

Studies of differential counts corroborate the numbers reported in the literature. The neutrophils reach their peak five hours post partum among both primiparas and multiparas and gradually diminish to normal proportions after five days among primiparas and four days among multiparas (table 3). As the percentage of neutrophils increased, the percentage of lymphocytes decreased. The percentage of monocytes varied little. The percentage of eosinophils and basophils was not noticeably altered. According to the Arneht count and the Schilling hemogram, the neutrophils shifted to the left.

The temperature of two patients was elevated during the postpartum period. One of these patients had a temperature of 101 F. on the seventh day and the other a temperature of 100.6 F. on the third day. In neither case was the leukocyte count above the average for the rest of the group of fifty-nine patients.

SUMMARY AND CONCLUSIONS

There has been nothing in the behavior of the mother or infant in any case in which pentobarbital sodium was administered to indicate any deleterious effect. Studies of the blood from this group of patients give no evidence of the production of a leukopenic condition with the amounts of pentobarbital sodium administered.

This series of studies of leukocyte and differential counts indicates that the greatest leukocytosis occurs at the fifth hour post partum. The level of leukocytes falls steadily to the fourth day, when the number of leukocytes per cubic millimeter of blood remains constant until the last examination on the tenth day.

THERAPEUTIC PNEUMOCOCCUS TYPE VIII (COOPER) SERUM

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Pneumococcus type VIII (Cooper) is identical with the Thomas strain (closely related immunologically to pneumococcus type III) described by Sugg, Gaspari, Fleming and Neill,¹ and the strain classified as pneumococcus IV A by Johnson of Pittsburgh, which was common in Pittsburgh in 1927. Georgia Cooper² published her description of pneumococcus type VIII in March 1929.

Pneumococcus type VIII is culturally distinct from pneumococcus type III, and the course of the pneumonias it causes is different from that induced by pneumococcus type III. Differentiation between type III and type VIII is readily made by the "swelling" reaction of Neufeld, specific rabbit serum being used for type III and type VIII, and by the colonies. The type III colonies are large and mucoid; the type VIII colonies are smaller, with more surrounding hemolysis.

Until July 1, 1933, my associates and I observed at Harlem Hospital 133 cases of pneumococcal pneu-

monia due to pneumococcus type VIII, in 122 adults and 11 children.³ Thirty-seven adult cases were treated with serum; twenty-seven were nonbacteremic and none of the patients died. Among eighty-five cases not treated with serum, seventy patients were nonbacteremic and nine died, a mortality of 12.8 per cent.

A factor determining the outcome in pneumococcus pneumonia is invasion of the blood stream. Apparently the amount of invasion is significant. Invasion with a few organisms, as revealed by growth in the broth with none or only a few organisms on the agar plates, is apparently of less significance. In several instances

Type VIII Pneumococcus Pneumonia in 122 Adults, 1928 to 1933

Treated with Serum			Not Treated with Serum		
Cases	Deaths	Percentage	Cases	Deaths	Percentage
37	2	5.4	85	14	16.4
10*	2*	20.0*	15*	5†	33.3*

* Asterisk indicates positive blood culture cases.

† Two cases with colonies in postmortem blood excluded.

the organisms grew in chains. In one fatal nonserum case, chain formation present at first, was absent in later blood cultures.

Of the bacteremic cases, ten were treated with serum and two patients died, a mortality of 20 per cent; fifteen were treated without serum and five patients died, a mortality of 33⅓ per cent.

In our nonserum cases, three patients died of the seven in whom a single colony occurred on agar or only the broth was positive. Two cases in which the organisms (in broth only) were recovered for the first time in postmortem blood from the heart were counted as nonbacteremic. In the serum series, none of the five cases of slight invasion resulted fatally. Possibly the serum prevented severer invasion of the blood stream.

Among the more heavily invaded group that received no serum, there were eight cases and five deaths; in one of these cases, meningitis due to pneumococcus type VIII supervened three months after the pneumonia, which had been complicated with empyema.

In the serum group, two of the four patients died. One had meningitis as well as pneumonia on admission; the other showed a marked reduction of the bacteremia after the serum, but the treatment was discontinued because the stock of serum was exhausted.

The cases were accepted for treatment alternately in order of admission. There was no attempt to select early or favorable cases. Twenty-seven per cent of the serum cases were bacteremic; only twenty per cent of the nonserum cases were bacteremic.

The usual duration of the cases not treated with serum was from eight to nine days; most of the cases treated with serum terminated by the sixth day.

Twenty-nine cases treated with serum and thirty-six cases not treated with serum were studied for the presence of agglutination by the Sabin slide agglutination technic. The agglutinins were present much earlier in the serum cases than in the controls. The agglutinations were found as early as the third day in three cases treated with serum and on the fourth day in four cases not treated with serum. Agglutinins failed to develop in three cases not treated with serum. One of

From the Harlem Hospital Station of the Littauer Pneumonia Research Fund of New York University.

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1. Sugg, I. Y.; Gaspari, E. L.; Fleming, W. L., and Neill, J. M.: Studies on Immunological Relationships Among the Pneumococci: 1. A Virulent Strain of Pneumococcus Which is Immunologically Related to but Not Identical with Typical Strains of Type III Pneumococci, *J. Exper. Med.* **47**: 917 (June) 1928.

2. Cooper, Georgia; Edwards, Marguerite, and Rosenstein, Carolyn: The Separation of Types Among the Pneumococci Hitherto Called Group IV, and the Development of Therapeutic Antiserums for These Types, *J. Exper. Med.* **19**: 461 (March) 1929.

3. The increasing importance of pneumococcus type VIII is evidenced by the fact that during the current season, in the nine months from July 1, 1933, until April 1, 1934, there have been, in my service among the adults, thirty-seven cases of pneumonia due to pneumococcus type VIII, and one among the children in the pediatric service of Dr. Morris Gleich.

two fatal serum cases showed agglutinins on the third day; after this they were absent.

The production of serum was commenced in 1928 in the laboratories of the New York City Department of Health. Seventeen horses have been under immunization; two have been immunized for more than two years. Four are being immunized at present. Miss Cooper reports that the mortality of the horses was unusually high, the titer of the antisera comparatively low and the duration of immunization to obtain usable serum unusually long. The concentration procedure was the same as for type I serum.

At the Lederle Laboratories, Inc., five horses have been immunized. For from six to eight months they were immunized with pneumococcus types IV, V, VII and VIII; then types IV and V were discontinued. Three of the horses produced from 1,000 to 4,000 units against type VII; the same animals showed only from 100 to 200 units against type VIII. Two of these were carried from eighteen to forty-eight months.

Frequently we encountered thermal or anaphylactoid reactions with the first dose of serum in a patient though he did not react with a second and larger dose of the same serum given a few hours later. A patient receiving the same serum as previously may react to a subsequent dose of the same size with a chill.

CONCLUSIONS

The mortality was less in patients suffering from pneumococcal pneumonia type VIII treated with serum than in those treated without serum. The duration of the illness was shorter in the serum treated than in those who did not have serum.

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Clinical Notes, Suggestions and New Instruments

BACILLUS WELCHII PANOPHTHALMITIS

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Infections from *Bacillus welchii* in different parts of the body are not uncommon; in fact, they are often encountered in industrial practice. The statistics give a high mortality rate. The previous war experience has done little to control this situation. Owing to the rapidity of the spread of the infection and the destruction of tissue thereby, it would naturally be assumed that such an infection in or about the eye would be fatal. Such apparently is not the case.

To date, there have been ten cases reported in the literature: five in Great Britain, four in France and one in the United States. James¹ made the clinical diagnosis by gas bubbles in the anterior chamber and eviscerated the contents of the globe. Heath² had a case of panophthalmitis in which he eviscerated the contents. Cultures yielded positive results. Ridley³ had a case of gas gangrene and panophthalmitis twenty-four hours after a penetrating wound of the eye. He eviscerated the contents. Hamilton⁴ had two cases, the first on the third day after infection and the second on the fourth day. He eviscerated in both cases. Chaillous⁵ had two cases and Darier⁶ also had two. All four eyes were enucleated.

Berry⁷ of Brooklyn had a patient who had been hit in the right eye by a chip from a nut and eighteen hours thereafter an active panophthalmitis developed. A roentgenogram showed

a foreign body 2 by 4 mm. and 20 mm. back. Gas bubbles filled the whole anterior chamber, and he reports that a dark substance followed the knife out of the wound. Two days later the eye was enucleated and laboratory examination was positive for *B. welchii*.

REPORT OF CASE

T. V., a man, aged 35, an automobile mechanic, referred to my office, Nov. 1, 1933, by Dr. Carls, had hit his left eye with something while pounding on an axle shaft of an automobile. He did not seek treatment until the following morning, and when I saw him that day he had an intensely inflamed left eye with a beginning hypopyon. There was a small corneal wound at 5 o'clock on the dial near the limbus; the lens showed beginning cataract, and no view of the deeper structures was possible on account of the cloudy media and lens changes. What appeared to be a very small bubble was seen in the anterior chamber at this time. A roentgenogram showed a piece of steel 1 by 3 mm., 10 mm. back. The patient was sent to the hospital and the corneal wound was slightly enlarged with a cataract knife, which, when it was withdrawn, was followed by a coffee ground-like discharge. The magnet point was introduced and the steel extracted. Foreign protein was given and the patient was put to bed. In twenty-four hours there was a very marked panophthalmitis with boardlike induration of the bulbar conjunctiva. Evisceration of the globe was done at once and a drain inserted. Massive doses of *B. tetani* and *B. welchii* serum were given. The drain was left in for four days and hot moist compresses were applied to the socket. The patient made an uneventful recovery and left the hospital on the twelfth day.

Pus was taken from the eye for culture, November 6. A specimen of 1 cc. of thick yellow pus was sent to the laboratory. Gram stain showed many leukocytes. Frequent gram-positive, blunt bacilli both large and small were seen. Amorphous material and erythrocytes were present. With the Ziehl-Neelsen method no acid-fast bacilli were seen.

The specimen was inoculated on aerobic blood agar plates, endo plates, semianaerobic blood agar slants, and anaerobic blood agar slants. There was no growth of organisms in seventy-two hours.

The specimen inoculated into litmus milk under anaerobic conditions produced rapid acidification and coagulation. The production of a large amount of gas and a characteristic stormy fermentation was noted in twelve hours, at a temperature of 37 C.

A small amount of the specimen was inoculated into anaerobic beef heart broth and again a considerable production of gas and turbidity of broth were noticed. Stained smears of the litmus milk and beef heart broth demonstrated the presence of very large, thick, gram-positive bacilli.

Solid dextrose agar tubes showed further the violent production of gas and isolated colonies of the gram-positive bacilli obtained. The organism was identified culturally as being *B. welchii*.

COMMENT

Jordan's textbook on bacteriology states that gas gangrene nearly always consists of mixed aerobes and anaerobes of several species. Cultures of *B. welchii* do not blacken brain and meat cultures normally, but the presence of metallic iron produces discoloration. This fact may and probably does explain the coffee-like secretion that was noted by Dr. Berry in his case and also in mine.

The striking thing is the rarity of *B. welchii* in perforating and lacerated wounds of the eye. During the last thirteen years I have operated on more than 400 patients with intra-ocular steel and as many with penetrating and lacerated wounds of the eye, but this is my first case of *B. welchii* panophthalmitis. Most of these patients are from industrial plants and are exposed to different types of infection. Physicians in general industrial practice not infrequently have cases of *B. welchii* infection, yet this is only the second reported case of ocular infection in the United States. The further fact that the mortality in *B. welchii* infection in other parts of the body is so high and yet in ten known cases of *B. welchii* in eye injuries there have been uneventful recoveries in every case is worthy of note and may be explained by the absence of muscle tissue infection. With the venae vorticosae and the deep ciliary

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