A CASE OF AGRANULOCYTOSIS IN AN INFANT: RECOVERY

BY

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The following case appears to warrant record because of its severity and the part played by blood transfusion and pentnucleotide in recovery.

Case Report

A girl aged 1 year and 11 months was admitted to hospital on November 16, 1940, obviously very ill. Dr. J. S. Topping, her doctor, gives the following account of her illness.

She was seen first on October 25, 1940. She was pale, seemed ill, and would not put any weight on the left leg: she appeared to have pain in the left knee. She was put to bed, the left leg was wrapped in wool, and she was given $7\frac{1}{2}$ grains of sodium salicylate with 15 grains of sodium bicarbonate every four hours. On October 28 the temperature was 100° and the pulse 90, and she seemed better. Up to November 1 the temperature and pulse remained the same, but the leg was better and she could stand on it. On November 4 she began to have bouts of crying and kept putting her hand to her right ear; there was some congestion of the fauces and the right ear-drum was inflamed. The temperature was 101° and the pulse 100. For the next few days the bouts continued, and she was seen by an aural surgeon, Mr. J. J. Rainforth, who reported that there was no evidence of mastoiditis and advised sulphapyridine (M & B 693). During the whole of this part of the illness no other physical signs of disease were observed; in particular there was no enlargement of glands nor was the spleen to be felt. On November 11 she was given 0.125 gramme of sulphapyridine twice a day, and this was continued for five days, making a total of $1\frac{1}{2}$ grammes. The ear symptoms ceased, but she seemed so ill that she was sent to hospital.

On admission she was profoundly anaemic. Examination of the blood showed only 930,000 red cells per c.mm., and the haemoglobin was down to 18%. White cells were 12,000 per c.mm., with a differential count showing 5% large lymphocytes, 2% lymphoblasts, 93% small lymphocytes; no granulocytes could be found. She was poorly nourished, but apart from the extreme anaemia there was no evidence of disease in any organs. There was no ulceration of the mouth, fauces, or tonsils; neither the spleen nor the glands were enlarged, nor were they ever found to be enlarged during the whole course of her illness. The temperature for the first four days after admission ranged between 101° and normal; after then it ranged between 103° and 100° from November 20 to December 3, when it subsided by lysis and was normal on December 9. There was no obvious cause for the fever except the septic condition in the arms, at the sites of the blood transfusions. At one time there was a little bronchitis. The pulse ranged between 135 and 155.

On November 19 the patient received a transfusion of 500 c.cm. of citrated blood by the drip method and an intramuscular injection of 5 c.cm. of pentnucleotide. Her general condition improved immensely almost at once, but no granulocytes were to be found in the blood. The pentnucleotide was given twice a day for the following ten days and she had a further blood transfusion of 250 c.cm. on November 24.

The accompanying graph is a record of the blood picture from November 18, 1940, to January 22, 1941. It shows the rapid rise in the red cells and haemoglobin after the first blood transfusion. From November 18 to 25, after prolonged search, but not a single polymorph could be found in the blood films, although the pentnucleotide was being given regularly; and it was not until fourteen doses had been taken that any appeared, and then there was a rapid rise to 40% fourteen days after the pentnucleotide had been begun. This rise steadily continued until a maximum of 83% was reached on December 17; after that there was a decline to normal. The number of white cells showed a remarkable fluctuation: from 12,000 on admission they fell rapidly to as low as 1,000 seven days later, after which they rose steadily to 12,000 by December 12; and, later, two counts of 20,000 and 24,000 were registered when sepsis was most marked in the transfusion wounds.

The general appearance of the child was remarkably improved after the first transfusion; but for a month she was listless and fretful, was difficult to feed, and showed a pronounced hypotonia. The sites of transfusion at the elbows became septic and sloughs appeared, and there was a complete agranulocytosis. The outlook seemed grave, but as soon as polymorphs began to be present the wounds became more healthy and slowly healed. A week after the second transfusion she became slightly jaundiced, but this cleared up in five days. In the beginning of January an indurated swelling appeared in the right buttock at the site of one of the injections of pentnucleotide; this was absorbed in ten days. During the last three weeks in hospital she steadily improved, and eventually could run about, took food well, and was happy and contented. A short course of light treatment seemed to help. She was discharged from hospital on February 1.

Commentary

At first the blood picture seemed to suggest an aleukemic lymphatic leukaemia, but the progress of the case negated any form of leukaemia. For several days, in spite of the most careful search, not a granulocyte could be found, and yet there were never any signs of throat infection. There is evidence that the child was anaemic before the sulphapyridine was given, and this condition, with a possible idiosyncrasy for the drug, may have so poisoned the marrow that it failed to produce any granulocytes. When the wounds at the elbows became septic it was feared that the infection would spread owing to lack of resistance. It was most noticeable how quickly the sores began to heal as soon as the polymorphs appeared. It is to be noted that after the transfusion the number of

red cells and the percentage of haemoglobin greatly increased, but there was no improvement in the white cell count—rather the reverse. Another point to note is that the pentnucleotide was given for eight days before the polymorphs began to appear.

I am indebted to Mr. W. Chandler for the very careful blood counts.

Clinical Memoranda

Fatal Case of Burns Complicated by Gas Gangrene and Acute Duodenal Ulceration

The occurrence of two of the rarer complications of burns in the following case makes it worthy of note.

CASE RECORD

A man aged 60 incurred extensive third- and fourth-degree burns of the left leg and thigh owing to the scattering of the coals from his grate through a bomb explosion. The burns were cleansed under general anaesthesia, and tannic acid was applied. Two days later he was transferred to an emergency hospital. On the fourth day the general and local condition were satisfactory. At 11 a.m. on the fifth day gas and fluid were present in the calf of the leg. The pulse was 100 and the temperature 99°. One gramme of sulphapyridine (M & B 693) was injected intravenously. By 2 p.m., the time arranged for operation, the gas had spread to the mid-thigh. All muscle groups were invaded. A circular amputation 4 inches below the hip-joint was performed and the stump was covered with sulphanilamide powder. A further 1 gramme of sulphapyridine was injected intravenously. From the fifth to the eleventh day the patient was given 15 grammes of sulphapyridine orally and 5 grammes of prontosil album, the latter preparation being retained after the former had caused vomiting. 7.2 c.cm. of anti-gas-gangrene serum was also given. On the twelfth day his general condition was fair. The temperature was normal and the pulse 80. The stump was fairly clean, and there was no gas in the limb. Severe melæna developed on the sixteenth day and continued until his death nineteen days after the burns were incurred. Repeated blood transfusions had been given.

Swabs and a portion of muscle were examined on the day of operation. A film showed debris and Gram-positive bacilli. Anaerobic culture revealed large Gram-positive bacilli with subterminal spores and *B. pyocyaneus*, and demonstrated Gram-positive bacilli forming a stormy clot in milk—? *B. welchii*.

At necropsy an ulcer the size of a shilling was seen on the anterior wall of the first part of the duodenum. The second and third portions were moderately injected. There was old blood clot in the bowel. The stump was clean. There were no other pathological changes.

Microscopical examination revealed disintegrating mucosa. The surface epithelium had been shed, but glands were present in the submucosa. On the surface there was a suggestion of a serous exudate, with some round-celled infiltration. No evidence of fibrous tissue formation was observed, nor was there any other sign of chronic inflammation. The general appearances suggested some acute necrotic process.

This case and a similar one occurring previously have impressed upon me the importance of examining all cases of burns daily for gas infection. The rapidity of spread in the subcutaneous tissue—about eighteen inches in three hours—is remarkable. Whether the same rate of spread occurred in the muscles it is more difficult to assess.

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Reviews

OFFICIAL HISTORY OF THE A.A.M.S.

The Australian Army Medical Services in the War of 1914-18. Vol. II. The Official History of the Australian Army Medical Service in the War 1914-18. The Western Front. By Colonel A. G. Butler, D.S.O., V.D., M.B., Ch.B. (Pp. 1,010; 212 illustrations, maps and graphs. 21s.) Canberra: Australian War Memorial. 1940.

The second volume of the story of the services of the A.A.M.C. in the last war is a worthy successor of the former one, which received our favourable comments. Colonel A. G. Butler, the editor, has taken a liberal view of his functions and has again given a fascinating story of the relation of the medical services to the fighting, this time on the Western Front, from the arrival of the Australians early in 1916, when the line had become fixed and trench warfare extended from the Belgian coast to the Swiss border, through the stage of attrition when heavy losses were suffered and a great number of casualties were caused by the attempts to batter the opposing lines, to the terminal war of movement, attack and counter-attack, which ended in the defeat of the German armies. The narrative chapters are followed by considerations of the special medical problems involved in each of these phases, and the administrative problems of the treatment and evacuation of lightly and severely wounded from France to the advanced base in the United Kingdom and ultimately to Australia. Changing problems required changed methods of tackling them, and high praise is given to the first Director of Australian Medical Services, Sir Neville Howse, and his staff for the way in which these problems were successfully solved. Details of surgical and medical treatment are naturally omitted, but a full discussion of the machinery of prevention of disease is given.

Colonel Butler is well qualified for the task he has carried through so successfully, because he saw service in the field as regimental medical officer, as commanding officer of a field ambulance, and as a member of the Corps staff. He has drawn his material from many sources, ranging from personal diaries and letters, written while the events described were shaping themselves, to the official medical histories of our allies and our enemies. The extracts made are apposite, illuminating the point under discussion, never redundant, and under the editor's skilled hand fitting aptly into the picture. It is interesting to trace the evolution of methods of evacuating the wounded under varying conditions of fighting on the Western Front and as experience grew. In this connexion reference is made to the distinguished service of Major-General G. W. Barber, D.D.M.S., Australian Corps, and his standing orders for the A.A.M.C. under his command are set out in full in an appendix. A special problem was that Great Britain was really an advanced base, and full tribute is paid to the work of Colonel D. M. McWhae in organizing the A.I.F. depots in the United Kingdom and dealing with the ultimate return of sick and wounded men to Australia. Throughout the volume the name of Sir Neville Howse recurs constantly, and the last chapter deals with the personality, policy, and outlook of the D.M.S., A.I.F., who wielded such power in the Australian Medical Services. It is a shrewd and well-informed appreciation of a great Australian.

Colonel Butler has produced a treatise rather than a history, and is to be congratulated on a valuable contribution to medical war literature of interest to many outside Australia. The print is clear, the illustrations (photographs, maps, diagrams, and sketches) are well chosen and