COMPLICATIONS OF BLOOD TRANSFUSIONS

:Prepared by

Dr. Nawal Mogales

&

Dr. Mohammed Aqlan

COMPLICATIONS OF TRANSFUSIONS

- **Transfusion reaction may result from either :**

A. **Immune transfusion reaction .**

B. **Non - immune mechanism.**

A. IMMUNE-MEDIATED REACTIONS

1. Acute hemolytic transfusion reaction
2. Delayed hemolytic transfusion reaction
3. Febrile non- hemolytic transfusion reaction .
4. Transfusion-related acute lung injury
5. Allergic reaction .
6. Anaphylaxis .
7. Graft-versus-host disease .

ACUTE HEMOLYTIC. 1 TRANSFUSION REACTIONS

- **It is premature destruction of red cells by reaction with immune antibodies (blood group incompatibility).**

  Either the recipients red cell which is avoidable e.g. group O blood with high titer anti A, B and AB .

  or donors red cell which is brought by antibodies in the recipient.

1. ACUTE HEMOLYTIC TRANSFUSION REACTIONS

- This either **intravascular** or **extravascular** red cell destruction.
- Immediate extravascular destruction of red cell lead to :

  hyperbilirubinemia, mild hemoglobinemia ..

  In sever cases : failure to achieve expected rise Hb level and renal failure is very rare .

- Intravascular destruction of red cell due to ABO incompatibility lead to anaphylaxis reaction

  (the worst reaction are seen in group O recipient).

ACUTE HEMOLYTIC 1 TRANSFUSION REACTIONS

- **Signs and symptoms :**
- Discomfort at infusion site .
- Fever and Chills .
- nausea and vomiting .
- Flank pain and abdomen pain .
- headache, dyspnoea
- tachy-cardia, .
- +/- hypotension, and shock.
- +/- Oliguria, anuria, acute tubular necrosis and acute renal failure .
- sometimes DIC.

ACUTE HEMOLYTIC. 1 TRANSFUSION REACTIONS

- Laboratory findings :

- Hemoglobinuria.
- Positive direct Coombs test.
- hyperbilirubinemia
- sometimes DIC finding.

ACUTE HEMOLYTIC. 1 TRANSFUSION REACTION

The hallmark :

red plasma and urine.

A. ACUTE HEMOLYTIC REACTION

Management :

- immediate cessation of blood transfusion .
- i.v. access , IV fliuds .
- +/- furosemide and mannitol .
- support blood pressure .
- maintain high urine flow .
- alkalinize urine.

A. ACUTE HEMOLYTIC REACTION

Management

- Blood sample for investigation :
- CBC .
- hemoglobinemia ,hemoglobinuria, haptoglobin .
- LDH .
- PT and PTT .
- bilirubin (total and direct) .
- renal function test.
- Advice blood bank for grouping and cross-matching .

ACUTE HEMOLYTIC. 1 TRANSFUSION REACTIONS

Evaluation of acute transfusion reaction:

(1) Patient's urine: Test for hemoglobin.

(2) Patient's blood:
Confirm blood type, screen for antibodies .

(3) Donor blood: Culture for bacteria.

2.DELAYED HAEMOLYTIC TRANSFUSION REACTION

- Usually due to minor blood group antigen incompatibility with low or absent titer of antibodies at time of transfusion.
- It is extra vascular RBC destruction, neither predictable non preventable .
- more common than acute hemolytic transfusion reaction .

- Occurs 3–10 days after transfusion.

DELAYED TRANSFUSION.2 :REACTION

Signs and Symptoms:

- It can be asymptomatic .
- present with symptoms of :

- Fever .
- Fatigue .
- Jaundice .
- dark urine.

DELAYED HAEMOLYTIC.2 TRANSFUSION REACTION

- **Lab. Finding :**

1. **anemia.**
2. **a positive Coombs test .**
3. **new RBC antibodies .**
4. **hemoglobinuria.**
5. **increased bilirubin, LDH and decreased haptoglobin .**
6. **reticulocytosis.**

The need for acute intervention is much less likely than with acute reactions.

DELAYED HAEMOLYTIC.2 TRANSFUSION REACTION

The hallmark :

an unexplained drop of Hb.

DELAYED HAEMOLYTIC.2 TRANSFUSION REACTION

Management :

provide compatible antigen negative units for future transfusion.

FEBRILE NON-HEMOLYTIC. 3 :TRANSFUSION REACTION

- arise in temperature (usually more than 1C) following or toward to end of transfusion characterized by :
  chill , rigor and diaphoresis.

- When other causes of fever in transfused patient are ruled out, this due to :

- cytokines derived from donor leukocyte in unit blood during storage .
- recipient antibodies directed against donor leukocyte antigens.

FEBRILE NON-HEMOLYTIC. 3 TRANSFUSION REACTION

- common in previously transfused patients.
- It is one of the most common transfusion reaction occurring in 0.5%-1% of RBC transfusion and 30% of platelet transfusion.
- If it is recurrent indicate that the mechanism involves patient alloantibodies.

FEBRILE NON-HEMOLYTIC. 3 TRANSFUSION REACTION

The hallmark :

transient fever.

FEBRILE NON-HEMOLYTIC. 3 TRANSFUSION REACTION

Management

1. stopping the transfusion.
2. blood sample to rule out an acute hemolytic transfusion reaction.
3. Antipyretics and corticosteroids (no benefit from antihistamine).
4. leukocyte poor blood before storage rather during transfusion by leukocyte filtration or prestorage leukodilution.
5. blood washing not effective way.

FEBRILE NON-HEMOLYTIC. 3 TRANSFUSION REACTION

6. premedication with antipyretic has not been successful.

7. leukocyte reduction has several other potentially beneficial effect including prevention of primary alloimmunization caused by HLA antigen on donor leukocyte .

8. after exclude acute hemolytic transfusion reaction slow the infusion (Not necessary to discontinuation the infusion) .

TRANSFUSION-RELATED. 4 ACUTE LUNG INJURY (TRALI)

- It is rare but sever reaction from antileukocyte antibodies of donor origin with patients leukocytes that aggregate to become trapped in the pulmonary capillary bed leading to alveolitis.
- Result from the used FFP or other product containing large volume of plasma.
- Recurrence occurred when one unit of transfusion from the same donor is used.

TRANSFUSION-RELATED ACUTE LUNG. 4 INJURY

- Signs and Symptoms :

- Non-cardiogenic pulmonary edema .
- fever and chill .
- sever hypoxia .
- acute respiratory distress syndrome (ARDS) .
- cyanosis .
- may be fatal occurred soon or during transfusion.

- Improved within 2-3 days unless the ARDS develops.

TRANSFUSION-RELATED ACUTE LUNG INJURY.

- **Criteria for diagnosis :**
  - Acute onset during 6 hr of transfusion.
  - Hypoxemia .
  - Bil.infiltration on CXR .
  - No evidence of volume overload .
  - No pre-existing lung injury .
  - No alternative risk factor for ALI .
- **Possible TRALI**

  Same criteria + identified risk factor for ALI as sepsis .

TRANSFUSION-. 4 RELATED ACUTE LUNG INJURY

Hallmark :

hypoxemia.

TRANSFUSION-RELATED. 4 ACUTE LUNG INJURY

Management :

- Stopping the transfusion .
- Oxygen and respiratory support .
- vasopressor for hypotension.
- Avoid Diuretics .
- Advice the blood bank so that the donor is deferred from future donation.

:ALLERGIC REACTION. 5

- Reaction to donor plasma proteins that can behave as allergic reacting with the patients IgE on mast cell causing :

  itching, erythema and urticaria .

- this reaction may not be completely preventable.
- If patient atopic sever respiratory symptom as wheezing and mucosal edema can develop.
- It is more common than febrile reaction 1-3% with FFP and platelet than PRBC.

:ALLERGIC REACTION. 5

The hallmark :

rash .

:ALLERGIC REACTION. 5

Management

- Stop transfusion immediately and replace it from another donor.
- Treat with antihistamines .
- close observation for development of anaphylaxis.
- Epinephrine and steroids if there is respiratory compromise .
- Premedication and slow infusion rate may lessen their severity and frequency
- Use washed or filtered RBCs with the next transfusion.

6. ANAPHYLACTIC REACTION:

- True anaphylaxis can occur in conjunction with or in absence of allergic reaction.
- Abrupt onset of hypotension, respiratory distress ,nausea ,abdominal cramp and diarrhea and progress to shock, collapse and respiratory arrest.
- Although symptoms can occur soon after transfusion is initiated, delayed anaphylaxis may occur.
- The earlier the sign and symptom develop ,the more sever the reaction.
- Incidence is 1:20000 to 50000 .

ANAPHYLACTIC. 6 :REACTION

Management

1. Stopping the transfusion .
2. Epinephrine and corticosteroid .
3. Cardiovascular support .
4. Respiratory support.
5. Anaphylaxis due to anti-IgA antibodies can be prevented by using blood from IgA-deficient donor.

GRAFT-VERSUS-HOST DISEASE. 7 ((GVHD

- mediated by donor T lymphocytes that recognize host HLA antigen as foreign and form an immune response .

- GVHD can occur when blood component that contain viable T lymphocyte are transfused to immunodeficient recipient or to immunocompetent recipient who share HLA antigen with donor (family donor).

GVHD. 7

- Manifested by :

1. Fever .
2. characteristic cutaneous eruption .
3. diarrhea
4. abnormal liver function .

- Also associated with bone marrow aplasia and pancytopenia with highly resistant to treatment with immunosuppressive therapy appear at 8 to10 days and death occur 3 to 4 weeks post transfusion.

GVHD. 7

Management :

1. Irradiation of cellular element before transfusion to patient at risk.
2. avoid directed donation by family members .

B .NON-IMMUNE MEDIATED REACTION

- Transmission of infectious diseases.
- Sepsis .
- Circulatory overload .
- Hypothermia .
- Electrolyte disturbances.
- Massive blood transfusion .
- Iron overload .
- Hypotensive reaction .

TRANSMISSION OF.1 INFECTIOUS DISEASES

Blood supply is tested for :

- ✓ HIV types 1 and 2 .
- ✓ HTLV types I and II .
- ✓ hepatitis B .
- ✓ hepatitis C .
- ✓ Syphilis .
- ✓ West Nile virus.

SEPSIS. 2

- It occurs predominant through asymptomatic donor bacteremia or because of skin plug drawn into collection bag during venipuncture.
- Sepsis occurs with products that are contaminated with bacteria, particularly platelets, because they are stored at room temperature.

SEPSIS. 2

- **Manifestation :**

- fever , chills, headach, ...
- back pain, chest pain or abdominal pain beginning during or shortly after transfusion.
- Hypotension .

- They may progress to DIC and septic shock, caused by gram negative bacteria .

SEPSIS. 2

Management :

a) Distinguishing septic reaction (septic screen).
b) Identification of the organism (gram stain and culture).
c) Administration of broad spectrum antibiotics .
d) Cardiovascular monitoring and supporting .

3. CIRCULATORY OVERLOAD

Patient at risk :

- Infant .
- patient with heart failure.

HYPOTHERMIA. 4

especially when rapidly infused.

IN 70 % of pt. who receive 4 ut. Chilled PRBCs will decrease Body .Temp. by 1 c

ELECTROLYTES DISTURBANCES. 5

- Hypocalcemia .
- Hyperkalemia :

Decrease risk :

- by selecting donated blood within 5 – 10 days .
- by wash PRBCs by isotonic saline .

- Metabolic Alkalosis.

MASSIVE BLOOD. 6 TRANSFUSION

- replacement of > 50 % of patient blood volume within 12 – 24 hr.

- Transfusion of > 10 units PRBCs within 24 hr

  or

  4 units within 1 hr.

SITUATION OF MASSIVE TRANSFUSION:

- Traumatic injurirs.
- GI bleeding.
- Aortic aneuresm rupture.
- Obstetric hemorrhage.
- Organ transplant surgery.

MASSIVE BLOOD TRANSFUSION. 6

- **COMPLICATION :**
  - Coagulopathy as dilutional effect .
    Recomended transfusing 1:1 :1 or 1: 1: 2 ratio of plasma: PLT : PRBCs .
  - Hypothermia .
  - Electrolytes disturbances .
  - Citrate toxicity (rare)
- > 9 Ut. Whole blood , 27 UT PRBCs .
- higher in liver disease .
- ttt by Ca replacement .

MASSIVE BLOOD. 6 TRANSFUSION

- MONITORING :

- ✓ TEMP.
- ✓ PH.
- ✓ Ionized Ca .
- ✓ Electrolytes .
- ✓ PT, INR , PTT , Fibrinogen level .

7. **Iron overload :**

each unit contain 200-250mg of iron.

8. **Hypotensive reaction :**

among transfused patient taking ACE inhibitor


شكرا لحسن الاستماع