Clinical Department.

A SEVERE CASE OF GAS BACILLUS INFECTION WITH RECOVERY.

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GAS bacillus infection has for a number of years been a well defined surgical entity, but the war has shown us this type of infection in a far more realistic way. For this reason we should be more on the alert to detect its presence, and get ahead of it if possible; or at least treat the accompanying toxemia with more understanding. As gas gangrene is noted as a complication of wounds seen in civil practice, both in the city and country, it should interest everyone alike.

On the night of October 19, 1919, Mr. B. was admitted to the hospital on the service of Dr. B. H. Alton, with a diagnosis of gunshot wound of left leg. That afternoon, while hunting, he had dropped his gun, the hammer striking the running board of the automobile and the charge from a 16-gauge shell entered his left leg below the knee. Within the hour he had medical attention; the hemorrhage, which was severe, was controlled by a tourniquet. He was sent to the hospital, and in so doing, had to travel about 50 miles in an open machine.

Examination showed a man 33 years of age, well developed and nourished, but in a severe state of shock. His temperature was subnormal, pulse 132, respirations 30, and blood pressure low. In addition he was very cold; due to the exposure. He was warmed up by the application of heaters and blankets; stimulants, as caffeine, camphor and oil, and strychnia were given, and the severe pain eased with morphia. Antitetanic serum 3000 units also was given intramuscularly at this time.

The affected leg showed a ragged wound of entrance on the inner aspect of the upper third of the tibia. No wound of exit was found although a small hematoma in the popliteal space showed the position of the retained charge. Powder marks covered the upper leg, and the tibia was badly comminuted. Complete anesthesia existed below the knee, and no pulse could be made out in the dorsalis pedis or posterior tibial arteries.

At this stage the patient had not reacted enough to warrant any surgical procedure, so he was given 1500 cc. of normal saline containing 2% sodium bicarbonate by vein.

This treatment brought about a fair degree of reaction. Advantage was taken of this, and the leg prepared for operation with benzine and iodine. Light ether anesthesia was given, and a debridement was done, beginning at the wound of entrance. Loose fragments of bone were removed, damaged tissue excised, and the track of the charge cleaned to the popliteal space. A large amount of shot, wadding, and bits of the patient's clothes were removed.

A counter incision was made over the popliteal space and the hematoma turned out. The end of the track lay between the two heads of the gastrocnemius muscle, and at that point the popliteal artery and vein were found to be completely severed. The artery and vein were tied above and below, all damaged tissue excised, and the track packed with gauze soaked with Dichloramine-T 5%. The leg was immobilized on a long posterior wire splint, and the patient sent to the ward in fair condition.

The patient's condition remained about the same for eight hours after operation. The temperature was then 103°, pulse 130, and the typical appearance of shock again manifested itself. In addition he showed evidence of sepsis, with occasional periods of delirium. His skin was rather yellowish, suggesting hemolysis.

He was removed to the operating room and under local anesthesia given 825 cc. of fresh blood, paraffined tubes being used. Following this, signs of shock rapidly diminished and the color improved, although toxemia persisted.

His condition remained the same until the evening of the 20th, about 24 hours after admission, when his temperature rose to 104°, and symptoms of severe toxemia prevailed. He was delirious almost constantly. The dressing was not taken down at that time because of the patient's poor condition.

The lower limb, however, was devoid of circulation, and amputation was planned for the following morning. Another suitable donor was procured, and about 36 hours after admission he was again etherized. At that time the patient had to be restrained, and was in very poor condition.

On removal of the dressing the affected limb was found to be grossly infected with a gas

forming organism. Well defined crepitus was elicited below the knee, with discoloration on the inner surface of the thigh, extending to the perineum. The wounds discharged a thin brownish fluid with a distinct gassy odor.

The case appeared hopeless, but to give the man the benefit of the doubt, a guillotine amputation was done about mid-thigh, with preservation of skin-flaps. Dichloramine-T dressings were applied to the raw surface. During the operation 800 cc. of fresh blood was given as described above, followed by 1500 cc. of normal saline containing 2% sodium bicarbonate.

Following this treatment the patient improved. He began taking fluids by mouth, and retained Murphy drip, containing 5% sodium bicarbonate. Within 10 hours he was again rational, and the infection had not progressed. A dressing was done and Dakin's solution substituted for the Dichloramine-T. Six perforated tubes were used and the instillations given hourly. From then on, the patient rapidly improved. Evidence of infection about the perineum and upper thigh disappeared. The stump granulated in well without infection of the end of the femur. As soon as the count was low enough, secondary suture was done under gas oxygen anesthesia. The result was excellent. At the present time the patient is ready for discharge.

In summarizing this case, we are interested in noting that we have a patient who, having received a gunshot wound, develops gas gangrene up to his perineum and groin within 36 hours. A type rapid in its advance, and yet controlled by amputation through, and not above, the active process. A case so far advanced as this would have been considered hopeless in France, and relatively few recovered, even when the most radical measures were employed.

It is difficult to explain this unless we can say that the organisms found in this country are less virulent than those obtained from the much worked over soil of Europe. Or, again, symbiosis may take a part. In the above case the bacillus was grown together with a slight growth of staphylococcus aureus. Had there been streptococcus present, there might have been a different outcome, for it was well recognized that those cases of gas bacillus infection seen abroad

where streptococcus, especially the hemolytic type, was found, the prognosis always was very bad. This was explained by the fact that the streptococcus aided the growth and progress of the gas-forming organisms, or vice versa; or the combined toxins of the two strains were too much for the patient's powers of resistance.

The treatment consisted of giving blood to replace blood lost and to raise resistance. Sodium bicarbonate solution was used to dilute toxins and to hasten the elimination of acid bodies. Heat is always essential in cases of shock.

The use of Dichloramine-T and Dakin's solution with final secondary suture, is but the outgrowth of the war. It has, and I hope it will continue to have, a place in civil practice in certain types of cases.

In conclusion I might say that, had a lower third amputation been done on admission, gas infection might not have manifested itself. However, it was hoped that the anastomosis would take care of a portion of the upper part of the leg, thus giving a more useful limb, as the knee-joint was unimpaired.

I desire to thank Dr. Alton for the privilege of reporting this case.

Book Review.

War Wounds of the Lungs: Notes on their Surgical Treatment at the Front: By PIERRE DUVAL: With 27 plates and illustrations. Authorized English translation. New York. William Wood and Company. 1918.

Duval presents a small book, less than one hundred pages, well printed and exceptionally well illustrated. He advances the theory that "Surgery of the lung takes its place amongst the recognized procedures of general surgery; and that the surgery of gunshot wounds of the lung must be governed by the principles of surgery as applied to any other gunshot wound; that is to say, removal of all foreign bodies (metal fragments, splinters of bone, pieces of clothing), excision of the wound, and complete suture." This, he says, is revolutionary, but it does not seem to be quite so revolutionary as he at first suggests, since there are a considerable number of contraindications for operation. He believes it better not to administer a general anesthetic, local or regional being preferable.