BLOOD TRANSFUSION

by

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THE establishment of Blood Transfusion as a life saving therapeutic procedure on a scientific basis, developed through the years, forms a fascinating chapter in medical history. It is an empirical deduction that the concept of blood as a remedial treatment began with the origin of medicine itself. Custom prevailed in Ancient Rome for the spectators to rush into the gladiatorial arena to drink freshly flowing blood from the victims. Egyptian nobility took regular blood baths for resuscitation. Classical Greek and Roman writers of antiquity have made mention of blood giving. During the Middle Ages ingestion of human and animal blood was considered a health restorative. Older records reveal the "transfusion" of animal blood into human beings. With all these vague and inconsistent data, it is difficult to entertain that "blood transfusions", as we understand it today, were practised, when the circulation of blood was yet unknown. Still considerable controversy prevails regarding the first blood transfusion. With the establishment of blood circulation in the year 1628 by William Harvey, definite advances were made in blood transfusion and since World War II, the horizon of our knowledge has broadened considerably in the techniques of transfusion therapy.

During blood transfusion, blood may be hæmolyzed as a result of a specific protein in the blood of one man on the erythrocytes of the other. Hæmolysis liberates toxic products, causing grave disorders and may lead to death. Compatibility of blood for transfusion is of vital importance. Blood typings of the donor and the recipient are determined in advance. Classification of blood groups depends upon the agglutination of erythrocytes ; the erythrocytes contain agglutinogens 'A and B' and 2 types of agglutinins "a and b" in plasma. Clumping together occurs when agglutinogens and the agglutinins of the same letters come into contact. The erythrocytes may be agglutinated only if 'A' agglutinogen interacts with 'a' agglutinin, or if 'B' agglutinogen interacts with 'b' agglutinin. The nomenclature by Landstener into 4 groups of O, A, B, and AB bears relationship to the agglutinogens present in the red cells.

The following table indicates the reactions which take place when the blood of different types are mixed.

Whole Blood	*AB group*	*A group*	*B group*	*O group*
1. AB group	O	X	X	X
2. A group	O	O	X	X
3. B group	O	X	O	X
4. O group	O	O	O	O

X indicates clumping ; O indicates compatibility.

It is clear from the above table that AB group can receive blood from all the groups and so are called "Universal Recipients", but can donate blood only to AB groups. A group can donate blood to A group and can receive from A and O groups. B group can donate blood to B groups and receive from B groups and O groups. O group can donate to any of the groups and so are called 'Universal Donors', but can receive only from O groups. The margin of safety is greater in transfusing blood of the same group.

The transfusion of the whole blood is indicated to restore or maintain the volume of blood in circulation ; to replenish the adequate percentage of hæmoglobin so that the oxygen carrying capacity for internal respiration is balanced ; and to promote or maintain the properties of coagulation of blood. Transfusion to replace blood lost as a result of injuries or surgery or other pathological conditions, is an ideal therapeutic measure. Plasma, though useful to combat shock, cannot fulfil the functions of carrying oxygen to tissue cells. The replacement of entire blood in infants struck with hæmolytic anæmia resulting from the incompati-

bility of their Rh-positive blood with that of mother's Rh-negative blood, brings often spectacular results. The availability of blood has made possible operative feats that were once considered almost impossible of performance.

Selection of healthy donors, who are free from blood-transmissible diseases, blood typing of the donor and the recipient, cross matching the cells of the donor with the serum of the recipient to rule out the possibility of agglutination microscopically, and to determine the presence of Rh factors, form the cardinal prerequisites of transfusion.

This vitally life-saving fluid has its hazards during transfusion and may prove a lethal therapy, if judicious and sustained care is not exercised. Hæmolytic, pyrogenic, anaphylactic and mechanical reactions are some of the untoward complications encountered during the transfusion.

Hæmolytic reaction, a dangerous sequel, is due to incompatibility of blood. On noticing the slightest reaction, transfusion should be discontinued immediately. The earliest warning symptoms are pre-cordial distress, lumbar pain with gradual increase of intensity, accelerated pulse rate with drop in blood pressure, elevation of temperature, hæmoglobinuria, increased bilirubin and icterus index, leucopænia, subsequent development of jaundice, shock followed by unconsciousness and sometimes death.

Rh factor plays an important role in reactions which occur in blood from the same group. It has been demonstrated that 85 per cent. of the population are Rh-positive. In 1940 Landstener and Wiener reported the discovery of a human blood factor which they termed "Rhesus" or Rh. The nomenclature bears its origin to the Rhesus monkey. When rabbits and guinea pigs were immunized with the blood from the Macacus Rhesus Monkey, an anti-serum was obtained which agglutinated the red blood cells of about 85 per cent. of the human blood samples. Therefore, when an Rh-negative individual is transfused with Rh-positive blood, anti-Rh antibodies are produced and, if repeated, Rh-positive blood is transfused, severe hæmolytic reactions may develop. Erythroblastosis fœtalis bears relationship to Rh factor when the infant is Rh-positive and the mother Rh-negative.

Pyrogenic reactions are caused by chemicals used in the blood for non-coagulation, improper methods of sterilization and handling of the transfusion sets. The sets should always be dismantled completely and washed well before boiling for 5 minutes in a solution of 1 per cent. sodium bicarbonate, then rinsed in distilled water and dry sterilized. Careful preparation of the skin with efficient antiseptic and puncturing the vein with all aseptic precautions, are important. Chills and moderately high fever are the symptoms of pyrogen reactions.

Anaphylatic reactions are usually due to the presence of allergens in the blood of the donor to which the recipient's blood may be hypersensitive. Urticaria and asthmatic symptoms are some of the common allergic manifestations. They are treated with adminis-

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