

PURULENT ENCEPHALITIS AND CEREBRAL ABSCESS IN THE
NEW-BORN DUE TO INFECTION THROUGH THE
UMBILICUS.¹By GUY HINSDALE, M.D.,
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THE brain which I have to show was removed from the body of a child, aged thirteen days, by Dr. J. T. Stanford, of Philadelphia, to whom I am indebted for the following history:

The mother of the child was a colored woman, aged about twenty-seven years, who had had uterine trouble, for which she was treated in the Presbyterian Hospital, Philadelphia, two years ago. She had a miscarriage and subsequent inflammatory trouble, for which her uterus was curetted.

During the early part of her pregnancy she complained greatly of pains in the right iliac region, and external applications were made, with very little relief. She was confined to bed and had some fever. In confinement she was attended by a midwife. After a labor of forty hours' duration she was delivered of a male child weighing twelve pounds. The midwife reported that during and after the expulsion of the placenta a large quantity of pus came from the womb. The child was fed from a spoon, and emaciation became marked after the third day. There was nystagmus from its birth, and he uttered short, shrill, frequent cries; there was continuous retraction of the neck. Dr. Stanford first saw the child four days after birth, and found the temperature 103° F. There were convulsions, but no paralysis; there seemed to be chills, and the mouth had the appearance of thrush. The umbilical cord had a fetid odor. It was then dressed with boric acid, and separated on the sixth day. The child continued to grow worse; he would not nurse, seemed to be in great pain, and died on the thirteenth day.

Autopsy nine hours after death; permission to examine the head only. The skull showed a deficiency at the frontal suture of about one centimetre; otherwise normal. There was no pus between the bone and the dura, but below the pia and generally over all surfaces of the brain was pus reaching down into the sulci. The pus was of a pale yellow hue and quite thick. In the left frontal lobe was an abscess containing about fifteen or twenty c.c. of pus. The cavity was evidently of recent formation and had no limiting wall. In a corresponding position on the opposite side was a large hemorrhage, and all through the cortex were minute hemorrhages. The cerebellum also showed purulent encephalitis. Bacteriological tests were undertaken by Dr. S. S. Kneass, of the Pepper Laboratory of Clinical Medicine. The brain was placed in 50 per cent. formalin solution, and was hardened and examined microscopically by Dr. Joseph Sailer, of the Pepper Laboratory, to whom I am indebted. He made the following report:

Sections through regions of the cortex, where there are macroscopical evidences of inflammation, show slight round-cell infiltration into the

¹ Read before the American Neurological Association, at the twenty-fifth annual meeting, at Atlantic City, June 15, 1899.

subarachnoid space and into the tissue of the pia. These round cells extend also into the tissue of the cortex, which appears in this region to contain fewer nuclei than are normal. In the reflections of the pia between the convolutions the round-cell infiltration is very extensive. All the bloodvessels in the soft membranes are enormously distended, and their walls are infiltrated with granules of hæmosiderin. The lymphatic spaces are distended, their walls forming delicate trabeculae between the areas of cellular infiltration. No hemorrhages into the arachnoid and pia can be detected. In the cortex the vessels are greatly distended, and there are enormous hemorrhagic areas, causing destruction of the infiltrated nervous tissue, which is filled more or less with crystals of hæmosiderin. The bloodvessels in all parts are distended, and sur-



rounded by a thin layer of round cells. The perivascular cellular infiltration is less distinct in the parts more distant from the cortex. The neuroglia tissue appears to be more reticular than is normal, excepting the extreme outer layer of the cortex, which appears pale, stains badly, and is granular or homogeneous. In this degenerated tissue practically all the vessels are surrounded by extravasations of blood, and there are a few minute accumulations of round cells. The cellular exudate is made up in part of mononuclear cells, with somewhat irregular vesicular pale nuclei, but also contains vast numbers of polynuclear cells and leucocytes, characterized by the intensity by which the nuclei take the stain. In addition, there are a few cells with pale, elongated nuclei. Numerous bacteria are found mixed with the exudate, usually rod-shaped and slightly curved. The nerve cells of the cortex are somewhat swollen. Their nuclei are often irregular, and their protoplasm

takes the stain poorly. In some cases they are distinctly and extremely vacuolated, the vacuoles being much larger than the rest of the cell. The neuroglia nuclei take the stain intensely. They are somewhat irregular in outline, but show otherwise no abnormality. In a section taken from a hemorrhagic area in the interior portion of the right frontal lobe there is considerable infiltration of the subarachnoid space by round cells and some degenerative changes in the adjacent cortex, extending rather further from the pia. In certain areas the round cells appear to have broken into the cerebral tissue, forming aggregations of considerable size. In addition to the more diffuse infiltration, the lymphatic vessels are surrounded and filled with dense masses of these cells, and there are considerable accumulations in the perivascular spaces. The tissue is everywhere infiltrated by a diffuse hemorrhage that in many cases has broken down with the formation of hæmosiderin granules. The cellular infiltration of the folds of the pia dipping into the convolution is enormous. There appears to be an excess of the neuroglia granules. The nerve cells show changes similar to but more severe than those seen in the other specimen. In sections stained by Rosin's mixture hemorrhagic extravasation into the tissue is seen to be very extensive. In some of the bloodvessels partially organized thrombi can be seen. In all situations in the cerebral tissue when round cell infiltration has occurred, bacteria can be found.

The cultures taken by Dr. Sailer from the meninges gave the following results: There resulted a pure culture of a bacillus, measuring from 4μ in length, and from 0.5 to 0.8μ in thickness, with rounded ends and without motility. It stains well with the aniline dyes, but is decolorized by treatment by Gram's method. It grows well on all media, producing a white to yellowish white moist opaque or somewhat translucent layer, with irregular but sharply marked edges on agar, solidified blood-serum, and gelatin. There is no liquefaction of the latter medium. Potato develops a spreading, moist, dirty white to yellowish growth, which becomes somewhat brownish in tint in old cultures. Bouillon and Dunham's solution become cloudy, with a granular deposit, and in some cases a slight mycoderma. In the latter medium there is production of indol. Litmus milk shows an acid production with coagulation of the casein and reduction of the litmus. In sugar media there is marked gas production, more in saccharose, maltose, and lactose than in glucose. The organism is quite pathogenic; guinea-pigs inoculated subcutaneously with 1 c.c. of a twenty-four-hour old bouillon culture succumbing in twelve hours or even less. Its description corresponds to that of the colon group, and it is probably that known as the bacillus coli immobilis.

The only case of abscess of the brain of which I have knowledge, causing death at an earlier stage in life than in the present instance, is one published by Ribbert,¹ in 1879.

In this case the mother had puerperal fever. The child's epigastrium about the navel was infiltrated, but there were no abscesses. The thoracic and abdominal viscera were without noteworthy changes. Both tonsils and the walls of the pharynx, as well as the larynx and vocal

¹ Berliner Klin. Woch., 1879, No. 41, s. 617.

cords, were covered with grayish-white masses, so as nearly to obstruct the passages. Microscopic examination showed *oidium albicans* or thrush fungus. Section of the brain showed that both hemispheres were filled with minute abscesses about a pin's-head in size. Microscopically, numerous granule cells, white corpuscles, and broken-down tissue. The abscesses were due to embolism.

Dr. L. Emmett Holt reported to the American Pediatric Society, in 1897, five cases of abscesses of the brain in infants, and has collected twenty-seven cases in infants and very young children. His cases occurred at the following ages: Six weeks, three months, five months, nine months, and three years. His collected cases varied in age from seven weeks to four years. The bacteriological examinations showed the *streptococcus*, *staphylococcus pyogenes*, *diplococcus*, *pneumococcus*, and, in one case, a child of three months, the *bacillus coli communis*. An organism resembling the *meningococcus* was found in one case. *Oidium albicans* is also a cause of purulent meningitis in infants, and it is not surprising that abrasions about the mouth, so frequently the seat of fermenting detritus, should open a pathway for infection. That the colon bacillus should be found in the brain is noteworthy. Dr. L. N. Boston found it in J. H. Lloyd's case, an adult who died on the fourth day of purulent meningitis. Councilman, Mallory, and Wright have found it, but considered it a contaminating organism. Their investigations show that the *diplococcus intercellularis* is responsible for epidemic cerebro-spinal meningitis in children.

In the case which I present the infection was evidently through the umbilicus, and the lesions of the brain were apparently consistent with a short duration, probably not longer than elapsed between the birth and death of the child. It should be added that the mother made an uneventful recovery.

CONGENITAL IDIOPATHIC DILATATION OF THE COLON.¹

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DILATATION of the colon may be produced by a variety of causes, and various subdivisions based on etiology have consequently been made by writers. The form most frequently seen is that occurring generally in adult life, the result of habitual constipation. In some instances obstinate fecal impaction has developed, followed by death. In certain cases the obstruction has been brought about by the constipation producing kinking of the bowel through the weight of the

¹ Read before the Association of American Physicians, May, 1899.