream and indicate active erythropoiesis. In hemolytic anemias, the increased destruction of red blood cells leads to a higher than normal reticulocyte count as the bone marrow attempts to recover from the loss and meet the body's oxygen demands. In contrast, increases in vitamin B12 levels, decreased ferritin levels, and elevated mean corpuscular volume are not characteristic of hemolytic anemia. Vitamin B12 is typically associated with megaloblastic anemias; decreased ferritin levels indicate iron deficiency; and a high mean corpuscular volume is associated with various forms of macrocytic anemia rather than hemolytic processes. Thus, the elevated reticulocyte count specifically signifies the bone marrow's reaction to hemolysis, making it the most relevant finding in this context.

10. Plasminogen deficiency is associated with:

A. Bleeding

B. Thrombosis

C. Increased fibrinolysis

D. Increased coagulation

Plasminogen deficiency is primarily associated with thrombosis. Plasminogen is a precursor to plasmin, an enzyme that plays a crucial role in breaking down fibrin—a key component of blood clots. When plasminogen levels are insufficient, the conversion to plasmin is impaired, leading to reduced fibrinolytic activity. This impaired fibrinolysis means that clots that should normally be broken down remain in place longer, predisposing the individual to the formation of abnormal blood clots, or thrombi, which can lead to thrombosis. Understanding the balance between coagulation and fibrinolysis is essential in hematology. A healthy hemostatic system relies on the fine-tuned regulation of both processes, and a disruption in one can lead to consequences such as increased clotting tendency seen in plasminogen deficiency. While bleeding can be a concern in various clotting disorders, in this particular case, the main issue arises from the inability to adequately dissolve clots rather than an increased tendency to bleed or increased coagulation outright.

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