BOC Blood Bank Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **Which laboratory test result would likely be negative in a patient experiencing TRALI?**
   - **A. Direct Antiglobulin Test (DAT)**
   - **B. Crossmatch**
   - **C. Type and screen**
   - **D. Antibody screening**

2. **What process involves collecting platelets while returning whole blood elements to the donor?**
   - **A. Apheresis**
   - **B. Plasma exchange**
   - **C. Whole blood donation**
   - **D. Fractionation**

3. **What is the consequence of not following the storage conditions for Platelets?**
   - **A. Reduction in platelet activity**
   - **B. Increased chance of bacterial contamination**
   - **C. Inability to issue platelets to patients**
   - **D. Lowering of pH in stored platelets**

4. **At the indirect antiglobulin phase of testing, there is no agglutination between patient serum and screening cells. What is the most probable reason?**
   - **A. Patient has an antibody directed against a high incidence antigen**
   - **B. Patient has an antibody directed against a low incidence antigen**
   - **C. Donor has an antibody directed against donor cells**
   - **D. Donor has a positive antibody screen**

5. **What is the primary reason for irradiating blood products before transfusion?**
   - **A. To improve shelf life**
   - **B. To prevent febrile reactions**
   - **C. To reduce the risk of transfusion-associated graft-versus-host disease**
   - **D. To ensure the compatibility of blood types**

6. Which immunoglobulin class is most commonly involved in transfusion reactions?

A. IgA

B. IgM

C. IgG

D. IgE

7. The preservation of platelets during storage is primarily affected by what factor?

A. Temperature control

B. Oxygen levels

C. pH levels

D. Presence of anticoagulants

8. Samples from the same patient show a change in results on two consecutive days. How should the request for crossmatch be handled?

A. Crossmatch A, Rh-positive units with day 1 sample

B. Crossmatch B, Rh-positive units with day 2 sample

C. Crossmatch AB, Rh-positive units with both samples

D. Collect a new sample and repeat tests

9. In which instance is the indirect antiglobulin test unnecessary?

A. A. when determining antibody specificity

B. B. when verifying blood type compatibility

C. C. when a direct antiglobulin test is negative

D. D. when performing routine screening for transfusion

10. Which of the following blood components contains the most Factor VIII concentration relative to volume?

A. Single-Donor Plasma

B. Cryoprecipitated AHF

C. Fresh Frozen Plasma

D. Platelets

Answers

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

Explanations

1. Which laboratory test result would likely be negative in a patient experiencing TRALI?

A. Direct Antiglobulin Test (DAT)

B. Crossmatch

C. Type and screen

D. Antibody screening

In the context of a patient experiencing Transfusion-Related Acute Lung Injury (TRALI), the Direct Antiglobulin Test (DAT) would likely be negative. TRALI is an acute immune-mediated reaction typically caused by antibodies in the donor blood that react with recipient leukocytes, leading to pulmonary inflammation and edema. In TRALI cases, the antibodies involved are usually directed against HLA or neutrophil antigens and do not result in the formation of red blood cell antibodies, which is what the DAT tests for. As a result, the DAT would not show evidence of sensitization with red blood cells, hence yielding a negative result. The other tests, such as crossmatch, type and screen, and antibody screening, are meant to identify compatibility and potential antibodies against red blood cells. These tests focus on red blood cell antigens and donor-receiver compatibility, which are not the direct cause of TRALI. In patients suffering from TRALI, there may be a presence of donor antibodies directed towards leukocytes rather than the red blood cells that these tests would typically evaluate, reinforcing why the DAT would not indicate any positive results in this scenario.

2. What process involves collecting platelets while returning whole blood elements to the donor?

A. Apheresis

B. Plasma exchange

C. Whole blood donation

D. Fractionation

The correct choice is apheresis. This process specifically involves the separation of blood components from a donor, allowing for the collection of a particular component, such as platelets, while the remaining components—such as red blood cells and plasma—are returned to the donor's circulation. Apheresis can be utilized for various blood components, including platelets, leukocytes, and plasma, by utilizing a machine that separates blood into its components. This technique is advantageous because it enables the collection of a higher quantity of platelets than would be possible through traditional whole blood donation, benefiting patients who require platelet transfusions. Plasma exchange, while similar in nature, specifically denotes the process of removing plasma and replacing it with a substitute solution, rather than focusing on the collection of platelets. Whole blood donation typically involves the collection of all components of blood without any separation or return of elements, and fractionation refers to the process of separating blood into its components after collection, rather than during donation. These key distinctions highlight why apheresis is the appropriate term for this process.

3. What is the consequence of not following the storage conditions for Platelets?

A. Reduction in platelet activity

B. Increased chance of bacterial contamination

C. Inability to issue platelets to patients

D. Lowering of pH in stored platelets

Not adhering to the prescribed storage conditions for platelets can significantly reduce their activity and functionality. Platelets are sensitive components of blood that require specific temperature ranges and agitation to maintain their viability and effectiveness. When platelets are stored at incorrect temperatures or without appropriate agitation, their metabolic processes can be adversely affected, leading to a decrease in their ability to aggregate and clot blood effectively. This reduction in platelet activity can ultimately compromise hemostasis in patients who require transfusion, particularly those with thrombocytopenia or other bleeding disorders. While factors such as bacterial contamination and pH changes are also important to consider, the primary and most immediate consequence of improper storage conditions is the impact on platelet activity, making it crucial for blood banks to adhere to established protocols to ensure patient safety.

4. At the indirect antiglobulin phase of testing, there is no agglutination between patient serum and screening cells. What is the most probable reason?

A. Patient has an antibody directed against a high incidence antigen

B. Patient has an antibody directed against a low incidence antigen

C. Donor has an antibody directed against donor cells

D. Donor has a positive antibody screen

The situation described involves a lack of agglutination between patient serum and screening cells during the indirect antiglobulin test, which is a critical part of the blood bank testing process. The most plausible explanation for this observation is that the patient has an antibody directed against a low incidence antigen. Low incidence antigens are present on the red blood cells of only a small percentage of the population. When screening cells are used, they typically contain a wider range of common antigens, making it unlikely that the specific low incidence antigen that the patient's antibodies are targeting is represented in the screening cell panel. As a result, the absence of agglutination indicates that the antibody in the patient serum is not reacting with any of the antigens present on the screening cells. This lack of reaction is significant as it suggests the patient's immune response is tailored to recognize a specific antigen that is not widely found amongst the routinely used screening cells, leading to a scenario where the intended agglutination reaction does not occur. Therefore, identifying the patient's antibody as one directed against a low incidence antigen is crucial for further testing and accurate serological assessment.

5. What is the primary reason for irradiating blood products before transfusion?

A. To improve shelf life

B. To prevent febrile reactions

C. To reduce the risk of transfusion-associated graft-versus-host disease

D. To ensure the compatibility of blood types

Irradiating blood products before transfusion serves a critical purpose in reducing the risk of transfusion-associated graft-versus-host disease (TA-GvHD). This disease occurs when transfused immunocompetent lymphocytes in a donor's blood product attack the recipient's tissues, especially in immunocompromised patients. The irradiation process effectively inactivates these T lymphocytes, thereby eliminating their potential to mount an immune response against the recipient's cells. It is especially important for patients who are at higher risk for TA-GvHD, such as those with certain hematological disorders, those undergoing bone marrow transplantation, or individuals who are immunosuppressed due to treatment for cancer or other diseases. By ensuring that the donor lymphocytes are inactivated, irradiating blood products significantly improves patient safety during transfusions. While improving the shelf life of blood products, preventing febrile reactions, and ensuring compatibility play important roles in blood transfusion practices, they are not the primary reason for the specific process of irradiation. The unique capability of irradiation to protect vulnerable patients from TA-GvHD underscores its importance in clinical transfusion protocols.

6. Which immunoglobulin class is most commonly involved in transfusion reactions?

A. IgA

B. IgM

C. IgG

D. IgE

The most commonly involved immunoglobulin class in transfusion reactions is IgG. This is primarily due to its ability to cross the placenta and its role in secondary immune responses. IgG antibodies are known to recognize specific antigens on red blood cells, which can occur during a blood transfusion if the recipient has developed antibodies against these antigens from prior sensitization. When IgG binds to its target antigen on transfused red blood cells, it can activate the complement system and lead to hemolysis, which is a significant mechanism of transfusion reactions. Unlike IgM, which is involved in primary immune responses and is effective at agglutination, its large pentameric structure typically cannot pass through the vascular endothelium, thus limiting its role in transfusion reactions compared to IgG. Additionally, IgE is associated with allergic reactions and not typically with transfusion reactions, and IgA is more relevant in mucosal immunity. Therefore, IgG's characteristics of promoting opsonization and activating complement make it the predominant antibody class implicated in adverse transfusion reactions.

7. The preservation of platelets during storage is primarily affected by what factor?

A. Temperature control

B. Oxygen levels

C. pH levels

D. Presence of anticoagulants

The preservation of platelets during storage is primarily influenced by pH levels. Platelets have a specific pH range in which they remain viable and functional. During storage, the metabolic processes of platelets can lead to the production of lactic acid, which can lower the pH of the storage medium. If the pH drops below the optimal level, it can negatively impact platelet function and survival. Maintaining an appropriate pH is crucial because it helps preserve platelet activation responses and overall functionality. While temperature control is also important for preserving platelets, it primarily affects the metabolic rate rather than the direct biochemical environment that influences platelet viability. Similarly, oxygen levels and the presence of anticoagulants are relevant to storage conditions but do not have the same significant impact on platelet function as pH does. Adjusting the storage environment to ensure ideal pH levels is essential for maintaining the quality of stored platelets.

8. Samples from the same patient show a change in results on two consecutive days. How should the request for crossmatch be handled?

A. Crossmatch A, Rh-positive units with day 1 sample

B. Crossmatch B, Rh-positive units with day 2 sample

C. Crossmatch AB, Rh-positive units with both samples

D. Collect a new sample and repeat tests

In situations where samples from the same patient show differing results on consecutive days, collecting a new sample and repeating the tests is the most prudent course of action. This approach allows for the validation of results, ensuring that any inconsistencies are thoroughly evaluated before proceeding with a crossmatch. The primary concern is the reliability of the test results; if there is a significant difference between the two samples, it raises questions about either the test methodology or the patient's condition at the time of testing. Factors such as changes in the patient's immunologic state, possible transfusion reactions, or assay variability could lead to discrepancies. By obtaining a new sample, the laboratory can confirm the patient's current serological status and secure an accurate crossmatch. Using either of the initial samples for a crossmatch without reassessing them could lead to incorrect transfusion decisions, putting the patient at risk. Therefore, opting to collect a new sample is essential for ensuring the safety and appropriateness of the transfusion process.

9. In which instance is the indirect antiglobulin test unnecessary?

A. A. when determining antibody specificity

B. B. when verifying blood type compatibility

C. C. when a direct antiglobulin test is negative

D. D. when performing routine screening for transfusion

The indirect antiglobulin test (IAT) is primarily used to detect antibodies in a patient's serum that may react with antigens on red blood cells, which is crucial in various situations such as pre-transfusion testing and antibody screening. However, in certain scenarios, this test is deemed unnecessary. When a direct antiglobulin test (DAT) is negative, it indicates that there are no antibodies bound to the patient's red blood cells in vivo. In this case, the likelihood of clinically significant antibodies present in the serum may be low, making it unnecessary to conduct an indirect antiglobulin test. This is especially relevant in transfusion settings where compatibility has been established, and the risk of hemolytic transfusion reactions due to unexpected antibodies is minimized. In contrast, situations such as determining antibody specificity, verifying blood type compatibility, and conducting routine screenings for transfusions typically require the indirect antiglobulin test to ensure patient safety and optimize the transfusion process. Thus, when the direct antiglobulin test shows a negative result, it can indicate that proceeding with the indirect antiglobulin test may not yield additional useful information, justifying its omission.

10. Which of the following blood components contains the most Factor VIII concentration relative to volume?

A. Single-Donor Plasma

B. Cryoprecipitated AHF

C. Fresh Frozen Plasma

D. Platelets

Cryoprecipitated AHF (Antihemophilic Factor) is the blood component that contains the highest concentration of Factor VIII relative to volume. This component is derived from fresh frozen plasma through a process of thawing and then spinning in a centrifuge to separate the precipitate, which is rich in clotting factors, including Factor VIII. During the preparation of cryoprecipitate, factors such as fibrinogen, Factor VIII, and von Willebrand factor are concentrated. The result is a small volume product that boasts a very high concentration of these factors, making it particularly useful in treating conditions such as hemophilia A, where Factor VIII deficiency is a concern. Fresh frozen plasma contains a wider range of plasma proteins, including clotting factors and other components, but the concentration of Factor VIII is not as high relative to the total volume of the plasma. Similarly, single-donor plasma and platelets do not have the same concentration of Factor VIII due to the nature of their processing and their respective contents. Therefore, cryoprecipitated AHF is the most effective source for delivering concentrated Factor VIII, which is why it is the correct answer.