TRANSFUSION HISTORY

Author: Prof. Fred Stratton
Article originally published in *Newsletter* Number 7 (August 1985)

JAMES BLUNDELL (1790-1877) worked in London on Blood Transfusion in the 1820s and was the first man in the U.K. to recognise the necessity of using human blood for transfusion purposes. He also invented equipment for the collection and transfusion of blood but, subsequently, others continued to use animal blood for transfusion purposes. One of the characteristics of advances in blood transfusion throughout the years has been that important developments have remained neglected or ignored for long periods of time, as was the work of this pioneer in those far off days.

James Blundell, and particularly his successors, had two major problems. The first was that blood very readily clotted and you won't be surprised to learn, therefore, that he used his assistants as blood donors. The second, of course, was the occurrence of unpleasant reactions and even death following human transfusion. It was not until the turn of the century that Landsteiner discovered the ABO blood group system, but again, it took at least ten years for Landsteiner's discoveries to be fully appreciated. The clotting problem was not solved until citrate was used as an anticoagulant by a number of workers around 1914, but it was Lewishon, a New York surgeon, who studied the matter thoroughly and showed that large quantities of citrated blood could be used and, indeed, to some extent this concept was implemented in the First World War. I had the privilege of meeting Dr. Lewishon on a very early visit I made to the United States and he explained to me how he had used citrate as an anticoagulant. Rous and Turner in 1916 described the value of glucose added to citrate solution for the collection and preservation of blood. They used animal blood but could preserve it for fourteen days under refrigeration. Robertson, a Canadian Army Officer, used a citrate glucose solution for collecting and transfusing blood in 1918 and kept it in an ice box for ten days or more. The remarkable thing about this development was that it remained largely neglected for about twenty years. Even at the outbreak of the second World War, when I first entered the Blood Transfusion Service, people began collecting blood in trisodium citrate solutions alone, but in Manchester we started with trisodium citrate and glucose.

It was 1937 before Dr. Fantus set up the first Blood Bank at the Cook County Hospital in Chicago. The idea of a Blood Bank was a good one but banking is not very effective when the storage time of blood is short and trisodium citrate glucose solutions only permitted the storage of blood for a relatively short time. It was 1943 before the major break-through occurred with the description by Loutit and Mollison of their ACD solution. This development had a particular impact on Blood Banking procedures because blood could be stored for twenty-one days, enabling a substantial Blood Bank to be created. ACD, incidentally, had another advantage because when this mixture was autoclaved, caramelisation did not occur. In fact, the ACD solution was so good and so widely used, not only in the United Kingdom but eventually throughout the world, that it was a very long time before improved anticoagulants for longer blood storage were put into use.

In the early days of transfusion practice, serology consisted in detecting the ABO blood groups by saline agglutination tests. It was due to the untiring efforts of Taylor, Race and workers in the M.R.C. Unit in Cambridge that the problems of ABO grouping were solved. Accurate grouping became possible and antisera were made available. The discovery of the Rh factor provided a shock to conventional serology of that time. It created new serological problems in that many antibodies could not, in the first instance, be readily detected because they were incomplete antibodies which defied detection by direct saline aggutination techniques. A number of new tests were therefore devised to enable incomplete antibodies to be detected and of these,

the most important were the albumin test developed in 1945 by Diamond and Denton in Boston, U.S.A., and that most formidable of all serological tests, the antiglobulin or Coombs' test, described in 1946 by Coombs, Mourant and Race. A further test, described about this time by Morton and Pickles in Oxford, demonstrated the value of red cells treated with trypsin for the detection of incomplete antibodies. The emergence of these exciting developments coincided with my appointment as Director of the North West Regional Transfusion Centre in Manchester in 1946. Transfusion workers at this time were busy implementing these tests, not only in routine procedures, but in research work as well. It was the discovery of such tests that enabled all the major blood group systems, from the Kell blood group system onwards, to be detected and the hazards of haemolytic transfusion reactions due to incompatibility to be largely eliminated.

There remained, however, that other hazard - blood infection. Sterility had to be achieved. The glass bottle with the rubber tubing subsequently changed to disposable plastic tubing was a hazard, not only because of the difficulties of cleaning the apparatus but also because it was a discontinuous system and there was always the chance of contamination occurring. However, in the U.K. in general, the techniques employed and the control tests that were undertaken were very successful in ensuring that contamination of the blood was an extremely rare event. Nevertheless, the advent of the plastic bag was a major step forward because, not only does it use a continuous system, unlike the bottle and taking set, but it also enables blood components to be made without risk of contamination. Although the United Kingdom was perhaps rather slow to adopt plastic bags universally, their gradual introduction coincided with new ideas on the use of blood components and the two came together very well.

In the early days, after the end of the second World War, it was the serological difficulties that people concentrated on most because these were the problems that really had to be solved as transfusion became more frequent. With the advent of plastic bags and the increasing emphasis on the preparation of blood components, transfusionists were once again turning their attention to achieving effective and more prolonged storage of red cells and components, such as platelets. Thus, immense advances have been made since the days when I first started transfusion work.

In the past, many medical, scientific and technological inventions have provided new ideas and new advances in Blood Transfusion practice and so it will be in the future. We are particularly fortunate, now, to have the British Blood Transfusion Society providing a forum for workers to communicate their new ideas and give the members the opportunity of discussing these, evaluating and implementing them, if they wish to do so. This, I think, will certainly speed up the adoption of worthwhile practices in Blood Transfusion. The Society, as a result of its award lectures, also offers members the chance to hear the latest work in a particular field.

The opportunity for the development of the Society is now greater than it ever was because we are moving into the era of Blood Transfusion Medicine and Science which will become specialties in their own right, it they are not already so. The Society will play a major role in seeing that this is achieved.