

# RECOVERY FROM OTITIC PNEUMOCOCCIC MENINGITIS

## *Report of Two Cases*

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No attempt will be made in this report to review the extensive literature on pneumococcic meningitis. Suffice it to say that prior to the advent of chemotherapy there were no recoveries from this condition, in spite of desperate attempts to control the disease by early and complete operations on the mastoid, with extensive exposure of the dura and repeated or continuous drainage of the spinal fluid. Since the use of the sulfonamide drugs, especially in conjunction with the type-specific antipneumococcic serum, numerous recoveries have been reported.

### CASE REPORTS

The first of these two cases was a typical Type III pneumococcic infection in the ear, with subsequent meningitis. The second case was a Type I pneumococcic meningitis which developed suddenly from an otitis media without mastoid involvement. Chemotherapy and the type-specific antipneumococcic serum were used in both cases. In the first case the mastoid was operated upon late in the treatment to prevent a recurrence. In the second case, surgery was unnecessary. Both patients recovered completely and have had no further complications.

*Case 1:* A white man, 62 years of age, was admitted to the hospital in August, 1938, in a semistuporous condition. Three months previously, in May, he had had an acute infection of the upper respiratory tract, with a temperature of 100 to 101° F., headache, and a right otalgia. A week after the onset there was a discharge from the right ear for about twenty-four hours. He gradually felt better and was able to do some work, but he continued to have a temperature of 100° F, and a headache. He felt much better during the following month. However, about the middle of July, the headaches became more severe. He had some right otalgia at all times during this period. Thirty-six hours before admission to the hospital he went to bed with increased otalgia, headache, and general malaise. He became very drowsy. On the morning of admission to the hospital he vomitted several times, and it was noted that his neck was rigid.

Examination revealed a well-developed, elderly man in a semistuporous condition. The skin and mucous membranes were dry and the tongue was coated. The pupils, which were very small as the result of a previous administration of morphine, were regular and equal, and reacted sluggishly. The extra-ocular movements were normal and there was no nystagmus. The left ear was normal. The right external auditory canal and drum were discolored from the previous use of some type of ear drops. There was no pus in the right canal. The right ear drum was intact, but was thickened and had lost its lustre. It had a dirty grey appearance and showed some fulness. There was no injection. No edema nor tenderness was present over the right mastoid. The chest was of the emphysematous type. The heart, lungs and abdomen were normal. All of the cranial nerves were intact. The biceps reflexes were active and the patellar reflexes were very sluggish, the left being more active than the right. There was a two-plus Brudzinski's sign, a one-plus Kernig's sign, and a plus-minus Babinski reflex on the left.

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The temperature was 101.8° F. Soon after admission, however, it rose to 103.2° F. Roentgenograms showed both mastoids to be of the small celled type. The left mastoid was normal. The right mastoid was quite cloudy, but showed no evidence of destruction of bone. (Fig. 1.) Both petrous tips were without cellular content. The paranasal sinuses were normal. Lumbar puncture obtained cloudy spinal fluid under a pressure of 250 mm. of water. The pressure rose to 300 mm. on deep jugular compression, and fell to 120 mm. after the withdrawal of 10 cc. of spinal fluid. The fluid contained 1,420 cells, most of which were polymorphonuclear leukocytes. Culture of the spinal fluid yielded a Type III pneumococcus. Sulfanilamide and sodium bicarbonate were given by mouth, and 20,000 units of Type III antipneumococcic rabbit serum were administered intravenously after carefully testing for sensitivity with skin and conjunctival tests, and by injecting small quantities subcutaneously. A myringotomy was done on the right drum and a small amount of thick, tenacious mucopus was obtained. Blood cultures were negative, as were Wassermann and Kahn tests of the blood.

On the fourth day after admission, the temperature was normal and he was mentally alert. The spinal fluid contained 160 polymorphonuclear leukocytes, and culture of the fluid was negative. On the seventh day the headache and rigidity of the neck disappeared. From the fourth to the eleventh day the patient had to be catheterized because of bladder retention. On the twelfth day, the spinal fluid contained only 8 cells and the pressure was normal.

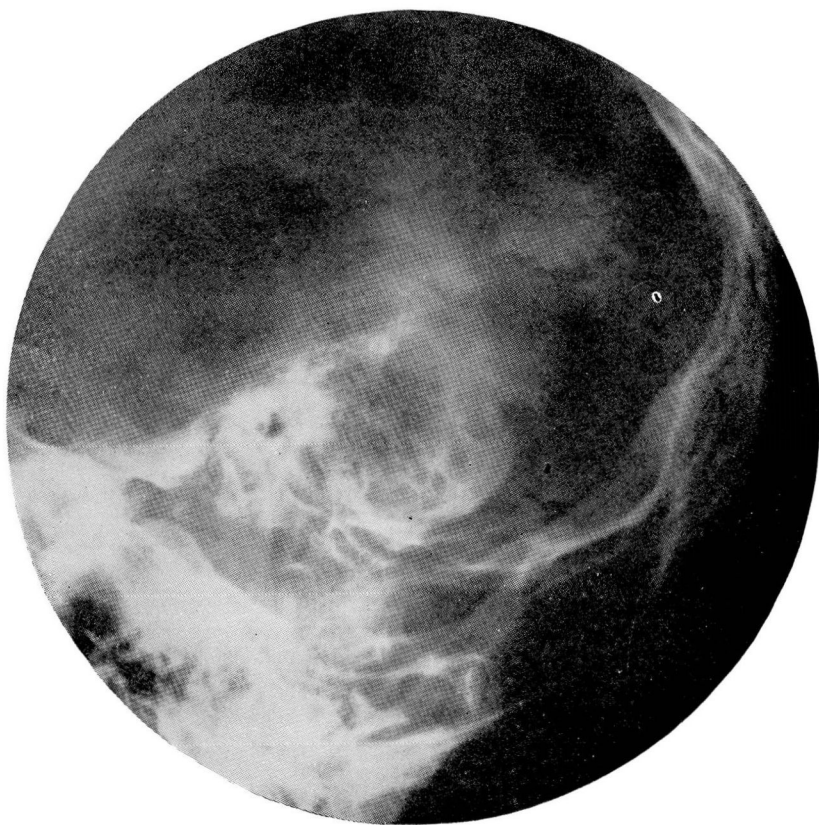


FIGURE 1 (Case 1): Roentgenogram of right mastoid.

The right ear drained for only a few days after the myringotomy, and at no time was there any edema or tenderness over the mastoid. Audiograms showed normal hearing on the left side, and the right curve was about 10 db below the left. Bone conduction was prolonged. The Weber test was referred to the right ear. Rinne's test was negative on the right and positive on the left. Progress roentgenograms of the mastoid showed continued cloudiness of the cells, and it was felt unwise to discharge the patient without clearing up the primary focus of the meningitis. Accordingly, on the twenty-second day in the hospital, a simple mastoid operation was done on the right side. He was discharged fourteen days later. No destruction of bone was found at the time of operation, but the antrum contained thick mucopus, and the cells were completely filled with thickened membrane. Cultures taken from the mastoid were negative.

Determinations of the sulfanilamide concentration in the blood showed 14.7 mg. per 100 cc. on the second day, 13.1 mg. on the fourth, 9.2 mg. on the sixth, 8.5 mg. on the eighth, 7.7 mg. on the tenth and eleventh, and 5.0 on the twelfth day, at which time the drug was discontinued. Determinations of the red and white cells of the blood and hemoglobin content were made every other day. The red cell count remained at 4,250,000 or more, and the white cell count ranged from 13,350 to 6,000. The hemoglobin was 65 per cent the first day, and ranged from there to 84 per cent.

Equal amounts of sulfanilamide and sodium bicarbonate were given throughout the period of medication. On the first day 30 grains each were given on admittance and at 2:00 p.m., 60 grains at 6:00 p.m., 30 grains at 10:00 p.m., and 15 grains at 12 midnight. Following the ten o'clock dosage the patient had an emesis of 90 cc. Therefore, he did not retain all of the 135 grains given the first day. On the second day 15 grains were given every two hours until 2:00 p.m., and then 20 grains at 8:00 p.m., totaling 125 grains. On the third, fourth and fifth days he received 20 grains every six hours, totaling 80 grains a day. On the sixth day 55 grains were given, and 30 grains were given in divided doses on each of the seventh and eighth days. On the ninth, tenth and eleventh days, 15 grains a day were administered. The total amount of sulfanilamide received during the eleven days was 660 grains, of which less than 30 grains were lost by emesis.

This case was treated before the routine of a large initial dose followed by regular smaller doses every four hours had been established.

*Comment:* This case was the first in our experience to recover from an otitic pneumococcic meningitis. The infection was typical of Type III pneumococcus. The original infection in the ear occurred three months prior to the onset of the meningitis. It was felt that his only salvation lay in the use of chemotherapy, and as soon as the infecting organism was definitely identified, the type-specific rabbit serum was administered. The operation on the mastoid was delayed because it was felt that it would be futile unless the chemotherapy was effective. He responded so well to the use of chemotherapy that operation was withheld until complete recovery from the meningitis occurred, and then it was done only to prevent a possible recurrence.

*Case 2:* A 13 year old white girl was admitted to the hospital in February, 1941, in coma. Eleven days before admission, during the course of a cold in the head, an acute otitis media developed on the left side. This ruptured spontaneously, and the drainage seemed adequate to the attending physician. Five days before admission to the hospital 15 grains of sulfanilamide was given, followed by 5 grains every four hours. This was discontinued after two days, however, because of nausea. The temperature remained normal and except for the otorrhea, she was quite well until 5 p.m. of the day preceding admission, when a left facial paralysis occurred, with headache and pain in the neck, accompanied by a sudden rise in the temperature. At 8:00 p.m. the neck was rigid and she gradually became less responsive.

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Examination revealed a gravely ill girl in coma. The neck was rigid, partially extended, and held to the left. There was a conjugate deviation of the eyes to the left, associated with a spontaneous horizontal nystagmus to the left. A peripheral type of facial paralysis was present on the left. The reflexes were hypoactive and Babinski's reflex was absent. She cried out when moved. The left external auditory canal contained a bloody, purulent discharge. The left drum was dull, injected, and bulging. There was no tenderness or edema over the left mastoid and roentgenograms showed a normal petrous tip and normal mastoid cells. The right ear drum and canal were normal. The nasal passages were clean and clear. The tongue was moist and the pharynx was moderately injected. The anterior cervical glands were palpable bilaterally. The chest showed equal expansion and the lungs were clear to percussion and auscultation. The heart was not enlarged, the rhythm was regular, and there were no murmurs. Except for bladder dullness from the symphysis to the umbilicus, abdominal examination was negative. The temperature was 102.6° F., the pulse rate 100, the respirations 25, and the blood pressure 110 mm. systolic, 70 mm. diastolic. On lumbar puncture the spinal fluid pressure was 200 mm. of water. It rose to 350 mm. on left jugular compression, to 340 mm. on right jugular compression, and to 550 mm. on bilateral compression. The pressure fell to 115 mm. after the removal of 10 cc. of cloudy, ground-glass appearing spinal fluid. The fluid contained 4,000 white blood cells, with 90 per cent polymorphonuclear leukocytes, a trace of globulin, and 320 mg. of protein. Cultures of the spinal fluid and of pus from the left ear produced Type I pneumococci. A culture of the blood was sterile.

A left myringotomy was done on the first day (February 6) and 3 grams of sulfapyridine were given intravenously, followed by 1500 cc. of 5 per cent glucose solution. On the following morning the report of the culture was received, and 100,000 units of Type I antipneumococcic rabbit serum was administered intravenously after first testing for sensitivity. Fluids were given through a nasal feeding tube. From the second to the sixth days she received an initial dose of 2 grams of sulfapyridine, and 1 gram every

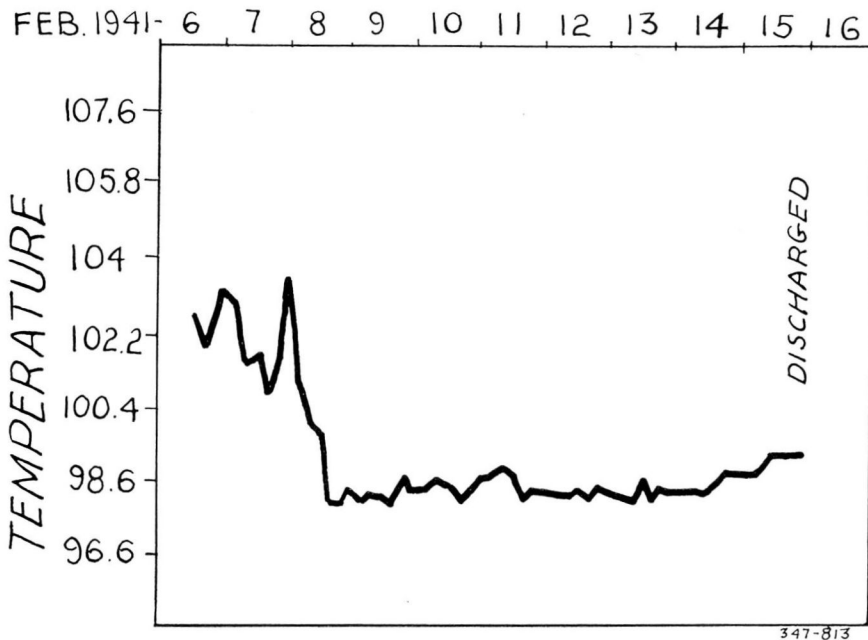


FIGURE 2 (Case 2): Temperature chart.



four hours through the tube. She was given 3.5 grams of sulfapyridine intravenously on the third day, followed by a transfusion of 500 cc. of blood. On this day the temperature became normal (Fig. 2), and remained normal during the rest of the period of hospitalization. The conjugate deviation of the eyes disappeared and the movements of the eyes were free. The rigidity of the neck became less and her cry was more normal. At times she showed some response to questioning. Four days after admission to the hospital she was fully conscious and there was practically no rigidity of the neck nor facial paralysis. She would not permit removal of the nasal feeding tube because she thought that she would be unable to swallow. She agreed to its removal on the following day, however, (February 11). At this time the ear was dry and she was free from symptoms. Seven days after admission the spinal fluid showed 200 white blood cells, which were chiefly lymphocytes, and 95 mg. protein. Smears and cultures were negative for organisms. She was given a soft diet on this day. Roentgenograms of the mastoid on the ninth day were normal. She was allowed out of bed the following day and was discharged from the hospital on February 16, ten days after admission to the hospital.

Determinations of the blood sulfapyridine concentration showed 1.2 mg. per 100 cc. the second day, 3.0 on the third day, 2.7 the fifth, and 2.5 mg. the sixth day. On February 7 the red blood cells numbered 3,790,000; the white blood cells, 12,900; and the hemoglobin was 61 per cent. Five days later the red blood cells numbered 5,000,000; the white blood cells, 6,050; and the hemoglobin was 84 per cent. Wassermann and Kahn tests of the blood were negative. The total dosage of sulfapyridine was 486 grains by mouth and intravenously.

*Comment:* This case represents a truly miraculous recovery accomplished by the use of serum and chemotherapy. When admitted to the hospital the patient was in a deep coma, with full-blown meningitis and organisms in the spinal fluid. The conjugate deviation of the eyes suggested involvement of the brain stem and was a grave prognostic sign. The infection had bypassed the mastoid and had entered directly into the meninges from the tympanum. The facial nerve probably was involved in the tympanum itself. In spite of this desperate picture, she responded to treatment and was discharged from the hospital ten days after admission, completely recovered from the meningitis, facial paralysis, and the infection in the ear. Before the patient was discharged, a second roentgenogram was taken of the mastoid to make sure that no involvement had occurred which might act as a focus for future complications.

A myringotomy was the only surgical procedure. Before the advent of the sulfonamide drugs and the type-specific antipneumococcic serum, the accepted method of treatment was an immediate operation on the mastoid, regardless of negative roentgenograms. Had this procedure been followed, in all probability this girl would not have recovered.

## DISCUSSION

Two cases obviously form an inadequate basis on which to draw conclusions. It would seem, however, that early identification of the infecting organism, followed immediately by the use of the type-specific serum and the appropriate sulfonamide preparation given to near the limit of tolerance, form a rational basis of treatment. Immediate mastoid surgery, therefore, would no longer seem necessary.