GAS BACILLUS INFECTION—A REPORT OF SIX CASES *

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There has recently appeared in the *Annals of Surgery*¹ a comprehensive report by Dr. Cramp of this hospital on this type of infection, therefore, it will be unnecessary to go into detail in regard to the history of the cases previously reported. Of the two deaths in this series, one was caused by a deep infection of the thigh muscles complicated by considerable hemorrhage; the other was that of a patient admitted in an advanced stage, though the infection was controlled before the patient succumbed to a pulmonary disease.

That an infection of this type in a localized area can be overcome by the body tissues, as in the untreated interscapular area in Case 2, is a fact already proved by Blake and Lahey.² The hydrogen peroxid used in these cases was the undiluted U. S. P. 3 per cent. solution.

CASE 1.—W. D., aged 17, was admitted June 18, 1912, to the service of Dr. L. W. Hotchkiss. June 17, the patient fell from a height of five stories sustaining a compound fracture of the right tibia and fracture of the fibula. The wound was dressed and splints applied at another hospital and the patient was transferred to Bellevue the next day.

June 18: Temperature was 103; pulse 132; respirations 28. Physical examination was negative except for a compound fracture of the right tibia about 5 inches above the ankle; the fibula was fractured at about the same level. The wound was dressed with 7.5 per cent. solution of tincture of iodine and splints applied.

June 20: Temperature still elevated to about 103. Interstitial crepitus has become evident about the wound and extends upward toward the knee; leg very painful. Under nitrous oxid anesthesia, free longitudinal incisions were made in the crepitant tissue, gas bubbles of characteristic odor and dark red fluid exuding from the wounds. A thorough hydrogen peroxid irrigation was made and a dressing of peroxid-soaked gauze was applied. Both smear and culture from the fluid showed the *Bacillus aerogenes capsulatus*.

For the next two weeks the temperature fluctuated between 101 and 105 daily, and the patient had chills almost every day. Complete dressing was made but once a day, being so painful that on each occasion nitrous oxid had to be administered. Throughout the day the dressings were kept moist with peroxid. There was no extension of crepitus following the primary operation, and the wounds, though sloughy, and at first, giving off a disagreeable odor, gradually became clean and healed by granulation. There was severe persistent pain which at times could be relieved only by morphin.

The progress of the patient, except for a small superficial abscess on the back, which yielded quickly to treatment, was very good, and on August 18 the wounds were sufficiently healed to permit the leg to be encased in a plaster splint in which a window was cut to allow a discharging sinus to be dressed. On September 12 a painless swelling appeared in the lumbar region which when opened contained clear fluid showing, on culture, colon bacillus infection. On September 15 a small sequestrum was removed from the discharging sinus on the leg. By this time the temperature of the patient had become normal. Radiographic examination on October 1 showed osteomyelitis of the tibia about the seat of fracture with the presence of a sequestrum, but further operation at this time was considered inadvisable. Three weeks later, the patient, at his own request was discharged in care of his relatives for further treatment in the country. A report of this case made some five months later by Dr. E. M. Armstrong of Tuxedo, New York, shows a small sinus leading down to the bone and incomplete union at the site of the fracture.

CASE 2.—J. S., aged 29, admitted July 1, 1912, to another division of this hospital, had sustained, about half an hour prior to admission, a compound fracture in the upper third of the left humerus, caused by a blow from a paving-stone thrown from a height of five stories, the force of the blow felling him. On admission the wound was swabbed out with 7.5 per cent. solution tincture iodine and dressed with gauze soaked in 50 per cent. alcohol and splints were applied. Pulse in left wrist palpable. Temperature 97; pulse 65; respirations 20.

July 3: Temperature rose steadily yesterday afternoon, rising to 102.4 to-day; pulse 130, respirations 34. Interstitial crepitus found to be present about wound in arm and spreading across to midline anteriorly.

The operation under ether anesthesia in another surgical division of this hospital was a free incision in the deltoid as well as below the seat of fracture and in the anterior axillary fold. All incisions were connected and irrigated with hydrogen peroxid; drainage was by rubber tubing, the dressing of peroxid-soaked gauze. A thin dark red fluid containing gas bubbles which was obtained from the wounds showed the presence of the *B. aerogenes capsulatus*.

The case was transferred to the service of Dr. Hooker.³ By 10 p. m., the same day the condition had become progressively worse, the patient being very weak and toxic. The interstitial emphysema extended across the breast to the right axilla and upward over the right clavicle to the supraclavicular fossa. In the neck the crepitus extended across the midline anteriorly and upward on each side to the level of the thyroid cartilage, and within 2 inches of the midline posteriorly; the lower limit of the crepitus was found in the fifth interspace at the sternum. The left wrist was pulseless. Under a general anesthetic very free incisions were made in the right breast and on each side of the neck, and blunt dissection was carried out widely through the crepitant tissue. Thorough peroxid irrigation and dressing of peroxid-soaked gauze was made. Dressings were changed every three hours and kept moist with peroxid.

July 4: Temperature 99.8; pulse 120; respirations 26. Patient weak and apprehensive; profuse sweating. No extension of crepitus beyond limits noted yesterday except a small isolated patch about 3 cm. in diameter high up between the scapulae. This was not opened. The left arm below the fracture was pulseless and becoming gangrenous.

July 6: Temperature 100; pulse 104; respirations 26. General condition improving slowly though patient shows signs of absorption from the gangrenous arm, in which the line of demarcation is forming. Interstitial crepitus is subsiding; the interscapular area has practically subsided without being opened.

July 8: The general condition is improving. Amputation of the left arm was done at the line of demarcation; the stump was left open and packed with peroxid-soaked gauze. The condition in neck and breast is improving.

The subsequent progress was very good; a localized furunculosis developed over the sacrum, but responded readily to incision and drainage. Except for a slight pocketing of pus in one of the wounds, those of the body and neck healed well by granulation. On July 12 some sloughs from the amputation stump still showed the presence of *B. aerogenes capsulatus* in spite of constant dressing with peroxid. The patient improved steadily, and on August 8, under ether anesthesia, the upper end of the left humerus was removed by incision through the joint capsule; the stump was left open and packed with gauze. The excised head of the humerus showed areas of necrosis. The patient was discharged from the hospital August 21 and by September 14 the stump was healed by firm scar tissue.

CASE 3.—S. J., aged 35, was admitted July 21, 1912, to the service of Dr. R. S. Hooker. Was wounded in the middle of the left thigh by the charge from a shotgun fired from a distance of 12 feet while he was attempting to rob a barge.

3. Presented by Dr. R. S. Hooker, at the meeting of the Society of Clinical Surgery in New York, November, 1912.

* From the Surgical Wards of the First Division, Bellevue Hospital, New York.

1. Cramp, W. C.: Gas Bacillus Infection, with Special Reference to Treatment, *Ann. Surg.*, October, 1912; abstr., *THE JOURNAL A. M. A.*, Nov. 2, 1912, p. 1650.

2. Blake, John Babst, and Lahey, Frank H.: Infections Due to the *Bacillus Aerogenes Capsulatus*, *THE JOURNAL A. M. A.*, May 21, 1910, p. 1671.

Temperature was 99.4; pulse 84; respirations 26. The injury occurred about one hour prior to admission to the hospital. On the anterior aspect of the left thigh was a large irregular wound in which the entire hand could be inserted and which extended backward past the inner side of the femur. The femoral artery could be felt pulsating in the posterior part of the cavity. Several gun wads and numerous leaden pellets were picked from about the artery and out of the depths of the wound. The cavity was irrigated with peroxid and swabbed out with 7.5 per cent. solution of tincture iodine. There was profuse oozing, and the wound was packed with lengths of gauze. Repacking was necessary in the afternoon on account of the persistent oozing. The severe pain in the leg was controlled by morphin. At 9 p. m. the temperature was 102.8; pulse 116; respirations 24.

The following day the temperature rose to 104 and the patient complained of pain in the affected leg. The outer packing was changed on account of a recurrence of the oozing. Tetanus antitoxin, 1,500 units, was administered.

The next day the patient became rather restless and complained of great pain in the leg. Temperature 103.2. There was a dark reddish fluid on the outer dressing and a disagreeable odor from the leg. No interstitial crepitus was felt. A diagnosis of gas bacillus infection was made, the thigh was opened up widely, irrigated with hydrogen peroxid and dressed with peroxid-soaked gauze. At operation the intermuscular planes were found to be infiltrated with a dark red fluid and gas bubbles giving the characteristic odor. Death occurred thirty hours later.

CASE 4.—M. W., a woman, aged 46, a prisoner, was admitted to the service of Dr. R. S. Hooker, July 21, 1912, having suffered a fracture dislocation of the upper end of the right humerus and a Colles' fracture of the right wrist. Temperature was 99; pulse 100; respirations 24. The body was filthy and showed multiple contusions; the legs were discolored and ulcerated. The patient was put in bed under restraint. The general condition was poor and the patient incontinent. The fractures were treated by plaster splints.

July 26: Temperature was 101.6; pulse 110; respirations 24. A large superficial bleb has appeared over the dorsolateral aspect of the first metacarpophalangeal joint of the right foot, the upper half of the bleb being occupied by a single large gas bubble. On incision the fluid below the bleb was found of a dirty, grayish-green color and the gas had a foul, disagreeable odor. The fluid was positive for *B. aerogenes capsulatus*. The base of the bleb was composed of sloughy superficial fascia. No interstitial crepitus was present in the foot. The affected area was irrigated with hydrogen peroxid and dressed with peroxid-soaked gauze.

Further progress was uneventful. The temperature came down to normal three days later, and for the next twelve days rose to about 99 each day. By August 15 healthy granulations were present over the affected area and the patient was discharged to court.

CASE 5.—W. S., a Russian man, aged 55, was admitted July 24, 1912, to another division of this hospital. Temperature was 103; pulse 100; respirations 29. Three days prior to admission a soft rubber catheter had been passed into the bladder, and for the last twenty-four hours patient had had some trouble in voiding urine. The history was unsatisfactory and indefinite. The patient had complained of no lesion about the anus. Scrotal swelling had appeared within the previous forty-eight hours. Patient was well nourished and well developed, but appeared very toxic. The lungs showed dulness and fine crepitations at both bases posteriorly and bubbling rales were heard throughout them. The heart sounds were of only fair quality.

Local Condition.—The scrotum was about four times its natural size, red, shiny and rather tense. The swelling was elastic and fine interstitial crepitus could be felt throughout the scrotal tissues. No fluctuation was present. There was an erythematous, indurated area with well-marked and slightly raised border extending out toward the ischial tuberosities on each side of the anus, forward on the perineum and upward on the pubes, and for a short distance on the inner side of

each thigh. Catheter No. 20 F could be introduced into bladder without difficulty.

The operation was twelve hours after admission in another surgical division of this hospital and consisted of a free antero-posterior incision in the scrotum on each side of the median raphe, with a free median perineal incision. The scrotal tissues were found to be infiltrated with small gas bubbles and a dark reddish fluid of a disagreeable and characteristic odor. *B. aerogenes capsulatus* was found in smear and culture. Blunt dissection into the crepitant tissue was performed with hydrogen peroxid irrigation and the wounds were lightly packed with peroxid-soaked gauze. The patient was transferred to the service of Dr. R. S. Hooker. Some hours later, owing to the extension of the crepitus upward to each inguinal region and backwards over each ischial tuberosity, incisions were made in those regions and connected with the scrotal and perineal wounds, respectively, by undermining the intervening skin. Irrigation with peroxid and packing with peroxid-soaked gauze were repeated.

During the next five days the temperature was normal, the dressings were changed frequently and kept moist with peroxid. Although there was some sloughing of the scrotal tissue between the two lateral incisions, the induration decreased and there was almost complete subsidence of the gas bacillus infection. The edema of the lungs increased steadily, with only one period of temporary improvement, and the patient died five and one-half days after admission.

CASE 6.—W. R., an Italian boy, aged 5½, was admitted Dec. 15, 1912, at 6:30 p. m., to the service of Dr. John B. Walker. The patient was in shock suffering from a fracture in the upper third of the left femur, and a severe crushing, without open laceration of the left leg below the knee. The right thigh showed a compound supracondylar fracture of the femur and extensive crushing and laceration of the right leg below the knee. The patient had been run over by a wagon. The wounds were irrigated with a diluted aqueous solution of tincture of iodine; dressings and splints were applied and efforts made to counteract the shock. Temperature was 98; pulse 162; respirations 42.

December 16: The patient was very restless and fretful; some bloody discharge was on the dressings. At 8 a. m. temperature was 98; pulse 152; respirations 40. At 8 p. m. temperature was 102; pulse 162; respirations 42.

December 17: Temperature 104; pulse 164; respirations 42. When the dressings were removed a thin, reddish fluid with a disagreeable odor came from the lacerated wounds on the right leg. No interstitial crepitus could be felt. No circulation was present below the right knee. With a commencing gangrene of the leg and the strong probability of gas bacillus infection it was thought advisable to amputate above the supracondylar fracture in the right femur. This was done and smears taken, not only from the lacerated tissues, but also from the cut muscular surface of the amputated leg. Both showed the presence of *B. aerogenes capsulatus*, though examination afterward of the amputated leg showed gas bubbles only in the deeper calf muscles. No reddish fluid or gas bubbles were present at the site of amputation. On account of the presence of the gas infection at the amputation site the stump flaps were opened up and packed with peroxid-soaked gauze.

December 18: Interstitial crepitus was found in the stump. The affected areas were opened and irrigated with peroxid. Temperature was 103; pulse 150; respirations 28. The patient was delirious at the time and very weak.

December 19: There was an extension of interstitial crepitus in the stump, a free incision under nitrous oxid anesthesia was made, and peroxid irrigation used. By December 25 all interstitial crepitus had disappeared and healthy granulations were appearing. The left leg showed dry gangrene below the knee. The patient's general condition had improved, though he was much emaciated. Two weeks later amputation at the middle of the left thigh was performed for deep infection of the left leg which had developed in the dry gangrene and had spread to the knee. From this time on the patient improved steadily and by Feb. 2, 1913, the afternoon temperature reached only 100. The left stump healed by primary union

and the right stump by healthy granulations about the protruding end of the cut femur, which shortly afterward was removed under ether anesthesia, the wound healing by granulation. The patient was discharged for further treatment in the country. When seen last on March 23, 1913, there was a small area of healthy granulations on the right stump and the general condition was excellent. For permission to report the cases, I am indebted to Drs. Hotchkiss, Walker and Hooker, of this hospital, and further to Dr. Hooker, for his kind assistance in the preparation of these notes.

A CASE OF TUMOR OF THE HYPOPHYSIS

PARTIALLY REMOVED BY THE TRANSFRONTAL
METHOD OF APPROACH

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AND

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MEDICAL NOTES BY DR. LLOYD

The following case occurred recently in my wards at the Philadelphia General Hospital. As a hypophyseal case it is noteworthy for two things, namely, the presence of marked pressure or "neighborhood" symptoms, and the absence of a distinct cachexia either of acromegaly or of the dystrophia adiposogenitalis. The patient was neither infantile nor acromegalic; he was not overgrown or undergrown; he was neither too fat nor too lean; neither too large nor too small; his sexual organs were normally developed and he did not have a "hypotrichosis" either of his face or of his pubes; he had no craving for sweets, nor had he any diabetes or polyuria, and his temperature range was normal. What he did have was rapid onset of blindness with headache and vomiting, and he presented, under the Roentgen ray, the evidence of a pituitary tumor. In addition to headache he had at various times, as will be seen in the clinical report, severe pains in the limbs (and even in the chest); and to these pains, as an unusual feature, we invite special attention. Somewhat similar pains have been reported in acromegalia; thus Cushing, in one of his cases, describes pains in the limbs, in the active period of overgrowth, as somewhat like growing pains. Whether such pains may really be referred pains, caused by pressure on or irritation of the cerebral peduncles, is a subject worthy of consideration. In this connection it may be well to recall the fact that referred pains are sometimes observed in lesions in other basal structures, as for instance in the optic thalamus. Pain in the paralyzed limbs has also been observed in hemiplegia even before the attack. In the partial obscurity which still shrouds the course of the pain fibers, it is impossible to do more than to theorize about the relation of these clinical facts with the facts of anatomy, but to me it is conceivable that a pituitary lesion might, by pressure, as by a hydrocephalus, cause involvement of these pain-tracts as they pass cephalad. Their course is doubtless through the cerebral peduncles and the optic thalami.

Patient S. W.—Russian, aged 21, was admitted Aug. 27, 1912. Family history was negative. The patient came to the United States from Russia in 1911. He is a fairly well-developed young man. He used alcohol and tobacco moderately and denies venereal infection. He had always been in good health up to the onset of his present illness.

Present Illness.—This began in August, 1911, when the patient was suddenly seized with violent headache, more marked on the right side, and repeated vomiting spells. The

vomiting was propulsive, not preceded by nausea, except sometimes for a few moments, and occurred irrespective of eating, as a rule. This headache with vomiting lasted for several weeks and then ceased rather suddenly. After this illness the patient noticed that his vision was becoming hazy and that he saw double. He then began to have shooting pains in his right shoulder and arm, attended with tremor and convulsive movements of this limb. These movements do not seem to have been epileptic. At this time he received glasses at the Wills Eye Hospital, where a diagnosis was made of chorioiditis of the macular region. In June, 1912, the patient had another attack of headache and vomiting, not so severe as the former. After this second attack his vision failed still more until, on admission to the Philadelphia General Hospital, he could see only a little out of his left eye, and at best could only tell the difference between light and darkness. He said, also, that he had had a staggering gait since his first attack of headache.

Examination.—The patient was seen to be a fairly well-nourished young Hebrew. His musculature was rather poorly developed, but there was no excessive adiposis. His sexual organs were well developed and he had hair on his face and pubes. His gait was steady, without swaying or staggering, although somewhat uncertain because of his blindness. He was not paralyzed in any of his muscles. The knee-jerks were normal; Babinski reflexes absent; skin reflexes normal; sphincters not involved. The patient's mentality was good. The eyes were examined by Dr. Shumway, who made the following report: Double optic nerve atrophy probably following optic neuritis. The edges of the nerve-heads were obscure; the arteries very narrow; veins of good caliber. The nerve-heads were filled in from inflammatory changes. The eyes were entirely sightless and there was no pupillary response. The ocular movements were well performed; the eyeballs, at rest, slightly divergent.

After admission to the hospital the patient had a great deal of headache, coming and going, with attacks of cerebral vomiting. These attacks, and his blindness, constituted practically the whole of the symptomatology for a long while. The patient preferably remained in bed, lying on his back, often holding his hand to his head; but he had free use of his limbs and could arise and walk if requested. His mental state continued good and he had no speech defects. It is especially noteworthy that he occasionally complained of pains in his legs; these pains, taken in conjunction with similar pains which he had had in his arms before entering the hospital, and with the severe pains which he had in his arms and chest after the operation, as will be seen, may have more than usual significance. The patient never had an epileptic attack, nor any uncinat or olfactory auræ.

On one occasion the patient had pain in his right ear and under his right eye, followed by a slight chill and a little discharge from the ear. There was no tenderness or redness over the mastoid, but slight tenderness in front of the tragus. The attack passed by under the care of Dr. Grayson.

The heart, lungs and kidneys were normal. There was no polyuria.

The patient did not present the appearance either of acromegaly or of dystrophia adiposogenitalis.

The examination of the blood and cerebrospinal fluid gave the following result: The Wassermann test was negative in both. The cerebrospinal fluid was negative to the Nonne and Noguchi tests; no lymphocytosis.

The roentgenogram revealed the following condition: The floor of the sella turcica was entirely destroyed. A portion of the posterior clinoid processes remained and showed indistinctly. The appearance suggested that a tumor mass extended into the sphenoid sinus. There was also evidence of intracranial pressure in the fact that the cranial sutures were more or less separated.

It was unfortunately too late, when this patient was admitted to the Philadelphia Hospital, to take his visual fields. In these cases, as is well known, a bitemporal hemianopsia is sometimes seen in the early stages, caused by pressure on the optic chiasm. Other forms of hemianopsia, as a blotting out of the superior halves, have been noted.