
TRANSFUSION REACTIONS

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INTRODUCTION

- **Blood transfusion can be associated with various adverse effects.**
- **Incidence of adverse reactions due to blood and blood products is 1-3%**
- **Some of these reactions are acute, which arise during or shortly after the transfusion and some reactions are delayed**



ACUTE COMPLICATIONS OF TRANSFUSION

- Acute transfusion reactions occur during or shortly after (within 24 hours) the transfusion.
- They can be broadly classified in the following three categories according to their severity and the appropriate clinical response.
 - Category 1: Mild reactions
 - Category 2: Moderately severe reactions
 - Category 3: Life-threatening reactions



Category 1: Mild reactions

- Mild hypersensitivity: allergic, urticarial reactions



Category 2: Moderately severe reactions

- Moderate–severe hypersensitivity (severe urticarial reactions)
- Febrile non-haemolytic transfusion reactions (FNHTR):
 - Antibodies to white cells, platelets
 - Antibodies to proteins, including IgA
- Possible bacterial contamination (early signs)
- Pyrogens



Category 3: Life-threatening reactions

- **Acute intravascular haemolysis**
- **Bacterial contamination and septic shock**
- **Fluid overload**
- **Anaphylactic reactions**
- **Transfusion-associated lung injury**



Delayed complications of transfusion

1) Transfusion-transmitted infections

- HIV-1 and HIV-2
- HTLV-I and II
- Viral hepatitis B and C
- Syphilis
- Malaria



Delayed complications of transfusion

2) Other delayed complications of transfusion : Occur days, months or even years after the transfusion has been completed

- Delayed haemolytic reaction
- Post-transfusion purpura
- Graft-vs-host disease
- Iron overload (in patients who receive repeated transfusions)



Category 1: Mild reactions

Urticaria and itching are common reactions following transfusion.

- They arise as a result of type I hypersensitivity with local histamine release to proteins, probably in the donor plasma.
- 1) Donor plasma has allergen with which IgE or IgG or both of patient react
 - 2) Donor plasma has reagins (IgE or IgG or both) with which patients plasma proteins react



Category 1: Mild reactions

- **Signs and symptoms**

Localised cutaneous reactions (urticaria and rash), often accompanied by pruritus (intense itching), occur within minutes of commencing the transfusion.

The symptoms usually subside if the transfusion is slowed and antihistamine is given.



Category 1: Mild reactions

■ Management

1. Slow the transfusion.
2. Give an antihistamine: e.g. chlorpheniramine 0.1 mg/kg by intramuscular injection.
3. Continue the transfusion at the normal rate if there is no progression of symptoms after 30 minutes.
4. If there is no clinical improvement within 30 minutes or if signs and symptoms worsen, treat the reaction as a Category 2 reaction.



Category 1: Mild reactions

- Prevention

If a patient has previously experienced repeated urticarial reactions, give an antihistamine such as chlorpheniramine 0.1 mg/kg IM or IV 30 minutes before commencing the transfusion, wherever it is possible.



Category 2: Moderately severe reactions

- **Fever or rigors during the transfusion of blood or platelet concentrates may affect 1–2% of recipients.**
- **They are caused by cytokines released from leucocytes in stored blood components and by the reaction of infused white cells with antibodies in the patient's plasma, resulting in the release of pyrogens.**
- **It is important to routinely record the patient's temperature, pulse, respiration and blood pressure before starting the transfusion to avoid confusion due to pre-existing fever.**
- **Signs and symptoms usually occur 30–60 minutes after the start of the transfusion.**



Category 2: Moderately severe reactions

■ Signs

■ Flushing

■ Urticaria

■ Rigors

■ Fever

■ Restlessness

■ Tachycardia

Symptoms

■ Anxiety



Category 2: Moderately severe reactions-Management

- 1. Stop the transfusion. Replace the infusion set and keep the IV line open with normal saline.**
- 2. Notify the doctor responsible for the patient and the blood bank immediately.**
- 3. Send the blood unit with infusion set, freshly collected urine and new blood samples (1 clotted and 1 anticoagulated) from the vein opposite the infusion site with an appropriate request form to the blood bank for investigations.**



Category 2: Moderately severe reactions -Management

4.Administer antihistamine IV or IM (e.g. chlorpheniramine 0.01 mg/kg or equivalent) and an oral or rectal antipyretic (e.g. paracetamol 10 mg/kg: 500 mg – 1 g in adults).

5.Give IV corticosteroids and bronchodilators if there are anaphylactoid features (e.g. broncospasm, stridor).

6.Collect urine for the next 24 hours for evidence of haemolysis and send to the laboratory.



Category 2: Moderately severe reactions -Management

7.If there is a clinical improvement, restart the transfusion slowly with a new unit of blood and observe carefully.

8.If there is no clinical improvement within 15 minutes or the patient's condition deteriorates, manage the case under category 3.



Category 2: Moderately severe reactions -Prevention

If the patient is a regular transfusion recipient or has had two or more febrile non-haemolytic reactions in the past:

- 1. Give an antipyretic 1 hour before starting the transfusion: e.g. paracetamol 10–15 mg/kg orally. Do not use aspirin in a patient with thrombocytopenia.**
- 2. Repeat the antipyretic 3 hours after the start of transfusion.**



Category 2: Moderately severe reactions -Prevention

3. Transfuse slowly, wherever possible:

- **Whole blood and red cells: 3–4 hours per unit**
- **Platelet concentrates: up to 2 hours per concentrate.**

4. Keep the patient warm.

5. If this fails to control the febrile reaction and further transfusion is needed, use buffy coat removed or filtered red cells or platelet concentrates to remove the leucocytes.



Category 3: Life-threatening reactions

The most common causes of life-threatening transfusion reactions are:

- Acute intravascular haemolysis
- Bacterial contamination and septic shock
- Fluid overload
- Anaphylactic shock
- Transfusion-associated lung injury (TRALI)



Category 3: Life-threatening reactions

Signs

- Rigors
- Fever
- Restlessness
- Shock
- Tachycardia
- Haemoglobinuria
(red urine)
- Unexplained bleeding (DIC)

Symptoms

- Anxiety



Category 3: Life-threatening reactions-Management

- 1. Stop the transfusion. Replace the infusion set and keep IV line open with normal saline.**
- 2. Infuse normal saline to maintain systolic BP (initial 20–30 ml/kg). If hypotensive, give over 5 minutes and elevate patient's legs.**
- 3. Maintain airway and give high flow oxygen by mask.**
- 4. Give 1:1000 adrenaline 0.01 mg/kg body weight by intramuscular injection.**



Category 3: Life-threatening reactions-Management

5. Give IV corticosteroids and bronchodilators if there are anaphylactoid features (e.g. broncospasm, stridor).

6. Give diuretic: e.g. frusemide 1 mg/kg IV or equivalent

7. Notify the doctor responsible for the patient and the blood bank immediately.

8. Send blood unit with infusion set, fresh urine sample and new blood samples (1 clotted and 1 anticoagulated) from vein opposite infusion site with appropriate request form to blood bank and laboratory for investigations.



Category 3: Life-threatening reactions-Management

9. Check a fresh urine specimen visually for signs of haemoglobinuria (red or pink urine).

10. Start a 24-hour urine collection and fluid balance chart and record all intake and output. Maintain fluid balance
11 Assess for bleeding from puncture sites or wounds. If there is clinical or laboratory evidence of Disseminated Intravascular Coagulation (DIC) give:

- Platelet concentrates *and*
- Either cryoprecipitate *or* fresh frozen plasma.



Category 3: Life-threatening reactions-Management

12.Reassess. If hypotensive:

- **Give saline 20–30 ml/kg over 5 minutes**
- **Give inotrope.**

13.If urine output falling or laboratory evidence of acute renal failure (rising K⁺, urea, creatinine):

- **Maintain fluid balance accurately**
- **Give furosemide**
- **Consider dopamine infusion**
- **Seek expert help: the patient may need renal dialysis.**



Delayed haemolytic transfusion reactions

Cause

- In patients who have previously been immunized to a red cell antigen during pregnancy or following transfusion, the level of antibody to the blood group antigen may be so low that it cannot be detected in the pre-transfusion blood sample.
- After transfusion of red cells bearing the relevant antigen, a rapid secondary immune response raises the antibody level so that, after a few days, transfused red cells bearing that antigen are destroyed.
- Most red cell haemolysis is extravascular.



■ Signs and symptoms

The signs of a delayed haemolytic transfusion reaction appear 5–10 days after transfusion:

- Fever
- Anaemia
- Jaundice
- Occasionally haemoglobinuria.

Severe, life-threatening delayed haemolytic transfusion reactions with shock, renal failure are rare



Management

1 Usually, no treatment is required. However, if hypotension and renal failure occur, treat as for acute intravascular haemolysis.

2 Investigations:

- **Recheck the patient's blood group**
- **Direct antiglobulin test is usually positive**
- **Raised unconjugated bilirubin.**

Prevention

Delayed haemolytic reactions can be prevented by careful laboratory screening for red cell antibodies in the patient's plasma and the selection of red cells compatible with these antibodies. However, some reactions are due to rare antigens (i.e. anti-Jka blood group antibodies that are very difficult to detect pre-transfusion



TRANSFUSION REACTION WORKUP IN BLOOD BANK

- **Check for clerical errors.**
- **Identify the patient/donor/sample correctly**
- **Centrifuge and compare the color of plasma for evidence of free hemoglobin or bilirubin visually**
- **Perform DAT and IAT on the post transfusion blood sample of the patient**
- **DAT demonstrates sensitization of patient red cells by immune antibodies(IgG) or by complement (C3d).**
- **IAT demonstrates atypical antibodies in patient serum.**



TRANSFUSION REACTION WORKUP IN BLOOD BANK

- Regroup pretransfusion samples of donor and patient as well as post transfusion sample of patient.
- Recrossmatch pre and post transfusion samples of patient with pretransfusion sample of donor.
- Examine the first post transfusion urine sample (after 5 – 6 hrs) for evidence of hemoglobin or bilirubin(using dipstick).



TRANSFUSION REACTION WORKUP IN BLOOD BANK

- **BLOOD BAG :**
- **Gram stain contents of blood bag and look for bacteria.**
- **Culture for contents.**
- **Look for free hemoglobin in plasma after centrifugation.**
- **Repeat all tests after 3 days to detect delayed hemolytic reaction.**
- **Report the results to the treating clinician immediately**



**The transfusion reaction is intimated
to the NATIONAL INSTITUTE OF
BIOLOGICALS, Noida, INDIA under
Hemovigilance programme of India**



THANK YOU

