SUMMARY

The decline in blood volume produced by bleeding decreases venous return and cardiac output. Multiple compensatory reactions are activated that help to maintain adequate venous return, cardiac output and blood pressure. In chronic anemic patients there are multiple homeostatic mechanisms that can maintain adequate blood oxygen content and tissue oxygen delivery, these included : an alternation in oxygen affinity of hemoglobin, capillary recruitment, changes in blood viscosity, and alternation in cardiac performance.

Blood transfusion is indicated frequently during operation and in the perioperative period for a variety of reasons; massive bleeding, major vascular surgery, spine fusions, genitourinary tumors, during liver transplantation etc.

Blood can be given through intravenous route, intraosseous, and intraperitoneal. The blood should be warmed and should be given through blood filters. The rate of administration of blood depends upon the patient status.

Whole blood is required primarily for patients who are actively bleeding and have sustained loss of greater than 25 percent of their total blood volume in adult or 10 percent of the blood volume in paediatric, to maintain adequate oxygen - carrying capacity which can be met by a hemoglobin of 7 g / dl or even less when the intravasculr volume is adequate for perfusion.

Packed red blood cells indicated for less sever haemorrhage, and to increase RBC mass in symptomatic anemia. Leukocyte reduced RBCs for febrile reactions, washed RBCs for patients with a history of recurrent sever allergic,reactions.

Component therapy has its own indications. e.g. platelet concentrates are indicated in thrombocytopenia (less than 20, 000 cells /m^3) and clinical signs of bleeding. In trauma or surgery a higher platelet count up to 100, 000 cells/ m^3 to maintain adequate haemostasis. F.F.P. are indicated for replacement of isolated factor deficiencies, reversal of warfanin effect, treatment of immunodeficiencies, treatment of thrombotic thrombocytopenia purpura, in antithrombin III deficiency, and rarely, when factor V and VIII are less than 25 percent of normal.

Before transfusion donated blood should be screened for ABO - Rh type, cross match, and antibody screen., also screened to exclude medical conditions that might adversely affect the recipient. e.g. disease transmission.

A variety of storage media have been used as a anticoagulant. When ACD solution was used as storage media, the shelf life is about 21 days, with CPD solution a shelf life of 28 days, while CPDA provides a shelf life up to 35 days. The shelf life can be extended to 42 days when adsol or Nutrice is used. Blood stored in heparin must be used within 24 to 48 hours of collection.

During transfusion the patient should be monitored; pulse rate, blood pressure, CVP, central temperature, and hourly urine output should

all be measured as well as continuous ECG monitoring and pulse oximetry.

Although blood transfusion is sometimes lifesaving, anaesthetists should be aware of its hazards and complications which are :

a- The immune complications :

Are primarily due to sensitization of the recipients to donor red cells, white cells, platelets, or plasma proteins, they are include the following, haemolytic reactions, and non-haemolytic reactions. The non-haemolytic reactions are febrile reactions, allergic actions, non cardiogenic pulmonary odema, Graft versus Host Disease (GVHD) and transfusion induced immunosuppression.

b- The non - immune complications are :

1- Transfusion - transmitted diseases; post - transfusion hepatitis, acquired immunodeficiency syndrome (AIDS), human - T - cell leukemia virus type I, cytomegalo virus (CMV), and other transfusion - associated infectious diseases.
2- Complications of massive blood transfusion. Massive blood transfusion may be defined either as the acute administration of more than 1,5 times the patient's estimated blood volume; or as the replacement of the patient's total blood volume by stored homologous bank blood in less than 24 h. Complications of massive blood transfusion are, coagulation, citrate intoxication and hyperkalemia, acid - base disturbance, hypothermia, and microaggregates.
3- Circulatory overload.
4- Haemosiderosis.

5- Air embolism.

6- Thrombophlebitis.

Transfusion whole blood transfusion is contraindicated in certain situations such as :

- Jehovah's Witness patients, who refuse blood or blood products on the basis of their religious beliefs.
- In treatment of chronic anaemias as the risk of fluid overload is excessive, so packed red blood cells are preferred.
- In treatment of deficiency of coagulation factors, as FFP, cryoprecipitate or specific factor concentrate are generally more effective than whole blood.

There are two ways of avoiding homologous blood transfusion :

1) Minimizing blood loss :

By induced hypotension, treatment with drugs that improve coagulation & positioning.

2) Autologous transfusion :

It uses the recipient's own blood for reinfusion to avoid complications associated with allogeneic transfusion that may cause immune mediated transfusion reactions and transfusion - transmitted infections and to conserve blood resources. There are 3 ways of autologous transfusion :

a) preoperative blood donation

b) Acute normovolemic hemodilution.

c) Intra - operative and post - operative blood salvage.

Recent concern over the safety of human blood has stimulated a renewed interest in finding alternatives to transfusion of red cells (red cell substitutes). Two types of artificial oxygen transporting fluids (red cell substitutes) have been under investigation :

1) Perfluoro chemical emulsion (PFC). 2) stroma - free hemoglobin (SFH). Neither of which will provide prolonged benefit and only be hoped to reduce the amount of homologous blood required and not replace it.