TRANSFUSION WITH STORED BLOOD

BY

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Although reports of the value of stored blood for transfusion purposes have been published recently by Biddle and Langley (1939), Elliott, Macfarlane, and Vaughan (1939), Vaughan (1939), and other writers, its widespread adoption has not yet followed. The advantages of a ready supply of stored blood are manifest and have been sufficiently emphasized by the authors I have named. From my own experience during the last twelve months I can echo their enthusiastic reports. There is, moreover, one advantage of stored over fresh blood to which, so far as I am aware, no reference has been made, and that is the diminished risk of transmitting syphilis. According to Neisser (1914) the *Treponema pallidum* loses its virulence after twenty hours in an ice-chest.

Collecting and Storing the Blood

Complicated and expensive apparatus is not needed for collecting or storing the blood. The one essential is that the blood should be withdrawn with every aseptic precaution into a closed bottle, and the purpose of this communication is to give my experience with sixty transfusions of stored blood at the General Hospital, Birmingham, using the method of collecting blood described by Marriott and Kekwick (1935). The donors were all members of the Birmingham Blood Transfusion Service, and were either Group II or Group IV (Moss). There is no need to enlarge on Marriott and Kekwick's method of bleeding donors, for they have described it fully. The blood is collected in a graduated quart milk bottle in which a negative pressure is maintained by means of a Dunlop foot-pump in which the valve has been reversed. If such a pump is not available a Potain's aspirator will serve the purpose. The average amount of blood collected from each donor was 600 c.cm., and this was mixed with 100 c.cm. of 3.8 per cent. sodium citrate solution.

After the blood had been collected the bottle was sealed with a plug of sterile cotton-wool round which a layer of gauze had been wrapped to prevent the wool from sticking to the neck of the bottle. A test tube with a few drops of the donor's blood in citrate solution for the cross-agglutination test between the donor's corpuscles and the recipient's serum was attached to the bottle with a rubber band. Finally the bottle was labelled with the date on which the blood had been taken and the group, and immediately conveyed to a refrigerator which maintained a temperature of about 4° C.

The Present Series

Fifty-three donors were bled and sixty transfusions given. In several cases two transfusions were given from blood collected from one donor. One bottle was discarded on account of excessive haemolysis. The average length of time the blood was kept before it was used was 5.5 days. The longest period was twenty-eight days, and no reaction followed the transfusion of this blood. The average length of time the blood had been kept in those cases showing reactions was four days. The blood was given by the gravity method, and in one case by means of Marriott and Kekwick's drip-transfusion apparatus.

Reactions

Reactions were observed in twelve cases, as follows: severe rigors, one case; slight rigor or shivering attack, eight cases; pyrexia, three cases. There were no instances of jaundice or haemoglobinuria. The reactions were equally divided among the patients of Group II and Group IV. In four of these cases it is not improbable that other factors besides the blood were responsible.

Case 1.—A patient with microcytic anaemia developed a slight rigor eleven hours after the transfusion.

Case 2.—A man who had been transfused after a perineo-abdominal excision of the rectum developed a rigor, but at the time of the rigor was actually on an intravenous glucose "drip."

Case 3.—A man with a bleeding peptic ulcer showed a rise in temperature to 101° twelve hours after transfusion.

Case 4.—A boy of 15 with leukaemia developed a temperature of 101.4° after transfusion.

In the last case the blood had been transfused a few hours after it had been taken. Blood from the same bottle was given three days later to another patient without any reaction developing. In the last two of these cases it is just as likely that the rise of temperature was a natural feature of the disease as that it was an effect of the transfusion. If these two be excluded from the twelve cases which showed a reaction we are left with ten, giving a reaction rate of 16.6 per cent. This rate is almost identical with that found by Vaughan (1939) in fifty consecutive transfusions with stored blood at the British Postgraduate Medical School. Although I have no figures for comparison I have an impression that this reaction rate is no higher than after the transfusion of fresh blood, and the various ward sisters are of the same opinion.

Haemolysis which is apparent to the naked eye usually starts after the blood has been stored from ten to fourteen days, but may appear much earlier if there has been difficulty in securing a rapid even flow from the donor, if clot is present, or if the blood has been taken out of the refrigerator and allowed to get warm in anticipation of a transfusion and then returned to the refrigerator. Blood in which the supernatant plasma has turned red should be discarded, and, as stated, one bottle was discarded for this reason; but a slight degree of haemolysis does not appear to give rise to any unpleasant sequelae. Routine bacteriological tests were not carried out, but occasional samples were cultured and were always found free from microbic contamination.

It is my pleasure to express thanks to the medical and surgical staffs of the General Hospital, Birmingham, for free access to their cases, and to Dr. W. T. Hillier for the bacteriological examinations and much friendly advice. I owe a special debt of gratitude to numerous donors and to Mr. H. E. Cooper, the honorary secretary of the Birmingham Transfusion Service. His friendly co-operation made this work possible.

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