



Round : ..General surgery

Group no : B3.....

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Blood products

🌸 Whole blood transfusion has significant advantages over packaged cells as it is rich in coagulation factors and it is limited to acutely hemorrhagic individuals

🌸 Packed red blood cells are stored in a S.A.G.M solution (saline, adenine, glucose, mannitol) to increase shelf life two 5wks at 2-6°C it is component of choice to increase Hb one unit of RBCs increase an average adult Hb about 1g/dL indicated when there is active bleeding or symptomatic anemia, it must be a BO compatible.

🌸 Fresh frozen plasma rich in coagulation factors stored at -40 to -50 with two years shelf-life. Therapy of choice in coagulopathic hemorrhage

- FFP if prothrombin time (PT) or partial thromboplastin time (PTT) >1.5 times normal

🌸 Cryoprecipitate is a supernatant precipitate of FFP and is rich in factor VIII and fibrinogen. It is stored at -30°C with a two-year shelf life.

- cryoprecipitate if fibrinogen <0.8 g/L

🌸 Platelets are stored at 20-24 °C and have a shelf-life of only five days Platelet transfusions are given to patients with thrombocytopenia or with platelet dysfunction who are bleeding or undergoing surgery. (clopidogrel او الاشخاص اللي بياخدوا)

- platelets if platelet count <50 × 10⁹/mL

🌸 Prothrombin complex concentrates contain factors 1922

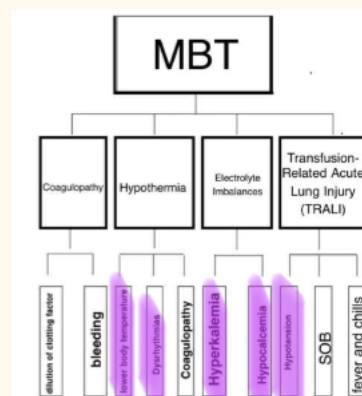
Indicated for the emergency reversal of warfarin and uncontrolled hemorrhage

🌸 عند نقل خلايا دم المعطي العام هو O- و المستقبل العام هو AB+

🌸 عند نقل بلازما المعطي العام هو AB و المستقبل العام هو O

3- massive blood transfusion

Defined as the rapid replacement of a large volume of blood, typically more than one blood volume (about 10 units of red blood cells)



Complications:

🌸 **Febrile none hemolytic reaction** is the most common transfusion reaction it's occur because of recipient's **WBCs** reaction with the donor's **WBCs** (و بصير ارتفاع بالحرارة خلال 24 ساعة)

🌸 pt's with a previous history of febrile reaction should receive leuko-reduced blood product .

In Hemolytic reaction the recipient's immune system is damaging and killing the donor's **RBCs**

(بصير لما Ab الي بجسم المستقبل يهاجم ال Ag الي من المعطي) في هاي الحالة لازم كثير انتبه على الكلى لانه ممكن تضرب

🌸 **TRANSFUSION RELATED ACUTE LUNG INJURY:**

Donor's Ab reacting with recipient leukocytes causing

pulmonary damage . Occurring within (1-2) h of blood transfusion but can occur anytime up to (6) hours . Most cases resolve on their own.

🌸 **GRAFT-VERSUS HOST DISEASE**

Donor's T lymphocytes cause an immune response in the recipient by attack the recipient's marrow and tissues.

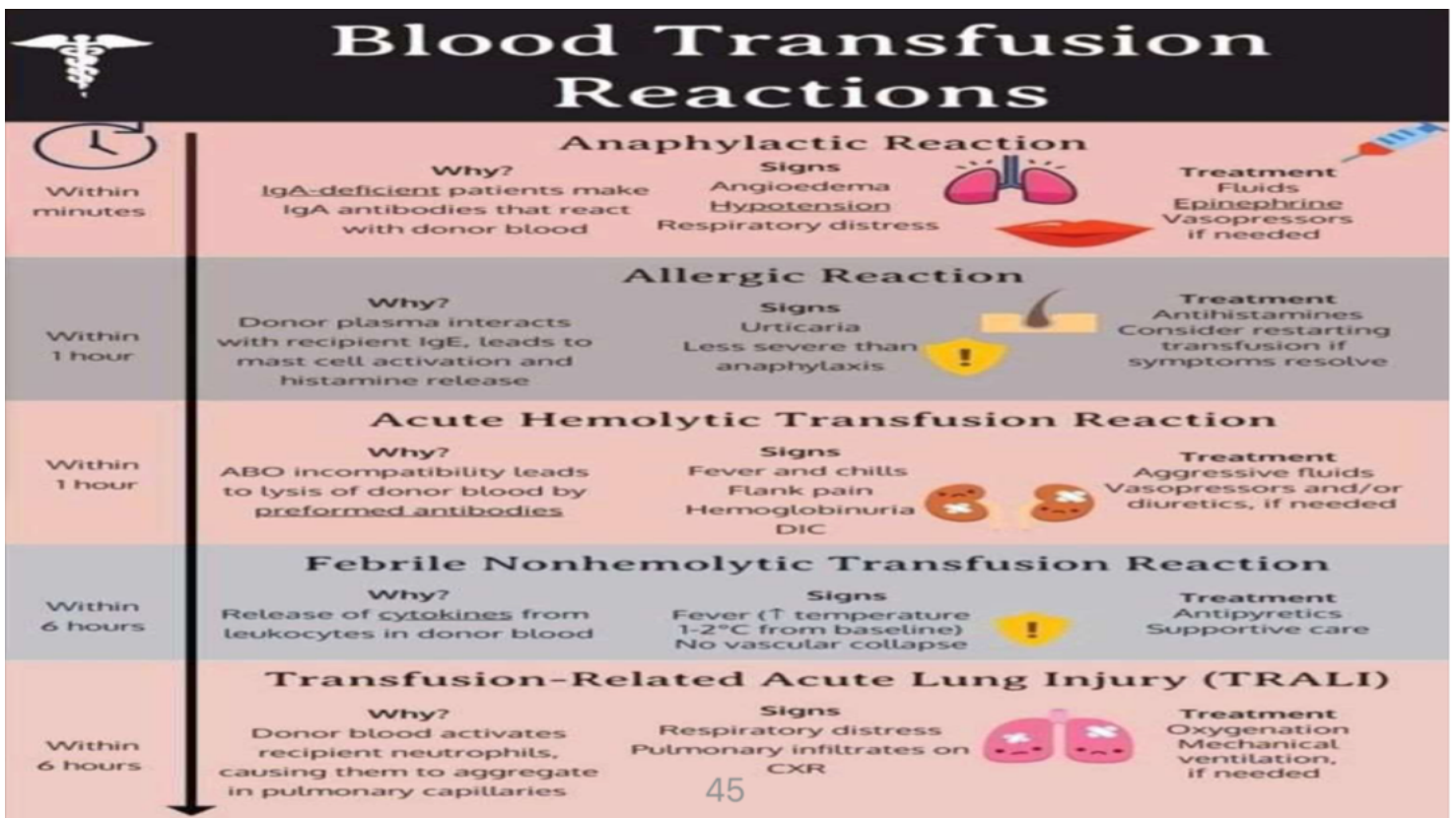
Happen during (days to weeks) after blood transfusion .

This occurs mainly in immunocompromised patients .

Symptoms : fever , rash all over the body (feet and hand too) nausea, liver inflammation and diarrhea

Management : Liver function test , treatment involve immunosuppressive therapy .

It has associated mortality of greater than 80%



🌸 Blood substitutes are either biomimetic or abiotic. Biomimetic substitutes mimic the standard oxygen-carrying capacity the blood and are haemoglobin based. Abiotic substitutes are synthetic oxygen carriers and are currently primarily perfluorocarbon based.

1. A 57-year-old male who developed atrial fibrillation is noticed to have a drop in his platelets to 60,000/ μ L 7 days after initiation of a heparin drip. He goes on to develop lower extremity swelling, and the presence of a new DVT is confirmed with ultrasound. What if any changes should be made to address his anticoagulation regimen and thrombocytopenia?

- a. Continue heparin drip
- b. Discontinue all anticoagulation and place an IVC filter
- c. Start the patient on a bivalirudin drip
- d. Start platelet transfusion
- e. Obtain a hematology consult

1. **Answer: c.** The patient has developed HIT type II. HIT type II is a severe immune-mediated syndrome caused by heparin-dependent antiplatelet antibodies and develops 5 to 10 days following heparin exposure. The patient needs anticoagulation because of the atrial fibrillation and new DVT; however, this should be achieved with a nonheparin anticoagulant such as bivalirudin. Transfusion of platelets is contraindicated since it will actually worsen the thrombosis.

2. A 45-year-old male is septic and found to have DIC with hypofibrinogenemia. Which of the following products would be appropriate to administer?

- a. FFP
- b. PRBCs
- c. DDAVP
- d. Cryoprecipitate
- e. Whole blood

2. **Answer: d.** DIC is often marked by low levels of fibrinogen. Patients present with prolonged INRs and PTTs, along with decreased fibrinogen levels. Cryoprecipitate is often used to help correct fibrinogen deficiency in DIC or as second-line therapy in vWD. Transfusions of all other products are inappropriate in this case.

3. Patients with hemophilia A:

- a. Commonly present with spontaneous bleeding
- b. Should receive factor IX prior to surgery
- c. May produce factor VIII inhibitors
- d. Are deficient in platelet membrane receptors
- e. Are mostly female

3. **Answer: c.** Antifactor VIII antibodies may develop in hemophiliacs in response to prior factor VIII infusion. Hemophilia A rarely presents with spontaneous bleeding. Since hemophilia A is characterized by decreased factor VIII levels, there is no need for transfusion of factor IX prior to surgery. Hemophilia A is an X-linked recessive disorder and is therefore found mostly in males. Platelet membrane receptors are normal.

4. Which of the following is not an absolute contraindication to fibrinolytic therapy?

- a. Intolerable ischemia
- b. Active bleeding
- c. Recent stroke or neurosurgical procedure
- d. Intracranial neoplasm
- e. Active menses

4. **Answer: e.** Active menses in females is not considered an absolute contraindication. All other options are. For a list of both absolute and relative contraindications, see [Table 6-3](#).

5. Which of the following facts concerning von Willebrand disease is correct?

- a. It is the third most common inherited bleeding disorder.
- b. It is characterized by low levels of vWF alone.
- c. It is characterized by ineffective vWF alone.
- d. Type 2 is treated with DDAVP.
- e. Type 3 is treated with cryoprecipitate.

5. **Answer: e.** von Willebrand disease is the most common inherited bleeding disorder. It is characterized by low levels of vWF (type 1) or dysfunctional vWF (types 2 and 3). Type 1 is treated with administration of DDAVP which causes endothelial release of vWF, increasing intravascular levels. Types 2 and 3 require exogenous functional vWF which can be found in cryoprecipitate.

6. Which of the following concerning factor XIIIa is correct?

- a. It is involved in the activation of platelets.
- b. It is involved in the cross-linking of fibrin.
- c. It is not involved in coagulation cascade.
- d. It is deficient in Christmas disease.
- e. It is found in the prothrombinase assembly which involves factors Va, Xa, and calcium.

6. **Answer: b.** Factor XIIIa is involved in the cross-linking of fibrin which helps to stabilize newly formed clots. It has no role in the activation of platelets. Christmas disease, otherwise known as hemophilia B, is marked by a deficiency in factor IX, not XIIIa. The prothrombinase assembly involves factors Va, Xa, and calcium.

7. A deficiency of all of the following will result in hypercoagulability except:

- a. Prekallikrein
- b. Protein C
- c. Protein S
- d. Plasminogen
- e. Antithrombin III

7. **Answer: a.** Prekallikrein is involved in the intrinsic clotting cascade and its deficiency causes an elevation in the PTT but does not actually cause a hypercoagulability. Protein C, protein S, plasminogen, and antithrombin III are all natural anticoagulants, and deficiencies in these cause hypercoagulable states.

8. Which of the following is correct regarding antithrombin III?

- a. It is a necessary cofactor for heparin.
- b. It is activated by argatroban.
- c. It is secreted by endothelial cells.
- d. Its synthesis is affected by warfarin.
- e. It is inhibited by fondaparinux.

8. **Answer: a.** Antithrombin III is a major inhibitor of thrombin and Xa. Heparin, an anticoagulant, binds to antithrombin III and increases its activity. Argatroban is a direct thrombin inhibitor while fondaparinux is an indirect factor Xa inhibitor. Antithrombin III is secreted by the liver, and its synthesis is not inhibited by warfarin.

9. Which of the following regarding the prothrombinase complex is correct?

- a. It is inhibited by heparin.
- b. It is inhibited by argatroban.
- c. It does not require ionized calcium.
- d. It is inhibited by clopidogrel.
- e. It is inhibited by aspirin.

9. **Answer: a.** The prothrombinase complex is composed of factor Xa and factor Va bound to a negatively charged phospholipid membrane with calcium. Heparin, an inhibitor of factor Xa and thrombin, works by activating antithrombin III. Therefore the prothrombinase complex is inhibited by heparin. Argatroban directly inhibits thrombin which is not involved. Ionized calcium is required for phospholipid binding. Clopidogrel and aspirin both decrease platelet binding by binding to the ADP receptor and inhibiting cyclooxygenase, respectively.

10. Cryoprecipitate includes:

- a. Factor II
- b. Factor VII
- c. Factor IX
- d. Factor X
- e. vWF

10. **Answer: e.** Cryoprecipitate contains factors VIII, XII, and vWF. It is used in patients with DIC, dysfunctional vWF, and hemophilia A. FFP contains factors II, V, VII, IX, X, and XI.