



Fourth stage

Blood transfusion

Complications of blood Transfusion

Assistant Lecturer

Mohammed Sami Abdul Ameer

Introduction

- Blood transfusion complications are disorders whose symptoms appear during the transfusion of blood units or some blood components to the patient Or within 24 hours of a blood transfusion
- A blood transfusion is a very safe procedure but complications can occur and The patient should recognize it in case it happens.
- Sometimes the patient may have an allergic reaction to the blood transfused to him, and this may happen even when he is given the correct blood group. These allergic reactions range from mild to serious.
- Signs of allergic reactions include anxiety, back or chest pain, increased heart rate, low blood pressure, breathing disorder, fever, shivering, and nausea.

- Both fever and chills are the most frequent transfusion reactions and resolve without treatment or causing complications.
- Chronic shortness of breath, red color of urine, fever, and loss of consciousness may be an indication of chronic reactions that threaten the patient's life.
- Blood transfusions require early observation, laboratory tests, and necessary medical intervention.
- Blood transfusion reactions occur in critical situations that require distinguishing between a reaction between blood components or the occurrence of disease-related complications during or immediately after a blood transfusion.

Complications of blood Transfusion

Immunological

Febrile

Allergic

Hemolytic

Post-transfusion
purpura

Anaphylactic
reactions

Urticarial
reactions

Acute

Delayed

Non-immunological

Infections

Bacterial

viral

others

Febrile (non-hemolytic) reaction

- the most common immunological reaction.
- seen in patients having multiple blood transfusions or pregnancy.
- caused by Antibodies in the donor's blood attacking the white blood cell antigens (HLA), triggering inflammatory chemical signals that contribute to raising the temperature.
- It begins 30-90 minutes after the start of the blood transfusion (within 6 hours of a transfusion).
- The main symptom is fever (there may be chills, sometimes with mild dyspnea).

Management

include slowing the transfusion rate, antipyretics, (no need to terminate the transfusion)

Allergic reactions

Reactions to platelets antigens (Post-transfusion Purpura - PTP)

- This type of transfusion reaction is extremely rare
- They occur after transfusion of blood products and are associated with the presence in the patient's blood of antibodies directed against the platelets of both the donor and recipient HPA (human platelet antigen).
- The main feature is purpura, petechiae, accompanied by bleeding (due to severe thrombocytopenia).
- occurs during 7-10 days of transfusion.

petechiae = lesion < 3 mm
purpura = lesion 3-10 mm
ecchymoses = lesion > 10 mm



Management

It is usually self-limiting and platelet count is normal within 2 weeks. (preferred therapy is intravenous immune globulin (IVIG) in high doses)

Allergic reactions

Antibodies to plasma proteins (anaphylactic reactions)

- caused by hypersensitivity to donor plasma proteins and, if severe, can result in anaphylactic shock.
- The reaction is triggered by IgG antibodies that recognize IgA in the infused blood product (in patients with IgA deficiency).
- occurring within a few seconds to a few minutes after initiation of a transfusion.
- The clinical features are angioedema (→ facial edema, dyspnoea), and hypotension (pruritus, urticaria, fever, rigors).

Management

Immediate management includes stopping transfusion, O₂ and fluid support, antihistamines, and hydrocortisone. Adrenaline is also useful.



Allergic reactions

Antibodies to plasma proteins (urticarial reactions)

- It occurs due to hypersensitivity to donor plasma proteins.
- Are caused by IgE anti-allergen antibodies. When antibodies are bound to its antigens, histamine is released from mast cells and basophils. Either IgE antibodies from the donor's or recipient's side can cause the allergic reaction.
- These are more common, occurring in 1% to 3% of transfusions, but they are generally mild.
- present with urticaria, which can occur during, in the end, or shortly after a transfusion, flushing, dyspnea, and vomiting. No other allergic findings are present (there is no angioedema, hypotension, ..).

Management

Can be controlled by stopping the transfusion and giving antihistamines.



Hemolytic reactions (HTRs)

is caused by the premature destruction of the donor cells by antibodies present in the recipient plasma.

The hemolytic transfusion reactions (HTRs) could be:

1. Immediate or Acute hemolytic transfusion reactions
2. Delayed hemolytic transfusion reactions

Hemolytic reactions

Acute hemolytic transfusion reactions

- It is the most dangerous type.
- Occurs during a blood transfusion or within 24 hours.
- Is caused by ABO incompatibility (preformed IgM antibodies against donor red cells).
- "natural" IgM antibodies, usually against blood group antigens A or B, bind to red cells and rapidly induce complement-mediated lysis intravascular hemolysis + production of the anaphylatoxins (the C3a & C5a)

Hemolytic reactions

Acute hemolytic transfusion reactions

Intravascular hemolysis



Hemoglobinuria

Anaphylatoxins (the C3a & C5a)



- Smooth muscle contraction
- Platelets aggregation
- Increased capillary permeability
- Release of vasoactive amines from mast cells and granulocytes
- Hypotension and renal failure

Signs and symptoms (occur [within minutes to 1-24 hours from the start of transfusion](#)):

- Chills, fever, shortness of breath
- Throbbing headache
- Flushing of the face.
- Nausea.
- Hypotension and tachycardia.

Hemolytic reactions

Acute hemolytic transfusion reactions

Management

- Stop the transfusion immediately.
- Check vital signs (temperature, pulse rate, respiratory rate, BP, O2 saturation).
- Check the identity of the recipient and details on the blood unit.
- Check the urine for hemoglobinuria.
- Give IV normal saline to maintain the systolic

Hemolytic reactions

Acute hemolytic transfusion reactions

Management: (lab tests:)

- Repetition of ABO & Rh group tests of recipient and donor samples.
- Check the Hb and blood film.
- Examination of the post-transfusion sample for hemolysis.
- Coombs test on recipient post-transfusion sample.
- Biochemical studies: test for hemoglobinemia and bilirubin.

Hemolytic reactions

Delayed hemolytic transfusion reactions

- are caused by Abs that recognize red cell antigens that the recipient was sensitized to previously (e.g. previous blood transfusion or previous pregnancy).
- These are typically caused by antibodies (IgG) which are present in low titer and are not detected at the time of cross-matching (so this reaction is neither predictable nor preventable!).
- This usually happens 7-10 days after the blood transfusion
- Signs and symptoms: fever, jaundice, low hemoglobin level.

Management: (lab tests:)

associated with a positive direct Coombs test, and laboratory features of hemolysis (e.g., elevated LDH).

Infectious complications

Reactions due to bacterial pyrogens or bacteria

- It has a very high mortality rate.
- Blood may be contaminated by microorganisms that utilize citrate as the primary source of carbon, which leads to citrate depletion and hence clotting of blood.
- Visual inspection of blood units may reveal clots or discoloration, which may indicate contamination.

Types of bacteria

- Yersinia
- Serratia
- Escherichia coli
- Pseudomonas

Infectious complications

Transmission of viral Infection

- Hepatitis viruses: HAV, HBV, HCV, HDV
- Retroviruses:
 - Human immunodeficiency virus (HIV) 1 + 2
 - Human T-cell leukaemia virus (HTLV) I + II
- Herpes viruses:
 - Epstein-Barr virus (EBV)
 - Human herpes virus 8 (HHV -8)

Other Infectious

- Malaria.
- Leishmania

Also Happens

- Increased blood volume: It occurs when an anemic patient is given a whole blood bag without separating its components, as he should be given only RBC
- Hyperkalemia: The storage of blood results in a small increase in extra-cellular potassium concentration, which will increase the longer it is stored. is rare, but is most likely to occur during the course of a large-volume transfusion of whole blood.
- Hemosiderosis: With repeated blood transfusions permanently, there is an excess of iron in the patient's body, and this condition occurs largely in thalassemia patients