

# Some Practical Aspects of Blood Transfusion

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**T**HE history of blood transfusion dates from the seventeenth century. It was not, however, developed on a scientific basis until the discovery of blood groups by Dr. Karl Landsteiner, in 1900, and the transfusion of whole or citrated blood did not come into general use until about 1915.

Blood transfusion is the most effective and probably the only available procedure by which inevitable death from exsanguination can be prevented. It is indicated as a surgical measure whenever all or part of the elements of the blood tissue are needed and cannot be obtained in sufficient amounts from haematopoietic organs. These elements may be required (a) to replace loss of whole blood; (b) to increase coagulability; (c) to stimulate the hematopoietic organs or (d) to stimulate resistance to infection and various other toxic processes.

## Indications:

**Haemorrhage**—Severe haemorrhage is of course a specific indication for blood transfusion, and it is in such cases that the most brilliant results have been obtained. In postoperative or portpartum haemorrhage, in ruptured extrauterine pregnancy, in haemorrhage following abortions, in severe accidents, with loss of blood and with shock, and in haemorrhage from a gastric ulcer, transfusion is especially indicated and successful.

**Icterus**—Patients with obstruction of the common bile duct with long standing jaundice are extremely hazardous surgical risks due largely to the danger of haemorrhage. As a preoperative measure, a transfusion will materially lessen the risk of an operation.

**Haemophilia**—In this condition there is greatly delayed coagulation time, so that small abrasions may be followed by severe haemorrhage. Blood transfusion should be employed during the active stage of bleeding because in this way enough prothrombin may be supplied to produce the necessary clotting. At the same time the lost blood is being replaced by new blood elements.

**Haemophilia Neonatorum**—The real cause for this type of bleeding in infants is unknown. Whatever is lacking in the composition of the blood in these cases is supplied by the addition of whole blood. A single blood transfusion not only stops the bleeding immediately, but apparently cures the patient permanently.

**Preoperative Transfusion**—In weak, anaemic patients, preoperative transfusions are often indicated and will greatly increase their chances of recovery.

**Postoperative Transfusions**—When severe shock follows an operation either because there has been an abnormal loss of blood, or the operation has been unavoidably prolonged, or the surgeon has misjudged the pa-

tient's resistance to withstand that particular surgical procedure, a transfusion is indication. In chronic septic conditions, postoperative or otherwise, when the patient has reached a state of indifference and is not improving, or if so, only very slowly, transfusion is indicated and will often bring about remarkable results.

**Secondary Anemia**—In cases of persistent oozing of blood in small amounts from any part of the body, with a consequent drop in number of red blood cells blood transfusion has been found of great value.

There are several other indications for blood transfusions such as cases of pernicious anaemia, toxæmia, septicaemia, illuminating gas poisoning, infants with malnutrition, etc.

#### **Methods of Transfusion:**

There are three methods of transfusing blood. The direct or immediate, indirect or mediate and the non coagulant. The direct method is rarely used. Here the blood is transfused from one person to another without exposing it to the air. In the indirect method, the blood is collected from the donor in a long cylinder or syringes and injected immediately into the recipient. In the third method the blood is either defibrinated or citrated. In the defibrination method the blood is collected in a large beaker. It is kept stirred up until it is all collected and for four minutes afterward. Most of the fibrin collects on the stirring rod. The rest is removed by straining the blood through fine sterile gauze, before injection into the patient.

The citrated blood is the method generally adopted. The citrate does not alter the coagulation time of the blood in the recipient, it is non toxic, and it is easily excreted from the body. Usually 3% sodium citrate is placed in 50 cc. of distilled water and 450cc. of blood is then added making a solution of 500cc.

#### **Technique of Transfusion:**

The arms of both the donor and the recipient are prepared as for a surgical operation. An ordinary blood pressure apparatus is placed about the donor's arm and a pressure from 50-80mm of mercury is used. This makes an excellent constrictor and the pressure can be varied as desired. By this means the venous circulation is impeded, but not the arterial, making the entire arm a blood reservoir and increasing the pressure in the vein selected.

Separate sets of instruments are used in order not to transmit infections from patient to donor. Under local anesthesia, using one-half of one percent novocaine intradermally, the transfusion needle is injected into one of the branches of the basilic vein just below the elbow. A rubber tube about 8 inches long, which has been filled with some of the citrate solution is attached to the needle. The blood is allowed to flow freely into the beaker containing the citrate solution, with constant slow stirring of the mixture. The citrated blood is maintained at body temperature by keeping the beaker in warm water until it is transfused into the patient by means of the intravenous apparatus.

### Dangers of Blood Transfusions:

Transfusion of blood entails numerous dangers to the donor and recipient. To avoid these demands special precautions. We must particularly watch (a) that no diseases are transmitted; (b) that in bringing together the blood of the donor and of the recipient, neither haemolysis nor agglutination of the red blood corpuscles occurs; (c) that the blood does not coagulate; (d) that air and clot embolism and acute dilatation of the heart does not take place.

(a) In selecting a donor it is most important that an accurate record of the previous medical history be obtained. Also a complete physical examination should be made. If there is time, the result of a Wasserman reaction should be awaited. Young healthy adults are preferable as donors. These should not be chosen from persons giving a history of recent attack of typhoid fever, pneumonia, diphtheria, tonsillitis, malaria, syphilis, manifestations of hypersensitiveness, measles, smallpox or influenza, or from persons suffering from tuberculosis, chronic arthritis, or rheumatism or where there is a history of haemophilia. Sailors and others who have travelled in tropical countries should be avoided as donors unless there is time for a thorough study of each case. Donors should have normal blood, normal blood pressure and be free from neurotic tendencies. The average healthy young man may submit to transfusion of 500cc. of blood every six weeks for a year without material injury to his health provided he lives a healthy outdoor life.

(b) The blood serum of certain individuals agglutinates the corpuscles of other individuals in a very definite order. The serum of the recipient should never agglutinate the red corpuscles of the donor. It is the view of pathologists that no particular harm will result if the donor's serum agglutinates the cells of the recipient, since the serum is quickly diluted by the large volume of the recipient's blood. Clinically, however, it is found that too many reactions occur if bloods are not cross-matched. Only in great emergency should blood be used in which the donor's serum agglutinates the recipient's cells.

(c) In transfusion of the indirect method coagulation is prevented by the use of anticoagulants. As a rule, sodium citrate is used and it does not apparently affect the haemostatic efficacy of the transfused blood with the recipient.

(d) The danger of air and clot embolism can be avoided by proper care in carrying out the technique of the operation.

(e) Danger of acute dilatation of the heart can be prevented by injecting the blood slowly, especially in weak, anaemic patients.

### Effects and Reactions Following Transfusion:

The immediate effects of transfusion are usually striking. The red cell count is increased, often doubling immediately if the count is low. The haemoglobin percentage rises and the number of platelets increases.

After transfusion the patients immediately, as a rule, volunteer the information that they feel stimulated and much stronger than they felt

before. A few hours later they become ravenously hungry, while previously food had to be forced upon them. With improvement in appetite the mental symptoms become better, the insomnia is relieved and the glossitis clears up. The majority of patients do not experience any noticeable reaction whatsoever. In about 5% of cases a slight chill occurs, followed by a rise in temperature. In an additional 5% a mild temperature develops on the same evening or day following transfusion. This applies to transfusion in which the patient and donor are in the same group. In cases where a donor is from a different group than that of the recipient, the transfusion is usually followed by a marked chill and rise in temperature. A febrile reaction may also occur from a foreign protein in the blood of a non-fasting donor.

There seems to be an impression among some physicians that the procedure incident to blood transfusion is a minor operation. This indeed is unfortunate. The scientific administration of blood transfusion is one of the most highly technical procedures in medicine and surgery and should be so considered.

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Never believe what a patient tells you that his doctor has said.—*William Jenner.*

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It is best to attenuate the virulence of our adversaries with the chloroform of courtesy and flattery, much as bacteriologists disarm a pathogen by converting it into a vaccine.—*Raymon Y. Cajal.*

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Don't be faddy. This is the besetting sin of the specialist. He sees only what he has always seen and what he wants to see.—*Robert Hutchinson.*

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It is a wise man who knows his own business; and it is a wiser man who thoroughly attends to.—*H. L. Wayland.*

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Convalescence is a purification, a new birth. Never is life so sweet as after the pangs of physical suffering and never is the human soul so inclined toward purity and faith as after having had a glimpse into the abyss of death.—*D'Annunzio.*

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By examining the tongue of a patient physicians find out the disease of the body and philosophers the diseases of the mind.—*Justin.*