

2. The quarantine of carriers is as essential as is the quarantine of those suffering from diphtheria, in the controlling of an epidemic of diphtheria.

3. Two negative cultures should be required as the minimum from all children who have had a positive culture. A negative culture means something, but does not have the significance that a positive culture has.

4. Antitoxin has a very definite place in giving immunity against diphtheria, but it does not kill the diphtheria bacillus; so those who have had diphtheria may continue to be carriers for an indefinite time, if great care is not taken in getting at least two negative cultures from them.

5. Carriers usually clear up entirely without the use of antitoxin.

A CASE OF CEREBROSPINAL MENINGITIS DUE TO A DIPHTHEROID BACILLUS*

GEORGE F. DICK, M.D.
CHICAGO

While the part played by pseudodiphtheria bacilli in pathologic processes has been much discussed, they have not been recognized as the cause of meningitis, and those found in the nose are usually considered unimportant. Cases such as the one reported here are doubtless rare; but they are important in their bearing on the pathogenic possibilities of pseudodiphtheria bacilli.

REPORT OF CASE

A white man, aged 49, admitted to the service of Dr. James B. Herrick, June 20, 1919, with a family and personal history which gave no information bearing on this illness, two weeks before admission had fallen in the bathroom as the result of a shock received from a defective electric fixture. Three days after the fall he began to complain of headache and "seemed feverish." After ten days of persistent headache, he was brought to the hospital.

He was a well developed, well nourished man. The mouth temperature was 104.8 F., the pulse 88, the pharynx was red, the tonsils were small, the teeth were in bad condition and the cervical glands were palpable. There were dulness and subcrepitant râles over the left lower chest anteriorly, and in the axilla. The patient was drowsy, the knee and ankle reflexes were active, and flexion of the neck increased the headache. Roentgenograms of the head revealed no fracture. The erythrocyte count was 3,980,000; the leukocyte, 12,600, and hemoglobin, 65 per cent. The urine contained a trace of serum albumin and some leukocytes, but no casts.

The patient's condition grew progressively worse, and he died five days after admission, on the fifteenth day of the disease.

Spinal puncture on admission yielded a cloudy fluid containing 746 leukocytes per cubic millimeter, 54 per cent. of which were polymorphonuclear neutrophils, and the rest lymphocytes. The sediment was blood tinged. The ammonium sulphate test for globulin was positive, and the colloidal gold test indicated meningitis (0011234432). Wassermann tests of the cerebrospinal fluid in 0.2, 0.5 and 1 c.c. amounts were clearly negative. No tubercle bacilli were found in direct smears of the sediment. A guinea-pig inoculated subcutaneously and intraperitoneally with the sediment, and killed at the end of six weeks, showed no tuberculous lesions. Organisms were found in Gram's stains of direct smears of the cerebrospinal fluid. They were gram-positive, short, diphtheroid bacilli which most frequently occurred in pairs, end

to end. They were often within the leukocytes. In methylene blue stains they did not show polar bodies, and were shorter than the usual forms of diphtheria bacilli.

Aerobic and anaerobic goat blood agar slants and agar shake cultures were made of the fluid. At the end of twenty-four hours' incubation, all tubes contained in pure culture the gram-positive bacillus found in direct smears. In the shake culture made with 1 c.c. of the cerebrospinal fluid, the colonies were so numerous that it was impossible to count them. The bacillus grew both aerobically and anaerobically on the surface of goat blood agar, producing a delicate grayish film, or isolated, slightly convex, grayish colonies less than a millimeter in diameter. The blood was not changed. The growth on goat blood agar was more luxuriant than on plain agar or Loeffler's serum. The bacillus grew but produced no acid or gas in maltose, raffinose, saccharose, lactose, salicin, mannite, dulcitol, inulin, galactose, or dextrin azolitmin broth. In glucose azolitmin broth, it produced acid without gas. It had no effect on milk. Broth cultures were clear, with a finely granular sediment. In twenty-four hour old cultures the bacillus was not motile.

A guinea-pig inoculated intravenously with two twenty-four hour slants of the original culture died twenty-two hours later. There was a marked fatty degeneration of the liver, and a blood-tinged cerebrospinal fluid, which contained the bacillus in pure culture. Two guinea-pigs were inoculated intraperitoneally with a forty-eight hour broth culture of the organism, and one of them also received diphtheria antitoxin; neither of these pigs died.

Cerebrospinal fluid obtained from the patient three days later showed a negative Wassermann test in 0.2, 0.5 and 1 c.c. amounts. There were no tubercle bacilli in the smears. Cultures contained numerous colonies of the bacillus described. No other organisms were found in any of the cultures.

A blood culture the day following the first lumbar puncture showed about one colony of a gram-positive bacillus from each cubic centimeter of blood. Morphologically and culturally, it was identical with the organism found in the cerebrospinal fluid. A Wassermann test of the blood was negative.

COMMENT

The organism described differs from the diphtheria bacillus in the absence of polar bodies; failure to acidify maltose and dextrin; and in being not pathogenic for guinea-pigs on intraperitoneal injection of a forty-eight hour broth culture.

Eberson¹ has made an attempt to group diphtheroid organisms. He finds that strains isolated from the eye and nose are usually in the nonfermenting or in the glucose splitting group. The bacillus found in this case of meningitis resembles in morphology and staining properties Hofmann's type of pseudodiphtheria bacillus. It constantly fermented glucose with the production of acid. The pathogenicity of the bacillus for guinea-pigs was discovered only by intravenous inoculation: according to the method usually employed for testing the virulence of diphtheroids, it would be classed as nonvirulent.

On the whole, it is probably best considered as a pseudodiphtheria bacillus closely related to that described by Hofmann. It may be pathogenic for man, as in this case it was doubtless the cause of the fatal meningitis; and is pathogenic for guinea-pigs on intravenous, but not on subcutaneous or intraperitoneal inoculation.

637 South Wood Street.

1. Eberson, Frederick: J. Infect. Dis. 23: 1 (July) 1918.

Diagnosis of Tuberculosis.—The diagnosis in the early stage of tuberculosis must and should often be made before the bacillus can be found in the sputum and before the examination of the chest can give any help.—*Bull. Maine State Dept. of Health*, October, 1919.

* From the John McCormick Institute for Infectious Diseases and the Presbyterian Hospital.