THE TRANSFUSION REACTION

Learning Objectives

At the conclusion of this chapter the student should be able to:

- Define the term “transfusion reaction”
- Classify transfusion reaction
- Carryout laboratory tests during transfusion reaction

9.1 Types of Transfusion Reaction

- Any unfavorable response by a patient that occurs as a result of the transfusion of blood or blood products is termed as the transfusion reaction.
- This is the occurrence of signs of red cell destruction after blood transfusion.
- The most obvious of this are;
  Hemoglobinuria, fever, sweat, raised pulse rate, jaundice, chest pain, backache etc.
- There are two categories of blood transfusion reaction;
  (1) Intravascular reaction (in the veins)
    - Hemolytic reaction is immediate.
    - Mostly caused by cold natural antibodies in ABO incompatible blood
    - Reaction is immediate, severe and lethal.

  (2) Extravascular reaction (in the organ)
    - Hemolytic reaction is delayed.
    - This is caused by immune antibodies of other blood group.
    - Red cell coated by invading IgG antibodies are removed by the liver & spleen & finally destroyed.
- Transfusion reactions can be divided into;
  - Hemolytic
  - Non-hemolytic types.
- Hemolytic reactions may be defined as the occurrence of abnormal destruction of red cells of either the donor or recipient following the transfusion of incompatible blood.
- Non-hemolytic reactions on the other hand are not usually associated with erythrocyte hemolysis, constitute conditions such as shortened post transfusion survival of erythrocytes, febrile reactions, allergic response, and disease transmission.
- Febrile reactions are the most prevalent type of immediate non-hemolytic reaction and are commonly caused by leukocytes or platelet antibodies present in the recipient’s plasma, a reaction occurs between these antibodies and the antigen present on the cell membrane of transfused leukocytes or platelets.
- Transfusion reactions can be further classified in to
  - Acute (immediate)
  - Delayed in their manifestations.

- Factors that influence whether a transfusion reaction will be acute or delayed are as follows;
  - Antibody concentration,
  - Class or subclass,
  - Ability to fix complement,
  - Temperature of activity
  - Concentration of red cell antigen infused

- Acute hemolytic reactions, which are the most serious and potentially lethal, occur during or immediately after blood has been transfused.
- Most commonly are caused by Ag-Ab reaction between the patient’s serum and the donor’s red cells and vice versa, of transfusing ABO incompatible blood.

- Delayed hemolytic reactions, as the name implies the transfusion reaction is delayed due to weak antibody in the
  recipient 7 to 10 days of post transfusion.
- In most cases of delayed hemolytic reactions, the patient has been primarily immunized by previous transfusion or pregnancy.

- The antibody is too weak to be detected in routine cross-match, but becomes detectable 3 to 7 days after transfusion, eg. Antibodies of the Rh system & kidd system.

9.2 Laboratory Tests to be done When Transfusion Reaction Occurs

- ✓ Most of fatal transfusion reactions result from misidentification or clerical error such as misidentification of patients, mislabeling of blood sample, error in laboratory records, mistake in blood typing and inaccurate cross-matching.
- ✓ Whenever adverse reaction experienced by a patient in association with a transfusion it should be regarded as a suspected transfusion reaction, and the following lab.
- ✓ The following specimen should be brought to the laboratory for investigation;
  - Patients pre-transfusion clotted blood (usually present in the laboratory)
  - Patients post transfusion sample of blood from the opposite arm in;
    - EDTA container
    - In heparin or 3.2% trisodium citrate
    - In plain bottle

- ✓ The following investigations that must be performed.
  - Check the identification of the patient and transfused unit
  - Obtain a post transfusion specimen from the patient and visually examine it for hemolysis
  - Direct Anti-globulin Test (DAT) from post transfusion sample, taken as soon as possible after the reaction has taken place. This rules out if a reaction ever occurred at all.
  - Re-type the red cells of both donor and recipient for ABO and Rh grouping.
  - Re-cross match blood from each unit transfused using serum from both pre-and post-transfusion specimens from the patient.
  - Centrifuge and examine plasma from EDTA post-transfusion sample for free hemoglobin or jaundice. This rules out if hemolysis ever took place
  - Do antibody screening test on the patient's pre and post-transfusion sample. This rules out reaction due to irregular antibodies.
  - Do antibody identification if positive
  - Make a thin blood film of post transfusion EDTA sample & examine for spherocytes or schistocytes. This rules out reaction due to immune antibodies and natural antibodies respectively.
  - Do osmotic fragility using patient's heparinized sample. This rule out reaction due to immune antibodies.
  - Check color of donor blood and do blood culture. This rule out possibility of infected donor blood due to bacterial infection.
  - Test patient's post transfusion sample for methaealbumin (raised in intravascular reaction), haptoglobin (reduced in intravascular reaction), bilirubin levels (raised in intravascular reaction).
  - Test patients post transfusion urine for;
    - Free hemoglobin (present in hemolysis)
    - Urobilinogen (increased in hemolysis)
    - Haemosiderin (present in hemolysis)

Review Questions

1) What is a transfusion reaction?

2) On what basis do the transfusion reaction classified?
3) List laboratory investigations to be carried out when incompatible transfused reactions are suspected?