department of health, organisations were established for the collection of donor blood in very large quantities. The War Office appointed Col. Whitby to undertake the work at Bristol, and a very large depot was established there with a list of 30,000 donors available. Certain intrepid young ladies flew the blood across the Channel to the various hospitals in France. Large shipments were also made to Norway during that campaign. This depot was also available for military hospitals in England, although in practice during the winter and spring most of them had a list of donors available locally. In spite of the greatest care, with the inevitable delays of military movement, consignments of blood occasionally deteriorated and were useless on arrival. Reactions occurred when the blood was kept beyond four or five days. In the meantime many workers on shock had shown that the red cells were not a necessary adjunct to the intravenous fluids which were given to combat this condition, whether it be the shock associated with hæmorrhage or otherwise. The important factors are fluid and proteins.

A worker in London has just published a method of defibrinating the plasma by the addition of calcium and the production of a serum. All this developed naturally out of the previous organisation for blood banks. Blood serum has all the merits of whole blood or plasma in the treatment of shock. It has many advantages. With the separation of the erythrocytes the various types may be pooled and the resultant mixture given to a patient without the delay of typing. It contains no citrate or other chemical agent. Its preparation requires the minimum of handling. It can be concentrated either in liquid form or dried to a powder. It can be kept indefinitely (within months at least) at ordinary room temperatures. There are no transportation problems. Blood serum is being concentrated in Toronto in the Department of Hygiene under the direction of the Professor of Physiology and is available to military hospitals throughout Canada.

Closed Treatment: Having done what is necessary to prevent infection generally and to combat shock, the surgeon still has a grave responsibility for the local treatment of wounds. The man's life will depend on the capabilities and judgment of the surgeon who is responsible for the initial treatment. Professor Trueta, of Barcelona, during the Spanish Civil War elaborated and expanded certain principles of treatment announced by Carrel, Dakin, and Winnett Orr in the Great War. He found that this routine, as well as being convenient in a war which involved large centres of civilian population, cut down the mortality from infection. His results, as published in a short treatise in English in 1939, were astounding. So astounding, indeed, that surgeons throughout the world said that the soil of Spain and the climate of Spain must be different, that there were no streptococci or gas organisms there.

I have had an opportunity to discuss this subject with Trueta. He assured me that in the early stages of the war he unfortunately saw many cases of gas-gangrene and severe streptococcal infection. He is a man of the highest integrity. Since working in Oxford, as he has done after being outlawed from fascist Spain, he has convinced his associates of the value of the closed treatment. Briefly, this means debridement followed by immobilization. He does a most meticulous debridement of the wound. This frequently means in bomb wounds that the area must be opened up widely and that all devitalised tissue is cut away. Only in the smaller and more recent wounds is the skin closed. In the great majority of serious war wounds they are left open and the cavity filled with plain sterile gauze or a lightly coated vaseline pack. The whole limb is then included in a plaster cast, including the joints above and below the area, thus ensuring perfect immobilisation. The wound is not inspected for at least ten days and sometimes thirty days. The removal of the plaster, which in the meantime has developed an offensive odour, shows a non-œdematous granulating surface. The whole area is cleansed and the plaster is renewed. The initial operative procedure is followed as a rule by three or four days of fever, but the patients are comfortable and can be transported from the area of immediate danger within a very short time.

Girdlestone and Seddon of Oxford, with whom Trueta is now working, have become enthusiastic, and indeed, all over England so important has plaster become in wound treatment that special manuals and articles are appearing on the training of plaster teams and the economical and careful use of plaster generally. It has even been suggested that dentists might forsake their ministrations to the mouth and in air-raid crises become plaster specialists. Trueta describes the treatment of 1,200 cases of wounds and compound fractures in the Spanish war with a mortality of under 1 per cent.

What are the foundations of scientific fact on which his treatment depends? It has been repeatedly proved and reported that the removal of dead tissue is the best and indeed the only effective prophylaxis against gas gangrene. He insists on accurate debridement. Experimentally it has been shown that organisms from a wound may be absorbed rapidly and disseminated by way of the lymphatic system to the neighbouring lymph glands and even to the spleen within ten minutes. Experimentally, the flow of lymph in an extremity varies greatly. With an animal's limb at rest it is difficult to extract lymph. Movement or massage for even a few moments accelerates the flow of lymph tremendously. This is attended by an increase in the speed of movement of particles and colloid substances through the tissues. Trueta notes that after each change of plaster there is usually a day or so of pyrexia. Nature can best provide defence locally against infection when the whole limb is at rest. This is the keystone of his treatment.

The closed treatment, aside from affording the best insurance against serious infection is, of course, of immense value in a war such as the present one. Casualties occurring in a metropolitan area may be treated with the minimum delay in the centres set up in existing large hospitals. Once debrided and plastered, fractures may be transported safely within a few days to the parent or base hospital beyond the area under attack. In civilian practice it may well be that compound fractures could be saved many weeks of hospitalisation and tiresome dressings.

It is apparent that the medical services are playing a most important role in the great struggle. Unlike the other branches of the service, we can so far learn little

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