# *Spleen and Blood transfusion*

# *The spleen*

- The spleen is the largest lymphoid organ in the body. two anatomical components: the red pulp and the white pulp. Blood enters via the splenic artery.

# *The spleen; functions*

1. ***Sequestration and phagocytosis.***

Old or abnormal RBCs are removed by phagocytosis along with other circulating foreign matters.

IgG-coated red cells are removed by macrophages.

2. ***Extramedullary haemopoiesis.***

stem cells are present in the spleen and proliferate during severe haematological stress.

3. *Immunological function.*

   About 25% of the body's T lymphocytes and 15% of B lymphocytes are present in the spleen. The spleen shares the function of production of antibodies with other lymphoid tissues.

4. *Blood pooling.*

   Up to one-third of the platelets are sequestrated in the spleen and can be rapidly mobilized.

# SPLENOMEGALY ; causes

Portal hypertension:

liver disease.

Infection:

- parasitic - e.g. schistosomiasis, malaria, and kala-azar
- acute - e.g. septic shock, infective endocarditis, typhoid, infectious mononucleosis
- chronic - e.g. tuberculosis and brucellosis

Haematological:

haemolytic anaemia, leukaemias, lymphomas and myeloproliferative disorders.

Collagen diseases:

rheumatoid arthritis, sarcoidosis, SLE.

Miscellaneous:

storage diseases, amyloidosis, 1ry and secondary neoplasia.

# Hypersplenism

- This can result from splenomegaly due to any cause. It is commonly seen with splenomegaly due to haematological disorders, portal hypertension, rheumatoid arthritis and lymphoma.
- *Hypersplenism produces:*

1. pancytopenia
2. haemolysis due to sequestration and destruction of red cells in the spleen

- *Treatment* is often dependent on the underlying cause, but splenectomy is sometimes required for severe anaemia or thrombocytopenia.

# Splenectomy

- *Splenectomy is performed mainly for:*

1. Trauma
2. Idiopathic thrombocytopenic purpura
3. Haemolytic anaemias
4. Hypersplenism.

- *Problems after splenectomy*

1. An immediate problem is an increased platelet count (usually 600-1000 × $10^9$/L) for 2-3 weeks. Thrombo-embolic phenomenon may occur.
2. In the longer term there is an increased risk of infections, particularly pneumococcal infections.

# Blood transfusion

- *BLOOD GROUPS*

- The blood groups are determined by antigens on the surface of red cells (more than 400 blood groups have been found).

- The ABO and Rh systems are the two major blood grouping systems, but incompatibilities involving many other blood groups may cause haemolytic transfusion reactions and/or haemolytic disease of the newborn.

# Blood transfusion

This blood group system involves naturally occurring IgM anti-A and anti-B antibodies which are capable of producing rapid and severe intravascular haemolysis of incompatible red cells.

- *BLOOD GROUPS*

| *Phenotype* | *Genotype* | *Antigens* | *Antibodies* |
|---|---|---|---|
| *O* | *OO* | *None* | *Anti-A and anti-B* |
| *A* | *AA or AO* | *A* | *Anti-B* |
| *B* | *BB or BO* | *B* | *Anti-A* |
| *AB* | *AB* | *A and B* | *None* |

# COMPLICATIONS OF BLOOD TRANSFUSION

## *Immunological*

*Alloimmunization and incompatibility*

1. *Red cells*
   - Immediate haemolytic transfusion reactions
   - Delayed haemolytic transfusion reactions ,
2. *Leucocytes and platelets*
   - Non-haemolytic (febrile) transfusion reactions
   - Post-transfusion purpura
   - Poor survival of transfused platelets and granulocytes
   - Lung injury
3. *Plasma proteins*
   - Urticarial and anaphylactic reactions

- Incompatibility may result in poor survival of transfused cells, such as red cells and platelets, and also in the harmful effects of antigen-antibody reaction.

## 1. Red cells

### A) *Immediate haemolytic transfusion reaction*

- This is the most serious complication of blood transfusion and is usually due to ABO incompatibility.
- rigors, lumbar pain, dyspnea, hypotension, haemoglobinuria and renal failure.
- The initial symptoms may occur a few minutes after starting the transfusion.

- Activation of coagulation may also occur and bleeding due to DIC is a bad prognostic sign.

- Emergency treatment may be needed to maintain the blood pressure and renal functions.

- At the first suspicion of any serious transfusion reaction, the transfusion should always be stopped and the donor units returned to the blood transfusion laboratory with a new blood sample from the patient to exclude a haemolytic transfusion reaction.

## B) *Delayed haemolytic transfusion reaction.*

- The antibody level is too low to be detected by pretransfusion compatibility testing, but a secondary immune response occurs after transfusion, resulting in destruction of the transfused cells, usually by IgG antibodies.

- Haemolysis is usually extravascular as the antibodies are IgG, and the patient may develop anaemia and jaundice about a week after the transfusion. The blood film shows spherocytosis and reticulocytosis.

- The direct antiglobulin (comb) test is positive.

## 2. Leucocytes and platelets

- Non-haemolytic (febrile) transfusion reactions

  - Febrile reactions are common complication of blood transfusion in patients who have previously been transfused or pregnant women.

  - The usual causes are the presence of leucocyte antibodies acting against donor leucocytes leading to release of pyrogens, or the release of cytokines from donor leucocytes.

- Typical signs are tachycardia, fever (> 38°C), chills and rigors.

- The introduction of leucocyte-depleted blood, has reduced the incidence of febrile reactions.

- Potent leucocyte antibodies in the plasma of donors, may cause severe pulmonary reactions (called transfusion-related acute lung injury or TRALI) characterized by dyspnea, fever, cough, and shadowing in the perihilar and lower lung fields on the chest X-ray.

## 3. Plasma proteins

- Urticaria and anaphylaxis

- Urticarial reactions are often attributed to plasma protein incompatibility, but in many cases, they are unexplained.

- They are common but rarely severe; stopping or slowing the transfusion and administration of chlorphenamine 10 mg i.v. are usually sufficient treatment.

- Anaphylactic reactions may occur; The transfusion should be stopped and epinephrine (adrenaline) 0.5 mg i.m. and chlorphenamine 10 mg i.v. should be given immediately; endotracheal intubation may be required.

- Patients who have had severe urticarial or anaphylactic reactions should receive either washed red cells, autologous blood .

## *Non-immunological complications*

1. *Transmission of infection*

- Viruses: HAV, HBV, HCV, HIV, CMV, EBV.
- Parasites: malaria, trypanosomiasis toxoplasmosis
- Bacteria

2. *Circulatory failure* due to volume overload
3. *Iron overload* due to multiple transfusions
4. *Massive transfusion* of stored blood may cause bleeding reactions and electrolyte changes
5. *Thrombophlebitis and Air embolism*