PROGRESS IN PEDIATRICS

REVIEW OF NEUROLOGY IN CHILDHOOD FOR 1914-1915

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CHICAGO

CEREBROSPINAL FLUID

The latest conception regarding the manner of formation of cerebrospinal fluid is that it is a product of the secretory activity of the epithelium of the choroid plexus. Drugs which stimulate glandular secretion are supposed to increase the formation of cerebrospinal fluid. Using chlorbutanol as an anesthetic, Dandy and Blackfan¹ trephined the Atlas and inserted a special fitting cannula. The animal was so placed that the cannula formed the dependent part. A steady outflow of cerebrospinal fluid was thus obtained, after allowing the accumulated fluid to escape. Jugular compression, by production of cerebral venous stasis, caused an instantaneous increase of cerebrospinal fluid. Ether also caused an increased production of fluid. Amyl nitrite had no such effect. Pilocarpin produced a constant but very slight increase. Intravenous injections of freshly prepared aqueous extracts of choroid plexus and of posterior lobe of pituitary body failed to produce any increase. Following the pilocarpin experiments, the choroid plexuses were removed for histological study. No alterations which could be ascribed to glandular activity were observed.

"One of the strongest arguments in favor of the secretory theory of cerebrospinal fluid formation is the difficulty with which foreign substances pass from the blood to the cerebrospinal fluid." Of several substances tried, hexamethylenamin and salicylic acid were the only substances which Dandy and Blackfan could demonstrate in the spinal fluid after oral, subcutaneous and intravenous administration. Flooding the blood with colored solutions, such as indigo, carmin, trypan blue, and phenolsulphonephthalein failed to show even a trace in the cerebrospinal fluid. These investigators further state:

"The behavior of the Wassermann reaction in the cerebrospinal fluid of hereditary syphilis, without involvement of the central nervous system, gives further evidence of the impermeability of the choroid plexus to foreign substances. In the majority of patients whom we

1. Dandy, W. E., and Blackfan, K. D.: AM. JOUR. DIS. CHILD., 1914, viii, 406.

examined, the reaction was positive in the blood, but in no instance was there a positive reaction in the cerebrospinal fluid." Summarizing the views on the production of cerebrospinal fluid, they think probable that "cerebrospinal fluid is formed both by filtration and secretion."

Dandy and Blackfan studied the absorption of cerebrospinal fluid by substituting phenolsulphonephthalein solution for cerebrospinal fluid. The excretion of the dye was determined in the urine, blood and lymph. It was detected in the blood in three minutes, whereas there was no trace in the lymph for forty-five minutes. It appeared in the urine in five minutes. The greatest amount of absorption occurs from the spinal subarachnoid space, there being practically no absorption from the ventricles.

They were unable to find evidence supporting the existence of stomata in the subarachnoid space. India ink and lamp black granules substituted for cerebrospinal fluid, even when injected under a pressure of 100 mm., failed to show any passage of granules into the blood.

Grulee and Moody² take exception to the statement made by Miller and Levy that the Lange "gold chlorid reaction has no advantages over known laboratory proceedings in the diagnosis of congenital syphilis." They obtained characteristic reactions in the 1 to 40 and 1 to 80 dilutions in eighteen cases of congenital syphilis. In meningitis, reactions occur in the higher dilutions.

"Brain tumors, toxic meningitis (meningismus), edema from sun-stroke, uremia, etc., may give a slight reaction in the fourth, fifth and sixth tubes (1 to 80, 1 to 60 and 1 to 320) when they react at all. The reactions in this group are rarely stronger than a dark blue and usually lie between a red blue and a violet."

Neisser and Friedman had previously shown that other inorganic colloids besides gold chlorid could be used in the same manner. Emanuel³ adopted a Mastix solution, which is easily prepared. Five tubes are used for the test. In the first tube 1.5 c.c. of a 1.25 per cent. salt solution is placed. Only 1 c.c. is put in the other tubes. To the first tube, 0.5 c.c. of spinal fluid is added. After thoroughly mixing, 1 c.c. of the mixture in the first tube is added to the second, 1 c.c. of the second to the third, and so on. None of the mixture is put in the fifth tube. One c.c. of the Mastix solution is added to each tube. The reaction is read at the end of twelve hours. With normal spinal fluids, no precipitation occurs in the first four tubes, indicating the presence of a protective colloid. In syphilis of the brain and tabes, precipitation occurs in all five tubes.

2. Grulee, C. G., and Moody, A. M.: *AM. JOUR. DIS. CHILD.*, 1915, ix, 17.

3. Emanuel, G.: *Berl. klin. Wchnschr.*, 1915, lii, 793.

Major and Nobel⁴ find the glycyI tryptophan reaction a valuable addition to the diagnostic measures used in meningitis. The test determines the peptolytic power of cerebrospinal fluid. In no case without meningitis did these observers obtain a positive reaction. Various dilutions, up to 1 to 200, are made. One c.c. each of the fluid and glycyI tryptophan are placed in a test tube, and 1 c.c. toluene added as a preservative. The mixture is incubated for three hours. A few drops of dilute acetic acid are added, and then a small amount of oversaturated calcium chlorid, to be briskly shaken just before using. In the presence of free tryptophan a red color is obtained.

Segagni⁵ found the test constantly negative in eight cases of tuberculous meningitis, one of cerebral hemorrhage, and one of cerebellar tumor.

The value of the Meyerhofer test for spinal fluid is confirmed by Lackner and Levinson.⁶ The test consists in determining the amount of decinormal permanganate solution reduced by 1 c.c. of cerebrospinal fluid when boiled for ten minutes in a strongly acid medium.

Lemchen⁷ describes a new method of staining cells in the cerebrospinal fluid. Two solutions are prepared. Solution 1 is 2 per cent. benzidin in glacial acetic acid. Solution 2 is hydrogen peroxid. The two solutions are mixed in a small test tube before using. A white cell pipet is used to make the dilution. "Draw the stain to 0.5 and spinal fluid to 11. Mix and count." Red blood cells are stained blue, polymorphonuclears are stained light yellow, while the nucleus is visible by having blue granules in it. In lymphocytes the periphery is stained, appearing as a dark-blue ring.

The reduction of Fehling's solution in the cerebrospinal fluid has been utilized for diagnostic and prognostic purposes. DuBois and Neal⁸ state that while the absence of reduction is of marked significance, its presence means nothing. Equal quantities of cerebrospinal fluid and Fehling's solution should be used. These observers obtained reduction in 73 per cent. of tuberculous fluids. Abramson⁹ thinks the test has definite prognostic value not only in poliomyelitis but in other pathologic conditions. "A fluid that does not reduce Fehling's solution indicates an extensive and severe pathologic change." When the reducing power returns, improvement follows.

4. Major, R. H., and Nobel, E.: *Arch. Int. Med.*, 1914, xiv, 383.

5. Segagni, S.: *LaPediatria*, 1914, xvii, No. 12.; abstr., *Jour. Am. Med. Assn.*, 1915, lxiv, 285.

6. Lackner, E., and Levinson, A.: *Arch. Pediat.*, 1915, xxxii, 508.

7. Lemchen, B.: *Med. Rec.*, New York, 1915, lxxxviii, 443.

8. DuBois, P. L., and Neal, J. B.: *AM. JOUR. DIS. CHILD.*, 1915, ix, 1.

9. Abramson, H. L.: *AM. JOUR. DIS. CHILD.*, 1915, x, 344.

Auer¹⁰ studied the functional effect of experimental intraspinal injections of serums with and without preservatives. He endeavored thereby to determine the explanation for the occasional fatalities following the use of antimeningitis serum. Auer shows that one of the main dangers seems to be the increased intraspinal pressure, as has been suggested by Flexner. That this factor of increased pressure is a prominent one, is shown by the injection of a few cubic centimeters of tricoresol serum after the previous introduction of plain horse serum. A stoppage of respiration, broken occasionally by short gasps, occurs; a profound drop in blood pressure, and a marked slowing of the pulse. The removal of spinal fluid in such an instance suffices to restore pulse, blood pressure and respiration to their normal condition. Auer recommends that one be prepared to remove part of the injected fluid, and to administer artificial respiration. He suggests the use of a preservative which could be removed just before injection. Ether seems preferable to chloroform.

DuBois and Neal also think that the cause of fatalities following intraspinal injection of serum is probably "due to injudicious administration of the serum—too large dose, or too rapid increase of pressure, which is likely to happen unless the gravity method is used—or to an unusual susceptibility on the part of the patient." They also note that similar fatalities have been reported from France, "where serum without preservative is used."

Fonzo¹¹ records the occurrence of a respiratory failure during lumbar puncture which was performed on a child with meningitis. He explains the death by a probable "hyperemia ex vacuo" in the bulbar region. In order to facilitate the entrance of the trocar, the head was strongly flexed forward, probably causing a sudden displacement of cerebrospinal fluid forward.

Quincke¹² discusses the various indications for lumbar puncture. In acute cases of serous meningitis, lumbar puncture may effect a cure. Brain tumor is no contraindication for lumbar puncture. On the contrary, if carefully done, it may be beneficial, even causing a subsidence of choked disk.

Smith¹³ and Lapage¹⁴ report their experiences with lumbar puncture in the diagnosis and treatment of nervous diseases in childhood.

10. Auer, J.: *Jour. Exper. Med.*, 1915, xxi, 43.

11. Fonzo, F.: *LaPediatria*, 1914, xxii, 286.

12. Quincke, H.: *Therap. Monatsh.*, 1914, xxviii, 469.

13. Smith, F. H.: *South. Med. Jour.*, 1915, viii, 858.

14. Lapage, C. P.: *Med. Chron.*, 1914, xxvii, 227.

MENINGITIS

Bardth¹⁵ recommends the surgical treatment of purulent meningitis by lumbar laminectomy and drainage of the dural sac. The usual picture of meningitis observed at necropsy has made us skeptical in regard to the probable usefulness of any surgical measures. Bardth reminds us that a similar line of reasoning prevented us heretofore from treating peritonitis surgically.

Despite the bad results thus far obtained by drainage of the cisterna magna, Kopetzky¹⁶ believes that in purulent meningitis such an operation may prove a useful measure. He urges that the operation should not be entirely discarded.

Leighton and Pringle¹⁷ report two cured cases of streptococcus meningitis, treated surgically. One of these was in a child, aged 8 years. Lumbar laminectomy over the third lumbar vertebra was followed by complete recovery.

DuBois and Neal,¹⁸ reporting a complete recovery from streptococcus meningitis, disapprove of operative measures and think that Haynes' advice to operate on all patients with septic meningitis is quite unjustifiable.

Herman¹⁹ reports a case of pneumococcus meningitis in a sixteen-day-old infant. It was admitted to the hospital with a subnormal temperature. The physical examination was negative. Death occurred after twenty-four hours. A necropsy showed the presence of pneumococcus meningitis.

Mauriac and Philip²⁰ report a case of pneumococcus meningitis which developed one month after scarlet fever. The child, 8½ years old, was taken sick with vomiting and epileptiform movements of the left side, followed by fever and coma. The urine contained a large amount of albumin, the blood and spinal fluid a large amount of urea. The second lumbar puncture revealed a pneumococcus meningitis.

Krever²¹ distinguishes two forms of pneumococcus meningitis, differing in their origin and prognosis. The variety complicating a pneumonia is more fatal than that following nasopharyngitis.

Favorable results obtained by the use of ethylhydrocuprein in various pneumococcus infections have been reported by numerous observers during the past eighteen months. From the neurological viewpoint, it is encouraging to read of even a rare cured case of pneumococcus meningitis.

15. Bardth: *Arch. f. klin. Chir.*, 1914, cv, 653.

16. Kopetzky, S. J. *Laryngoscope*, 1914, xxiv, 733.

17. Leighton, W. E., and Pringle, J. A.: *Jour. Am. Med. Assn.*, 1915, lxiv, 2054.

18. DuBois, P. L., and Neal, J. B.: *Arch. Pediat.*, 1915, xxxii, 28.

19. Herman, C.: *Arch. Pediat.*, 1915, xxxii, 583.

20. Mauriac, P., and Philip, P.: *Ann. de méd. et chir. inf.*, 1914, xviii, 475.

21. Krever, A. R.: *Russk. Vrach., abstr., Jour. Am. Med. Assn.*, 1914, lxiii, 2170.

Loewe and Meyer²² report two cured cases of pneumococcus meningitis by the administration of ethylhydrocuprein. They gave 5 c.c. of a 1 per cent. solution intraspinally.

Leschke²³ states that Wolff had a recovery in an 8 months old baby with this drug.

Boland,²⁴ Terbutt,²⁵ Alan Brown,²⁶ Ely,²⁷ Hill and Packard²⁸ report cases of influenzal meningitis. Of the five patients reported by Hill and Packard, one survived. All the other cases terminated fatally.

Atkinson²⁹ reports a case of meningitis associated with an influenza-like bacillus. Besides the gram-negative bacilli, long wavy filaments and twisted spirals were observed. The finding suggests the possibility that some of the so called leptothrix forms sometimes seen in the spinal fluid from patients with meningitis, are, in reality, aberrant forms of *Bacillus influenzae*.

A singular case of meningitis in a two week old infant is reported by Garmer and Havelocque.³⁰ The spinal fluid showed the typhoid bacillus. The child was breast fed, and the mother gave no past history of typhoid infection.

Goebel³¹ reports a proteus meningitis in a new-born child. The clinical picture was that usually seen with any form of meningitis. A pure culture of *Bacillus proteus* was obtained from the spinal and ventricular fluid. The blood serum of the patient agglutinated the organism in a 1 to 60 dilution but did not agglutinate a stock culture of *Bacillus proteus*. The child presented an odor similar to that given by the organism growing on culture media.

Rutelli³² reports a case of streptothrix meningitis in a 6 months infant. The organism was cultivated in pure culture on Bordet-Gengou media.

A puzzling case of recurrent meningitis due to lead in a child of 5 years is reported by Thomas and Blackfan.³³ The patient was taken sick five days before admission to the hospital with characteristic symptoms. A lumbar puncture brought clear sterile fluid, cells 20-40,

22. Loewe, E., and Meyer, F.: Berl. klin. Wchnschr., 1915, lii, 1018.

23. Leschke, E.: Deutsch. med. Wchnschr., 1915, xli, 1359.

24. Boland, C. V.: Lancet, London, 1915, clxxxix, 704.

25. Terbutt, A. H.: Med. Jour. Australia, abstr., Rev. Neurol. and psychiat., 1915, xiii, 33.

26. Brown, Alan: Canad. Med. Assn. Jour., 1915, v, 1076.

27. Ely, F. A.: Jour. Iowa State Med. Soc., 1915, v, 391.

28. Hill, R. B., and Packard, R. J.: Lancet-Clinic, 1915, lxiii, 723.

29. Atkinson, E.: Med. Jour. Australia, 1914, i, 415, abstr. Rev. neurol. and psychiat., 1915, xiii, 34.

30. Garmer, M., and Havelocque, Mme.: Nourisson, 1914, ii, 211.

31. Goebel, F.: Deutsch. Arch. f. klin. Med., 1914, cxvi, 119.

32. Rutelli, G.: LaPediatria, 1915, xxii, 713.

33. Thomas, H. M., and Blackfan, K. D.: AM. JOUR. DIS. CHILD., 1914, viii, 377.

mononuclears predominating, globulin reaction positive. Fehling's solution was reduced. The Wassermann and Von Pirquet reactions were negative. The patient was discharged well after a month. Five months later, the patient was readmitted with a similar trouble. A lead line was noticed on the gums. Examination of the red blood cells showed characteristic stippling. The source of the lead was soon explained when the child's mouth was found covered with lead paint from his crib. The patient was discharged well. Three weeks later convulsions recurred, followed by death. No necropsy was done.

Jovane³⁴ records what he terms "a chronic form of meningitis" which usually ends in recovery after a number of months. During the disease a tremor is noticed. It is followed by various degrees of contractures. Other than slight pleocytosis, the spinal fluid appears normal. The etiology is unknown.

The pathologic findings of a case of pachymeningitis hemorrhagica interna, undiagnosed during life, are given by Riley.³⁵ The clinical diagnosis was "decomposition" and internal hydrocephalus. Wilcox³⁶ studied the value of Macewen's sign in the diagnosis of meningeal conditions. He found the sign present in sixty-seven of seventy-one patients who had meningitis. It was also present in all of five patients with acute poliomyelitis. Macewen's sign is best determined by the stethoscope placed on the forehead just above the base of the nose. The skull is percussed directly over the parietal region, the percussing finger going from a point just over the parietal boss to that at which the stethoscope is applied.

In "a summary of four years' clinical and bacteriologic experience with meningitis in New York City," DuBois and Neal select four signs as the most important in the diagnosis of meningitis. These are stiffness of the neck, variations of regularity in rate and depth of respiration, Macewen's sign and Brudzinsky's sign.

The differential points in the diagnosis of cerebral intoxication, meningismus and meningitis, pachymeningitis and encephalitis are emphasized by Heiman.³⁷ The difference between intoxication and serous meningitis, he notes, is only one of degree.

The symptoms of meningismus are frequently seen after decompression operations, according to Minz.³⁸ These symptoms are due to an increased amount of cerebrospinal fluid. They are especially seen following operations for tumors of the posterior cranial fossa.

34. Jovane, A.: *LaPediatria*, 1914, xxii, 181.

35. Riley, F. B.: *Tr. Chicago Path. Soc.*, 1915, ix, 233.

36. Wilcox, H. B.: *Arch. Pediat.*, 1915, xxxii, 909.

37. Heiman, H.: *Arch. Pediat.*, 1915, xxxii, 579.

38. Minz, V. M.: *Russk. Vrach.*, 1914, xiii, Nos. 13 and 14, abstr., *Jour. Am. Med. Assn.*, 1914, lxi, 616.

DuBois and Neal have never seen a case of meningitis follow one of meningismus. They believe that meningismus is a functional condition, probably of toxic origin.

Guinon³⁹ maintains that the term meningitis is used rather indiscriminately to cover many conditions associated with cerebral irritation, in which meningeal inflammation does not actually exist. A number of conditions so designated are cases of encephalitis. He quotes the admirable description of encephalitis by Comby and Chartier. Guinon thinks this picture should be made more flexible. Encephalitis may be mild or severe. He reports in detail two instances of encephalitis which recovered. The first, a child 4 years old, with a good family history, was taken sick after a normal convalescence from measles. One afternoon during her play the child fell, due to weakness of her extremities. Three days later she developed a train of symptoms characteristic of encephalitis. These consisted of gradually increasing stupor, inertia and apparent unconsciousness. The motor phenomena were general rigidity, contractures of the extremities, especially on the left side, exaggerated reflexes, partial athetosis and tremor. There was no Kernig's sign or any definite rigidity of the neck. The eyes were normal. Cerebrospinal fluid was normal. This period lasted for six days, and was followed by a period of aphasia lasting ten days. About the thirtieth day convalescence began and continued rapidly. In less than ten days speech returned and movements of the extremities became normal. Recovery was complete, except that there persisted a slight degree of facial asymmetry noted during laughter. The pathogenesis remains obscure. Rarely, a microorganism may be isolated, but the majority of investigators attribute the disease to a toxic origin. Guinon is unwilling to admit that the measles which the child had several weeks before the onset of this encephalitis played any rôle in the etiology of this particular case. He discusses the possibility of encephalitis being a manifestation of poliomyelitis.

MENINGEAL COMPLICATIONS OF THE CONTAGIOUS DISEASES

For persistent convulsions which occurred during the course of pertussis, which were refractory to chloral and chloroform, Fischer⁴⁰ performed ventricular aspiration. Immediate recovery followed.

Four cases of paralysis in pertussis are reported by Sorensen,⁴¹ who discusses their probable causes. Their rapid disappearance spoke against hemorrhage as a cause, especially since the paralysis occurred during the quiescent stage of the disease. He therefore considered them of toxic origin.

39. Guinon, L.: *Arch. de méd. d. enfants*, 1914, xvii, 561.

40. Fischer, L.: *New York Med. Jour.*, 1914, c, 1054.

41. Sorensen, S. T.: *Arch. f. Kinderh.*, 1915, lxiv, 368.

Weigert⁴² records the occurrence of meningocele in an infant of 4 months as a rare complication of pertussis. After recovery the tumor slowly receded.

Wharton-Smith⁴³ notes that text books do not refer to acute myelitis among the sequelae of varicella, and reports such a case. Two weeks after the onset of the varicella the patient's temperature began to rise, and it was noticed that the patient's legs were drawn up. He was unable to move either of his legs or his left arm. There was also loss of sensation over these extremities. Sensation gradually returned after two weeks. His left arm was held over his head and he would scream with pain, if one attempted to pull it down or to straighten his legs. Incontinence of urine and feces was present. Fourteen months later the patient was again seen. He was able to play. There was still some spasticity of the lower extremities. The reflexes were active. There was no evidence of urinary incontinence excepting nocturnal enuresis, from which he had suffered prior to his acute illness.

The occurrence of transitory ataxia in a 7 year old boy during convalescence from measles is considered by Morichau⁴⁴ as another example of acute encephalitis, such as described by Guinon.

Rolleston⁴⁵ reports a case of extensive occlusion of the cerebral arteries following diphtheria. Two weeks after the onset of pharyngeal diphtheria the patient, an eight year old girl, complained of pain in her left chest. As her heart was being examined, she became cyanotic and unconscious, had convulsive movements of the right arm and leg, and Cheyne-Stokes respiration. The corneal reflex was absent on the right side, but active on the left side. Paralysis of the muscles of deglutition followed. Two days later death occurred. The necropsy revealed a clot filling the basilar artery, which Rolleston remarks, from his observation of eighteen cases, is the most common lesion in diphtheritic hemiplegia.

Mollet⁴⁶ collected and studied the cases of organic hemiplegia of diphtheritic origin. It occurs once in 1,500 cases. It usually follows malignant diphtheria, occurring in the second or third week. In two-thirds of the patients the hemiplegia is right sided. The prognosis is grave, not alone because of permanent contractures which follow, but on account of the high mortality, one third of the patients succumbing to the attack.

42. Weigert, R.: *Monatsch. f. Kinderh.*, 1914, xiii, 139.

43. Smith, Wharton: *AM. JOUR. DIS. CHILD.*, 1915, x, 444.

44. Morichau, R., et al.: *Soc. méd. d. Hôp.*, July 3, 1914, abstr., *Arch. de méd. d. enfants*, 1915, xviii, 615.

45. Rolleston, J. D., and Guinon, E. B.: *Rev. neurol. and psychiat.*, 1915, xiii, 373.

46. Mollét, A.: *These de Paris*, abstr., *Arch. de méd. d. enfants*, 1915, xviii, 403.

POLIOMYELITIS

Gegenbach,⁴⁷ Whitman,⁴⁸ Amesse,⁴⁹ Andrews⁵⁰ and others discuss poliomyelitis.

Flexner^{51, 52} and his co-workers studied the mode of infection in poliomyelitis. They demonstrated that the virus readily reaches the central nervous system when brought into relation with peripheral nerves. Much larger quantities are necessary to produce poliomyelitis if the virus is introduced into the blood stream. The lesions in human poliomyelitis seem to correspond with those caused by intraneural and not by intravenous inoculation. Flexner considers the respiratory tract the "infection atrium" in this disease. Flexner was able to prevent the development of poliomyelitis in monkeys by the intraspinal injection of immune monkey serum. The spread of poliomyelitis is effected by the existence of healthy carriers, such having been demonstrated in the parents of an infected child and in recovered patients. There are also cases of nonparalytic ambulant forms. This has not only been proved clinically, but by the detection of changes in the cerebrospinal fluid, by the demonstration of neutralizing principles in the blood of such patients and by the determination of the virus of poliomyelitis in the upper respiratory tract.

Fraser⁵³ studied ninety cases of acute epidemic poliomyelitis. The symptoms usually encountered are feverishness, drowsiness, restlessness, twitching of extremities, sweating, vomiting and anorexia, rigidity of the neck, pain and tenderness, either generalized or localized to the limb involved. Similarly, the twitching may be confined to the extremity which is later paralyzed. The paralysis may involve the extremities, singly or combined, or may be respiratory or facial. Tuberculous meningitis and specific myelitis occasionally give the same clinical picture as well as cerebrospinal fluid findings as are noted in poliomyelitis. During the acute stage treatment has proven of no avail. After the acute stage massage will do much to improve paralyses. The importance of electricity is only secondary to that of massage and passive exercises.

Abramson examined the cerebrospinal fluid of forty-three patients with acute poliomyelitis. Fifteen showed a great increase in the cell count, twenty-four showed a moderate increase, four showed no increase. The lymphocytes were in excess in all but five fluids. These

47. Gegenbach, F. P.: *Colorado Med.*, 1915, xii, 21.

48. Whitman, R. C.: *Colorado Med.*, 1915, xii, 20.

49. Amesse, J. W.: *Colorado Med.*, 1915, xii, 17.

50. Andrews, L. E.: *Jour. Oklahoma State Med. Assn.*, 1914, vii, 56.

51. Flexner, S., and Amoos, H. L.: *Jour. Exper. Med.*, 1914, xx, 249.

52. Flexner, S.: *AM. JOUR. DIS. CHILD.*, 1915, ix, 353.

53. Fraser, F. R.: *Am. Jour. Med. Sc.*, 1914, cxlviii, 1.

five showed a polymorphonuclear pleocytosis. Abramson calls attention to the importance of large endothelial cells, and cells with pyriform nuclei. When he finds the former in large numbers he very strongly considers poliomyelitis. The cell count and globulin reaction in Abramson's examinations show a parallel relationship, contrary to what has been stated by the Rockefeller Institute workers. There exists an inverse relation between the amount of globulin and the reduction of Fehling's solution.

Sawyer⁵⁴ made an epidemiologic study of poliomyelitis in northern California. He demonstrated the active virus of poliomyelitis by animal inoculation in the rectal washings from a patient fourteen days after the onset of the paralysis.

Netter⁵⁵ reports his results obtained in the treatment of acute poliomyelitis by the use of serum obtained from individuals who have had the disease. He used the serum intraspinally in doses of 5 to 13 c.c., repeating the dose daily for eight consecutive days. Early administration is necessary, "from the first to the fourth day." Of thirty-two cases treated in this manner, six were completely cured, three were practically cured, twelve were improved, three were unchanged, eight died.

Alfara and Hitce,⁵⁶ following Netter's technic, treated an acute case of poliomyelitis in an infant of 7 months. On the fourth day of its illness, the baby was completely paralyzed. On the seventh day, 2 c.c. of serum was injected intraspinally. This was obtained from two children who had previously had the disease. Marked improvement resulted.

Ager⁵⁷ reports the death of two patients with afebrile, non-paralytic polioencephalitis, who were treated by autoinoculation with cerebrospinal fluid.

CHOREA AND TIC

Strauss⁵⁸ discusses the present conception of chorea. Heredity, neuropathic taint, fright and excitement have been frequently named as causes of chorea. Though these may play a rôle as predisposing causes, the exciting cause is probably of an infectious nature. The relation of chorea to rheumatism has been noted, and it has been suggested that the two diseases are caused by the same micro-organism. While from the blood of patients with arthritis diplococci are frequently isolated, the cultural and biological work that has been done on choreics has given conflicting results. At Mt. Sinai Hospital they had not been able to

54. Sawyer, W. A.: *Am. Jour. Trop. Dis. and Prev. Med.*, 1915, iii, 164.

55. Netter, Arnold: *Bull. de l'Acad. de méd.*, Paris, 1915, lxxiv, 403.

56. Alfaro, G. A., and Hitce, J. M.: *Semana méd.*, 1915, xxii, 211.

57. Ager, L. C.: *Arch. Pediat.*, 1915, xxxii, 755.

58. Strauss, I.: *Med. Rec.*, New York, 1915, lxxxviii, 255.

isolate organisms from the blood in chorea. Strauss thinks that the therapeutic test speaks against rheumatic arthritis and chorea being manifestations of one infection, since "In chorea one does not get the good results from salicylates as are obtained in polyarthritis."

The improvement following the use of arsenic suggests the possibility that a protozoon is the causative agent.

La Fetra reports that in two of his patients a streptococcus viridans was isolated from the blood.

Koplik believes that some organism is responsible, possibly not the streptococcus, but an organism associated with the streptococcus.

In an analysis of sixteen cases of chorea Middlemiss⁵⁹ calls attention to an underlying neurotic element, which, he thinks, has not received its due importance. In four of his series there was an undoubted history of rheumatism.

Mackenzie⁶⁰ reviews the various theories which have been given regarding chorea. He reports the detailed histories of sixty-four cases, and seems rather skeptical about any common origin for rheumatic arthritis and chorea.

Certain French observers having suggested a close relationship between chorea and syphilis; Comby⁶¹ determined the Wassermann reaction on 39 patients with chorea. Twenty-eight were negative, four were doubtful, seven were positive. Of these thirty-seven children, twenty-four gave positive tuberculin tests. This result would certainly not be interpreted as an indication of a tuberculous basis for chorea. Neither, according to Comby, do the positive Wassermann reactions in this series indicate an association with syphilis, both results being merely coincidences.

Koplik⁶² made a similar study on eleven successive cases of chorea. Eight patients gave a negative Wassermann reaction. In two patients the reaction was unsatisfactory, one was not done. If the study had been prolonged, positive Wassermann reactions might have occurred, for "a child affected with syphilis might contract chorea just as readily as another." Salvarsan has no virtues over previous remedies in the treatment of chorea.

Difficulty may be experienced in the elicitation of the reflexes in choreic patients. Swift⁶³ suggests that the examiner choose reflexes with long pendulums such as the knee and triceps, and that the test be preceded by instructing the child to hold still. Often a number of trials are necessary. Choreia may enforce, retard or add to the usual reflex.

59. Middlemiss, J. E.: *Edinburgh Med. Jour.*, 1915, xv, 333.

60. Mackenzie, I.: *Glasgow Med. Jour.*, 1915, lxxxiii, 259.

61. Comby, J.: *Arch. de méd. d. enfants*, 1915, xviii, 517.

62. Koplik, H.: *Arch. Pediat.*, 1915, xxxii, 561.

63. Swift, W. B.: *Albany Med. Ann.*, 1915, xxxvi, 425, 488.

Swift⁶⁴ notes a change in pitch and intensity during the prolonged sounding of certain vowels by patients with chorea. He has named this the voice sign. The patient is allowed to sit or stand with body relaxed. The patient is instructed to take a deep inspiration and sound for 15 to 20 seconds, the vowel *a* as in *are*. During the prolongation of this note contraction in the respiratory muscles may occur, changing the intensity of the sound.

An eosinophilia in the blood of patients with chorea is noted by Léopold.⁶⁵ He studied twenty cases, 50 per cent. of which gave an eosinophilia ranging from 4 to 16 per cent. In nine patients with recurrent chorea eosinophilia was found in six.

Acuna⁶⁶ obtained brilliant results in the treatment of chorea by the intraspinal injection of magnesium sulphate. He used a 25 per cent. solution, giving 1 c.c. of this solution for every 15 kg. weight. Exceptionally, the dose was increased to 1.25 or 1.5 c.c. per 15 kg. Improvement followed rapidly and seemed permanent. In each of the six cases reported, from one to four injections were given. In one patient, in whom 3 c.c. of the solution was used, there was a cessation of all choreic movements in forty-eight hours.

Passini⁶⁷ thinks that simple lumbar puncture is a useful therapeutic measure in chorea.

Vas⁶⁸ explains spasmus nutans in childhood as a "conditional reflex." This term was first elaborated by the physiologist, Pawlow, for the interpretation of certain physiologic phenomena, such as salivary secretion on thought of certain food. The practical bearing of this reflex to children was later studied by Krasnogorski and Czerny, and by Ibrahim. Blepharospasm following conjunctivitis and the holding breath spells seen in older children who have had tetany during infancy are examples of processes explained by this reflex.

Raudnitz had previously tried to show that the chief factor in the production of spasmus nutans was the dark dwelling house. When the child was put to sleep, its constantly repeated efforts to turn its head to a light area in the room produces the condition. Nystagmus occasionally followed, which seemed analagous to the nystagmus which develops in cave dwellers.

Such conditions, resulting from abnormal innervation, need not necessarily follow habitation in a dark room, according to Vas. They may also follow repeated efforts on the child's part to turn its head for hearing a certain sound, such as a clock, or to see a certain object, as

64. Swift, W. B.: AM. JOUR. DIS. CHILD., 1914, viii, 279; 1915, ix, 132.

65. Leopold, S. S.: New York Med. Jour., 1914, c, 225.

66. Acuna, M.: Semana méd., 1914, xxi, 929.

67. Passini, F.: Wien. klin. Wchnschr., 1914, xxvii, 1363.

68. Vas, J.: Jahrb. f. Kinderh., 1915, lxxxi, 123.

a mirror. With repetition of the strain which the muscles of the neck undergo, abnormal innervations are produced, which develop into a pathologic conditional reflex. The nystagmus secondarily follows either by the tiring of the eye musculature or by the attempt of the eye to produce sharper pictures on the retina, which does not receive such if the head is being moved constantly. It has been shown in the dog that such movements may produce concomitant nystagmus.

The diagnosis and treatment of habit spasm is discussed by Grossman.⁶⁹ He states that the distinction between chorea and tic is easily made. "Movements in chorea are more irregular, incoordinated, and less rapid. The movements in tic are more regular, purposive, and repeated at intervals in just the same manner." Observation of these movements aggravates them in chorea, but lessens them in tic. Tic may affect any muscle or group of muscles. Blinking the eyelids is the most commonly observed. Such a tic may be accompanied by a facial grimace. Grossman gives the patient a tonic, prescribes a proper hygiene, but more important still is the reeducation of the patient. This is accomplished by proper breathing exercises, and muscular exercises which Grossman describes in detail.

Cockayne⁷⁰ reports what he terms "the jaw-winking phenomenon," in an infant. When the patient was a month old the right eyelid "went up and down" when the baby nursed. At six months there was a slight ptosis of the right upper lid. Cockayne thinks there must have been a defect of the motor path for the movement of the upper lid, at least, of that part above the nucleus of the third nerve.

SYPHILIS

Camp⁷¹ calls attention to the variety of manifestations exhibited in syphilitic infection of the central nervous system. Chronic encephalitis or meningo-encephalitis are the usual pathologic conditions found. He states that, "Syphilis as a cause of epilepsy is well known. A great many cases of idiopathic epilepsy are due to syphilis, and in a certain number of cases the syphilis is congenital." Mental deficiency is another of its manifestations.

Keyser⁷² reports a case of syphilitic hemiplegia in a child aged 5. The symptoms disappeared under antisypilitic treatment.

Rohde⁷³ gives a detailed clinical and pathologic report of a case of syphilis of the brain.

69. Grossman, M.: *New York Med. Jour.*, 1915, cii, 339.

70. Cockayne, E. A.: *Brit. Jour. Child. Dis.*, 1914, xi, 352.

71. Camp, C. D.: *Am. Jour. Urol.*, 1915, xi, 233.

72. Keyser, T. J.: *Boston Med. and Surg. Jour.*, 1915, clxxii, 344.

73. Rohde, M.: *Monatschr. f. Psychiat. u. Neurol.*, 1914, xxxvi, 407.

Encephalitis of syphilitic origin may produce lesions not unlike those of an ordinary encephalitis according to Péhu and Gardière.⁷⁴ They report the sudden occurrence of hemiplegia in a two year old child, who had congenital syphilis. Death occurred in five days. Anatomically and histologically, the lesions could not have been distinguished from other forms of encephalitis. Large numbers of treponemata were found. The clinical diagnosis must depend upon the existence of syphilis in the parents or the occurrence of stigmata in the patient, or, finally, the action of mercury.

Zondek⁷⁵ observed a very puzzling case of apparent cerebral syphilis, which diagnosis the necropsy disproved. The patient was a well-developed and well-nourished infant, with a slight adenopathy, a palpable spleen and a weakly positive Wassermann reaction. During its stay in the hospital vomiting occurred, which was followed by the development of paresis and contractures on the left side. Despite the mercurial treatment the vomiting persisted, convulsions set in and general condition grew worse. Two subsequent Wassermann tests gave a three plus reaction. Lumbar puncture disclosed a clear fluid, under pressure, globulin positive, polymorphonuclear and mononuclear cells equal. The eye grounds showed a double neuroretinitis with a one-sided choked disk. Several weeks later the right side became spastic, and the child had tonic-clonic spasms, beginning on the left side, ending on the right side. Lumbar puncture was repeated. Lymphocytes predominated. Diphtheria and bronchopneumonia finally caused death. A diagnosis of hydrocephalus internus luetica with probable gumma was made. Necropsy showed no signs of syphilis (Aschoff). There was an extensive softening of the right frontal lobe, thrombosis of the longitudinal and transverse sinuses, and thrombosis of both Sylvian arteries; no endarteritis; external hydrocephalus.

The positive Wassermann reactions Zondek explains by an accumulation of lipoids in the blood stream from the broken down brain tissue. The choked disk is explained by increased intracranial pressure, the lymphocytosis by meningeal irritation.

Juvenile paresis is often overlooked in children, according to Leroux and Weinzwieg.⁷⁶ A number are diagnosed as chronic meningoencephalitis. The somatic signs resemble those seen in the adult, namely, arrest of physical development and nondevelopment of the sexual organs. Children do not usually show the ideas of grandeur and persecution so common in the adult. A change in character and intelligence usually occurs. The child becomes taciturn and inattentive, loses his memory, and complains of headache and insomnia. Occasionally, the

74. Péhu et Gardière: *Arch. d. méd. d. enfants*, 1915, xviii, 330.

75. Zondek, H.: *Deutsch. med. Wchnschr.*, 1915, xli, 558.

76. Leroux, C., and Weinzwieg, M.: *Arch. de méd. d. enfants*, 1915, xviii, 377.

beginning is abrupt, with epileptiform or apoplectiform attacks. Evolution is progressive without remissions. The average duration is from three to five years. The disease may be confused with idiocy, epilepsy, tumors or meningitis.

Schick,⁷⁷ Loffer,⁷⁸ Leonard,⁷⁹ Gostwyck,⁸⁰ Collett⁸¹ and others report cases of the disease observed in children.

Barkan⁸² discusses infantile and juvenile tabes, reporting twelve cases. Optic atrophy is usually the earliest symptom. Ninety-five per cent. present this symptom in childhood, in contrast to only 40 per cent. in the adult type of the disease.

The Wassermann reaction was positive in all. The patellar and Achilles reflexes were absent in 80 per cent. While in adults 80 per cent. exhibit a Romberg sign and ataxia, in children only 20 per cent. give these symptoms. Barkan says that a Romberg sign is rarely seen. Argyll Robertson pupils, and inequality of the pupils are usually present. The prognosis as regards sight is unfavorable, complete blindness being almost the rule. Mercury is of no avail.

EPILEPSY

Schlutz⁸³ says that a large number of infants have epilepsy. He makes some interesting observations in regard to its manifestations in childhood. The majority of cases develop it between the first and seventh years. The diagnosis of hysteria is frequently made when epilepsy is the disease present. The earlier epilepsy develops, the more unfavorable is the prognosis. Children seldom injure themselves during an epileptic attack. Very probably, these children have aura.

Turner⁸⁴ calls attention to the possible temporary remissions that occur in children at the age of 4 or 5, lasting until puberty. The treatment is very unsatisfactory.

Clarke⁸⁵ explains the pathogenesis of epilepsy on a Freudian basis. Epilepsy is essentially due to an arrest in the development of the psychosexual libido, he thinks. In this conception of epilepsy, the "fit" is explained as a libidinous outlet for the infantile unconscious, the nucleus of which is a desire on the part of the epileptic to return to a state of infancy. Close analysis of the epileptic supports this idea. The mental makeup of the epileptic resembles that of the child. They

77. Schick, B.: *Mitt. d. Gesellsch. f. inn. Med. u. Kinderh.*, 1914, xiii, 217.

78. Loffer, W. B.: *Cleveland Med. Jour.*, 1914, xiii, 607.

79. Leonard, E. F.: *Illinois Med. Jour.*, 1915, xxvii, 443.

80. Gostwyck, C. G. H.: *Jour. Ment. Sc.*, 1915, lxi, 254.

81. Collett, A.: *Jahrb. f. Kinderh.*, 1914, lxxix, 24.

82. Barkan, H.: *California State Jour. Med.*, 1914, xii, 488.

83. Schlutz, F. W.: *Journal-Lancet*, 1914, xxxiv, 504.

84. Turner, W. A.: *Brit. Med. Jour.*, 1914, ii, 665.

85. Clarke, L. P.: *New York Med. Jour.*, 1915, ci, 385, 442, 515, 567, 623.

memorize easily, while their constructive imagination is absent. In their speech, handwriting and deportment, they always show a childlike nature, never developing specific character individuality. An analysis of their dreams shows a similar condition. The dominance of the parents, the large number of simple repressed child wishes, and the functional character of the dream imagery is striking. The movements in the convulsion are very analagous to certain moods commonly seen in the infant, such as "the deflection of the head to the side, the quad-angle mouth, etc." The prognosis is good in proportion to the possible development of the individual adolescent.

Shaw⁸⁶ states that the manifestations of epilepsy are due to a sudden "anemia of the cortex causing a discharge of the cortical nerve cells." This anemia is produced by sudden stasis and agglutination of the nucleoproteid coagulative elements of the blood in the cortical capillaries. The unusual tendency to agglutinate and the decreased alkalinity of the blood which is present in epilepsy makes this always possible.

Amesse⁸⁷ believes that chronic intestinal indigestion plays a great part in the production of epileptiform seizures. The obvious remedy is therefore dietary regulation.

Reed⁸⁸ has noticed that relief of constipation often cures epilepsy. He thinks that epilepsy is an infectious disease, the infecting agent being probably located in the intestinal tract and favored by mechanical constipation. Reed therefore proposed to remove the cause by performing an ileosigmoidoscopy followed by a colectomy, and reports favorable results.

Roentgenologic studies of the head, particularly of the sella turcica, in patients with epilepsy, were made by McKennan⁸⁹ and his co-workers. They found an overgrowth of the anterior and posterior clinoid processes, which are not only increased in area and length, but are folded over the pituitary gland. This bony overgrowth practically causes a local acromegaly.

Löwy⁹⁰ studied the blood during an epileptic seizure. He found, principally, a rise in the refractive index and a slight leukocytosis. Attacks of jacksonian epilepsy resulting from intracranial telangiectasis are reported by Sachs.⁹¹ The patients were each 10 years old. One showed a vascularity, involving chiefly the dura, the other the cortex. One of these patients presented telangiectasis of the face. In similar cases telangiectasis has been reported on other parts of the body.

86. Shaw, J. J. M.: *Jour. Ment. Sc.*, 1914, ix, 398.

87. Amesse, J. W.: *Colorado Med.*, 1914, xi, 424.

88. Reed, C. A. L.: *Jour. Am. Med. Assn.*, 1915, lxiv, 1047.

89. McKennan, T. M. T., Johnson, G. C., and Henninger, C. H.: *Pennsylvania Med. Jour.*, 1915, xviii, 429.

90. Löwy, J.: *Zentralbl. f. inn. Med.*, 1914, xxxv, 985.

91. Sachs, E.: *Am. Jour. Med. Sc.*, 1915, cl, 565.

The unsatisfactory results of treatment in epilepsy is indicated by the numerous measures recommended from year to year for its treatment.

Brodsky⁹² thinks that the bromids are the best drugs to use. However, the physical and dietetic treatment are of primary importance. Protein food should be reduced to a minimum and salt given only sparingly. Institutional treatment is most satisfactory.

Crotalin has given poor results according to Yawger,⁹³ while Jenkins and Pendleton⁹⁴ conclude that the number of convulsions are increased by its use, and in direct proportion to the amount used.

Held⁹⁵ noted a symptomatologic and pathologic similarity between epilepsy and rabies. He devised a serum prepared as follows:

"Blood serum and cerebrospinal fluid is gained from epileptics and passed through animals first properly prepared with rabific virus. The resultant is again conducted through a series of animals in order to attenuate unpleasant bodies." Using this serum, Held has obtained good results in the treatment of epilepsy. He deplores the use of bromids in this disease.

Kutzinsky,⁹⁶ Dubrowski⁹⁷ and Klotz⁹⁸ report favorably the results of the treatment of epilepsy with luminal (chemically, phenylethyl-barbituric acid). Klotz makes no claim for curing epilepsy, but notes that it decidedly diminishes the severity of the attacks and may affect their frequency. He uses a dose of from 0.05 gm. to 0.075 gm. in very young children, and from 0.1 gm. to 0.2 gm. in older children. This dose is given on two successive evenings, followed by two evenings of abstinence, to avoid cumulative effects. This alternation is continued.

Callosal puncture is suggested by Stieda⁹⁹ as a simple, safe and useful procedure in the treatment of epilepsy. In his experience, it was followed by at least temporary improvement. He recommends the procedure for other conditions when there is associated an increased intracranial pressure.

Many cases of epilepsy are due to reflex causes, according to Kalischer.¹⁰⁰ These causes may be present in the skin, bone or elsewhere. When such a cause is demonstrable, the removal of the

92. Brodsky, E. S.: *Med. Rec.*, New York, 1915, lxxxviii, 479.

93. Yawger, N. S.: *Pennsylvania Med. Jour.*, 1914, xvii, 964.

94. Jenkins, C. L., and Pendleton, A. S.: *Jour. Am. Med. Assn.*, 1914, lxiii, 1749.

95. Held, W.: *Chicago Med. Recorder*, 1915, xxxvii, 157, 342.

96. Kutzinsky, A.: *Monatsch. f. Psychiat. u. Neurol.*, 1914, xxvi, 174.

97. Dubrowski, W. G.: *Monatschr. f. Psychiat. u. Neurol.*, 1914, xxvi, 248.

98. Klotz, M.: *Therap. Monatsh.*, 1915, xxix, 129.

99. Stieda, A.: *Arch. f. klin. Chir.*, 1914, cv, 277.

100. Kalischer, S.: *Centralbl. f. d. Grenzgeb. d. Med. u. Chir.*, 1914, xviii, 368.

peripheral irritation by operative measures may effect a cure. In children, in whom tetany is so frequent, the difficulty consists in distinguishing the two.

Surgical treatment of epilepsy, judging from the results, is unjustifiable, according to Minz.¹⁰¹

LITTLE'S DISEASE

Spiller¹⁰² studied the histories of four patients brought to him for spastic diplegia. Their ages ranged from 16 months to 3 years and 10 months. During infancy, these patients had all had jaundice, the duration of which varied from three days to three months. Several authors have noted in the adult a close relationship between diseases of the liver and alterations of the nerve cells of the brain. Spiller discusses this possibility in its application to Little's disease in childhood.

Throckmorton¹⁰³ reviews the various theories extant regarding this disease. He reports a case of early acquired spastic paraplegia, associated with various developmental anomalies. These were hypothyroidism, ichthyosis, and undescended left testicle. The presence of these conditions may be indicative of a degenerative condition which involves also the cells of the motor cortex or their neurons. Both paternal and maternal grandparents of this patient were cousins, wherefore Throckmorton observes that "consanguinity, even remote, may be a factor in the production of an inferior type or grade of human organism."

Batten and von Wyss¹⁰⁴ describe the atonic form of cerebral diplegia, of which they report four cases. Hypotonia of the extremities was marked, dorsiflexion of the feet on the legs and hyperextension of the legs was noted. The muscles responded normally to the faradic and galvanic current. There was no loss of sensation. If the patient was supported by the axillae, the thigh and legs became flexed at right angles with the body. Manipulation of the extremities in this position revealed spasticity. The mentality of these patients varied, deficiency being the usual finding. Three of these children were breech births. The condition may be distinguished from rachitic hypotonia by the absence of other rachitic signs, from amyotonia of Oppenheim by the electrical reactions.

Fearnside¹⁰⁵ reports a similar case.

Sharpe and Farrell¹⁰⁶ report striking results of cerebral spastic paralysis by subtemporal decompression. A history of difficult labor,

101. Korotnoff, N. I., and Minz, V. M.: *Russk. Vrach.*, 1914, xiii, Nos. 13 and 14, abstr., *Jour. Am. Med. Assn.*, 1914, lxiii, 616.

102. Spiller, W. G.: *Am. Jour. Med. Sc.*, 1915, cxlix, 345.

103. Throckmorton, T. B.: *Jour. Iowa State Med. Soc.*, 1915, v, 358.

104. Batten, F. E., and von Wyss, W. H.: *Brit. Jour. Child. Dis.*, 1915, xii, 65.

105. Fearnside, E. G.: *Brit. Jour. Child. Dis.*, 1915, xii, 166.

106. Sharpe, W., and Farrell, B. P.: *Jour. Am. Med. Assn.*, 1915, lxiv, 482.

and changes in the fundus, by ophthalmoscopic examination, are considered indications for operation. Sixty-five patients, selected from a total of 201, were thus treated by Sharpe and Farrell. Of these, thirty-four were diplegias, eleven were paraplegias, the remaining twenty were hemiplegias. Of these, six patients died, all within ten hours after the operation. Four of the six were under 2 years of age and "poor surgical risks." The usual pathologic findings are supracortical fibrous or cystic formation, the result of birth hemorrhages.

Resection of the posterior nerve roots is recommended by some and condemned by others in the treatment of Little's disease.

The compiled statistics gathered by Gumbel¹⁰⁷ are very disappointing. Schultless¹⁰⁸ notes that the hypertonicity may improve as a child grows older, and favors the postponement of operation. Bircher¹⁰⁹ recommends the operation. Bland¹¹⁰ reports favorable results, having had but one death in ten patients so treated.

HYDROCEPHALUS

Dandy and Blackfan¹ divide internal hydrocephalus into two groups, recognizable clinically by the presence of phenolsulphonephthalein in the spinal canal after interventricular introduction. The patency of the communicating foramina is thereby determined.

In a normal individual phenolsulphonephthalein appears in the spinal fluid in from one to three minutes. It was also found that the dye so introduced will appear in the urine in from ten to twelve minutes and that from 12 to 20 per cent. will be excreted in two hours. If introduced into the subarachnoid space, in the normal individual it will appear in the urine in from six to eight minutes and from 35 to 60 per cent. will be excreted in two hours.

The excretion of phenolsulphonephthalein in the urine from the ventricles of patients with internal hydrocephalus of the obstructive type is prolonged. The appearance time is also delayed. The authors further state:

"In marked contrast to the negligible ventricular absorption was the high subarachnoid absorption. The appearance time in the urine and the duration of excretion following subarachnoid injections were normal."

In the type of hydrocephalus with patent communication between the ventricles and subarachnoid space there is a rapid appearance of the dye in the spinal fluid following intraventricular injection. However, "the absorption from the subarachnoid space of these patients is greatly

107. Gumbel, T.: *Berl. klin. Wchnschr.*, 1914, li, 1353.

108. Schultless, M. W.: *Rev. méd. de la Suisse romande*, 1914, xxxiv, 550.

109. Bircher, M. E.: *Rev. méd. de la Suisse romande*, 1914, xxxiv, 550.

110. Bland, E. M.: *Lancet-Clinic*, 1915, cxiii, 300.

diminished, amounting to about 10 per cent. in two hours. There is a corresponding increase in the time of first appearance of phenolsulphonophthalein in the urine and the time required for its total excretion from the subarachnoid space. The diminished subarachnoid absorption is the factor responsible for the production of the internal hydrocephalus."

The treatment of these two distinct types of hydrocephalus is obviously different. In the obstructive type surgical measures are necessary to relieve the obstruction. "In the communicating type the internal hydrocephalus is the result of diminished absorption from the subarachnoid space. At present the rational treatment would be to draw the fluid into other tissues where there is adequate absorption."

V. Bokay¹¹¹ again urges the use of Strasburger's illumination method in the determination of ventricular hydrops. Transparency is only present where the brain substance between the vault of the skull and the wall of the hemispheres is not more than 1 cm. thick. The position of the greatest amount of fluid and the thinnest part of the brain substance may thus be determined. V. Bokay recommends frequent lumbar puncture in the communicating type of hydrocephalus. In the obstructive type ventricular puncture must be done. These procedures may be repeated for a period of several years without danger. It should not be repeated oftener than every four or six weeks, nor should more than 50 c.c. be removed at one time. He reports an instance in which fifty-one punctures were done over a period of six and one-half years, followed by improvement.

Amenta¹¹² and Cannata¹¹³ performed Wassermann reactions on patients with hydrocephalus. Amenta found seven positive reactions in eleven patients. Cannata obtained ten positive reactions in nineteen patients. Sixteen of the mothers gave positive Wassermann reactions. He recommends antisyphilitic treatment.

Tyler¹¹⁴ and Oertel¹¹⁵ report cases of hydrocephalus.

Oden¹¹⁶ thinks that a contracted pelvis in the mother may be a possible cause for hydrocephalus developing after birth.

111. V. Bokay: *Jahrb. f. Kinderh.*, 1915, lxxxi, 17.

112. Amenta, F.: *LaPediatria*, 1914, xxii, No. 8, abstr., *Jour. Am. Med. Assn.*, 1914, lxiii, 1334.

113. Cannata, S.: *LaPediatria*, 1914, xxii, No. 10, abstr., *Jour. Am. Med. Assn.*, 1914, lxiii, 1888.

114. Tyler, G. T.: *Jour. S. Carolina Med. Assn.*, 1914, x, 682.

115. Oertel, H.: *Canad. Med. Assn. Jour.*, 1915, v, 653.

116. Oden, R. J. E.: *Jour. Am. Med. Assn.*, 1915, lxiv, 816.

MISCELLANEOUS

Talbot¹¹⁷ reports "the energy metabolism of an infant with congenital absence of the cerebral hemispheres." The patient was a large baby, weighing more than the average for its age. It was blind and apparently deaf. A decompression operation showed the cerebral hemispheres entirely absent, replaced by cerebrospinal fluid. The patient had a very low metabolism, as shown in Table 1.

TABLE 1.—J. J. M., INFANT WITH CONGENITAL ABSENCE OF CEREBRAL HEMISPHERES; METABOLISM EXPERIMENT

Subject	Body Weight Without Clothing, Kg.	Height, Cm.	Age	Periods	Heat Produced		Pulse Rate
					Per Kg. per 24 Hrs., Cal.	Per Sq. M. Body Surface, Cal.	
J. J. M.	8.43	73½	8 mos.	2	29	574	73
R. L. (normal) ..	7.58	71	8½ mos.	8	59	991	115
J. J. M.	7.45	..	9½ mos.	2	35	661	94
E. G. (normal) ..	9.37	74	10 mos.	5	51	907	106

Talbot's explanation for the low figures given are that the absence of volitional areas in the brain, the muscular underdevelopment, with the excessive development of fatty and bony tissues, coupled with the lack of muscular activity, made only a small number of heat units necessary.

Strauch¹¹⁸ reports a case of myatonia congenita of Oppenheim, presenting usual clinical features, "pseudo-paralysis of the muscles of the extremities and trunk with the exception of the diaphragm, and an involvement of the facial muscles." There was no response to the faradic and diminished response to the galvanic current. Skin and tendon reflexes were absent. Pathologic examination of the calf musculature was made. The muscle fibers appeared small. Areolar tissue was present in excessive amounts. Large numbers of sarcolemma nuclei and apparent karyokinetic figures indicated an effort at muscle regeneration.

Dunn¹¹⁹ records three cases of myatonia congenita with complete necropsy on one. The muscles showed marked atrophy with increased areolar tissue and connective tissue. Two well-defined tissue masses were seen in the sections of muscle. One seemed to be made up of

117. Talbot, F. B.: Arch. Pediat., 1915, xxxii, 452.

118. Strauch, A.: AM. JOUR. DIS. CHILD., 1914, viii, 298; *ibid.*, 1915, x, 16.

119. Dunn, C. H.: Boston Med. and Surg. Jour., 1914, clxxi, 191.

normal muscle fibers. The other was seen, under high power, to be composed of very small muscle fibers. Vacuolation of the large fibers was noted. Cortex, cerebellum, pons and medulla were normal. The changes in the cord were so slight that "they would have passed unnoticed in a routine examination."

Brauwer and Schippers¹²⁰ report a case of myatonia congenita with clinical and pathologic findings not unlike those recorded by others.

Mott¹²¹ records a recovery following cerebral hemorrhage in a three year old girl. The hemorrhage was produced by a skull injury.

A case of myelitis of unknown origin is reported by Ashby.¹²²

Two cases of pseudohypertrophic muscular dystrophy, occurring in two boys of one family, are reported by Shaw.¹²³

Blauner¹²⁴ reports three cases of Friedrich's ataxia in one family. The first child developed the disease in its third year. Ataxia, explosive speech, characteristic carriage, and drunken gait were noted. The reflexes were present. The second child developed the disease in its fifth year. The third child developed the disease in its fourth year. All of these ended fatally.

Rothmann¹²⁵ reports a case of athetosis, with anatomical lesions in the corpus striatum, in a seven year old child.

Stamm¹²⁶ reports a case of multiple sclerosis in a boy of 12. The first symptom which occurred was blindness in one eye. Examination showed a central scotoma and a retrobulbar neuritis. The gait was spastic-ataxic. Oppenheim and Babinski reflexes were present. Clonus was positive. Later, the fundus examination showed a blurring of the temporal side of the disk. The Wassermann reaction was negative. The patient improved following the use of fibrolysin.

Griffith¹²⁷ describes the noteworthy features in a patient with acute cerebellar ataxia. The patient had a rapid recovery, one month after the onset of the disease.

Moreno¹²⁸ performed necropsies on forty newly born children. Examination of the brain disclosed a laceration of the tentorium in ten, with rupture of the falx cerebri in five. He was able to reproduce a similar condition experimentally in infant cadavers by exerting pressure on the sides of the head.

120. Brauwer, B., and Schippers, J. C.: *Psychiat. en Neurol. Blad.*, 1914, Nos. 4 and 5, abstr., *Rev. neurol. and psychiat.*, 1915, xiii, 32.

121. Mott, W. W.: *Jour. Am. Med. Assn.*, 1914, lxiii, 1028.

122. Ashby, H. T.: *Brit. Jour. Child. Dis.*, 1915, xii, 142.

123. Shaw, F. B.: *Dublin Jour. Med. Sc.*, 1914, cxxxviii, 115.

124. Blauner, S. A.: *New York Med. Jour.*, 1914, c, 83.

125. Rothmann, M.: *Berl. klin. Wchnschr.*, 1915, li, 754.

126. Stamm, C.: *Arch. f. Kinderh.*, 1914, lxiii, 199.

127. Griffith, J. P. C.: *Am. Jour. Obst.*, 1915, lxxii, 549.

128. Moreno, S. F. M.: *Arch. mens. d'obst. et de gynéc.*, Paris, 1915, iv, 145.

Sharpe¹²⁹ believes that spina bifida is caused "by the pressure exerted by an excessive secretion of cerebrospinal fluid, or what is more probable, some obstruction to its normal outflow." The preponderance of this anomaly in the lumbosacral region is explained on the basis that this point is the region of latest closure. The spinal cord and skin are both epiblastic tissues. The meninges and bones are mesoblastic tissues. In the third month of fetal life the adherent cord and skin are separated by the meningeal and bony structure of the canal becoming complete. The vertebrae of the dorsal region are the first to close, those of the lumbar region the last. The choroid plexuses are formed, however, in the second month of fetal life. Assuming that these may secrete an excessive amount before a proper closure occurs, and that undue pressure at this time may prevent such a closure, the mechanism of spina bifida is explained. Sharpe performed laminectomies experimentally and covered the defect with superficial sutures only. Large areas of skull were then removed and pressure applied to the head. This increased pressure caused protrusion of the meninges through the cleft.

PARALYSES UNCLASSIFIED

Fearnside¹³⁰ describes "a case of infantile hemiplegia affecting the left half of the body with considerable under development of the left upper extremity. Jacksonian convulsions affecting the paralyzed upper extremity, petit mal."

Wright¹³¹ and D'Espine¹³² report cases of infantile hemiplegia of obscure origin.

Erbsen¹³³ reports a case of bulbar paralysis of traumatic origin.

Bell's palsy occurring suddenly after fright is recorded by Synnott.¹³⁴

Platt¹³⁵ considers birth palsy the result of a primary plexus injury. In a certain proportion of cases, however, a shoulder joint or epiphyseal lesion may be present.

An unusual form of birth palsy is recorded by Gordon.¹³⁶ The condition was bilateral, symmetrical and identical in the two forearms. Two branches of the median and ulnar nerves supplying the flexor carpi radialis and flexor carpi ulnaris were apparently involved. The wrists remained extended in all movements of the forearm and arm, which were normal.

129. Sharpe, N.: *Ann. Surg.*, 1915, lxi, 151.

130. Fearnside, E. G.: *Brit. Jour. Child. Dis.*, 1915, xii, 136.

131. Wright, H. W.: *Jour. Am. Med. Assn.*, 1915, lxiv, 1577.

132. D'Espine, M.: *Rev. méd. de la Suisse romande*, 1915, xxxv, 52.

133. Erbsen, F.: *Monatsch. f. Kinderh.*, 1914, xiii, 254.

134. Synnott, M. J.: *Arch. Pediat.*, 1915, xxxii, 210.

135. Platt, H.: *Brit. Med. Jour.*, 1915, i, 793.

136. Gordon, A.: *Jour. Am. Med. Assn.*, 1914, lxiii, 2282.

Moren¹³⁷ discusses the differential diagnosis of paralysis in childhood.

BRAIN TUMOR

The unusual feature of a change in character as the primary sign of a brain tumor is presented by v. Malaisé.¹³⁸ Another patient showed the usual onset of headache and vomiting. A sarcoma was found in each instance.

An apparently complete recovery after operation for a cerebellar cyst is reported by Porter.¹³⁹

Salvini¹⁴⁰ removed an encephalocystocele and studied its structure. Other than twitching of the extremities due to irritation, the child appeared well after the operation. Whether this procedure will be the cause of a subsequent ataxia remains to be seen.

MENTAL DEFICIENCY

While the Binet-Simon method is still preferred in the measurement of mental capacity in childhood, numerous psychologists and neurologists maintain that its use, alone, creates false impressions in the determination of mental development.

Groszman¹⁴¹ condemns the habit of making quick examinations with the Binet scale. The determination of "exceptional development" is incomplete without a proper history, body measurements, thorough medical examination and the use of intelligence and physiopsychologic tests.

Potts¹⁴² discusses the methods "calculated to throw light upon the capacities of mental defectives for future work." In school, the child's aptness for manual work and for arithmetic should be observed. Various tests which may be of value are Warner's hand balance or an ataxiograph, where the subject holds a needle in holes of various sizes cut in a brass plate. All contacts made by the subject touching the plate are recorded by an electric battery connection.

The dynamometer measures the grip and also the dextrality, that is, the superiority of one hand over another. The use of the form board, and the cancellation of assigned symbols in a prepared form are also useful tests.

137. Moren, J. J.: *Kentucky Med. Jour.*, 1915, xiii, 92.

138. V. Malaisé: *München. med. Wchnschr.*, 1914, lxi, 1562.

139. Porter, L.: *Arch. Pediat.*, 1915, xxxii, 727.

140. Salvini, C.: *Ann. Surg.*, 1915, lxi, 10.

141. Groszman, M. P. E.: *New York Med. Jour.*, 1914, c, 1071.

142. Potts, W. A.: *Lancet*, London, 1915, clxxxix, 124.

Yerkes and Bridges¹⁴³ have devised a new scale for measuring mental capacity. Instead of using different scales for different mental capacities, a single scale is used, containing a series of tests applicable to children between 3 and 15 years. The subject is given a score in points, each question having a definite valuation. This serves as a basis for comparison with normal scores, and also makes possible a comparative appreciation of individuals which was not available by the Binet scale.

Belem and Lazar¹⁴⁴ introduce an additional method of testing mentality in the schoolchild—a test of speech function, particularly its grammatical expression. A series of questions are given. These are so worded that the answer necessitates the use of the various moods and tenses, as well as the comparative constructions of adjectives and adverbs.

Krause¹⁴⁵ urges the necessity of parental cooperation in the examination of mental defectives.

Hickson¹⁴⁶ examined 100 patients with mental deficiency at Vineland. All showed the reactions of spastic paralysis, indicating some organic brain lesion. The principal features are a lack of development on the affected side, a continuous Babinski reaction, irregularities in the Babinski and Oppenheim reflexes. Impairment of the lower facial branch is frequent. "It is rare to see an inmate of an institution for feeble-minded whistling," says Hickson. Contractures or hypertonicity of extremities are common. A lower blood pressure may be found on the affected side. In six necropsies done by Hickson at Vineland anomalies of other organs, such as hypoplasia of the cardiovascular system, supernumerary spleens and genito-urinary anomalies were noted.

Mendelsohn¹⁴⁷ reaches similar conclusions though his percentages are lower. Fifteen per cent. of his series showed evidences of infantile cerebral paralysis. In 6 per cent. of this group there is residual paralysis, function having been almost entirely restored. Paresis may be associated with epileptic convulsions or with choreiform movements and various tremors.

Dodd¹⁴⁸ believes that poor vision may prevent a child from receiving proper training and be productive of mental deficiency.

143. Yerkes, R. M., and Bridges, J. W.: *Boston Med. and Surg. Jour.*, 1914, clxxi, 857.

144. Belem, P., and Lazar, E.: *Ztschr. f. Kinderh.*, 1914, xii, 185.

145. Krause, J. T.: *Med. Rec.*, New York, 1914, lxxxvi, 337.

146. Hickson, W. J.: *Illinois Med. Jour.*, 1914, xxvi, 394.

147. Mendelsohn, J. J.: *Illinois Med. Jour.*, 1914, xxvi, 409.

148. Dodd, O.: *Illinois Med. Jour.*, 1914, xxvi, 404.

McCready¹⁴⁹ makes a plea for the application of mental hygiene in early childhood. "Early infancy is not too early to begin the inculcation of orderly habits of thought and action."

The care of the mentally backward child is discussed by Kendall,¹⁵⁰ Neustaedter,¹⁵¹ and Hebberd.¹⁵² The latter urges that a distinction be made between the "mentally defective dependent" and the "mentally deficient delinquent."

Kehoe¹⁵³ is frankly pessimistic regarding the care of the feeble-minded. He advises their custody, segregation and sterilization. Attempts at education he considers a waste of time and money.

Corwin¹⁵⁴ has seen mental improvement follow the removal of tonsils and adenoids.

Findlay¹⁵⁵ found a positive Wassermann reaction in 59 per cent. of fifteen mentally defective children. He recommends the use of neo-salvarsan.

Dendy¹⁵⁶ gives an enthusiastic account of Dr. Fernald's institutions at Waverly and Templeton. The keynote at these institutions is "occupation." Each individual is given work, that is pleasant and suited to his capacity. The boys first learn how to handle stones and wood, then tools. "From swinging a heavy mallet they pass on to hammering nails and using choppers and saws. No time is wasted trying to teach them to do what it is impossible for them to achieve."

Stevens¹⁵⁷ confirms the suggestion made by Sutherland regarding the association between syphilis and Mongolian idiocy. Stevens studied the blood and spinal fluid of these patients. Of twenty cases thus studied, he obtained 10 per cent. positive Wassermann reactions on the blood serum, 25 per cent. positive Wassermann reactions on the spinal fluid. The gold chlorid reactions showed color changes of two or more degrees, in 90 per cent. of the fluids. The globulin content of the spinal fluid was increased in 90 per cent.

Beier¹⁵⁸ discusses the various theories given for the causation of Mongolian idiocy. He states that an individual may present a Mongolian facial appearance and possess a normal mentality. In such individuals these Mongolian characteristics usually undergo change. The Mongolian idiot never changes in appearance. Treatment is unsatisfactory. Thyroid extract is useless.

149. McCready, E. B.: *Illinois Med. Jour.*, 1915, xxviii, 255.

150. Kendall, W. L.: *Oklahoma State Med. Jour.*, 1914, vii, 63.

151. Neustaedter, M.: *Am. Jour. Obst.*, 1915, lxxii, 520.

152. Hebberd, R. W.: *Albany Med. Ann.*, 1915, xxxvi, 19.

153. Kehoe, H. C.: *Illinois Med. Jour.*, 1914, xxvi, 407.

154. Corwin, A. M.: *Illinois Med. Jour.*, 1914, xxv, 400.

155. Findlay, L.: *Glasgow Med. Jour.*, 1914, lxxxii, 241.

156. Dendy, M.: *Jour. State Med.*, 1914, xxii, 412.

157. Coriat, I. H.: *Jour. Abnorm. Psychol.*, 1914, ix, 139.

158. Beier, A. L.: *Wisconsin Med. Jour.*, 1915, xiii, 348.

Coriat¹⁵⁹ reports explosive laughter and hydrocephalus as new symptoms in amaurotic idiocy.

Batten¹⁶⁰ describes a family of five children, non-Jewish, three of whom were affected with a progressive disease leading to dementia, blindness and paralysis. One of these showed changes in the macular regions of the eyes. The children became noisy, filthy in habits, and developed a spasticity of the extremities. All three died. In two of these a necropsy was done. In one no changes were observed in a histologic study of the central nervous system. In the other there was slight atrophy, with diffuse degenerative changes affecting the ganglion cells. The Wassermann reaction on the blood and spinal fluid was negative in both patients.

PSYCHIATRY

Hysteria in childhood is explained by the same mechanism as in the adult, according to Coriat.¹⁵⁷ He reports two cases in children, one manifesting itself by blindness, the other by convulsive attacks. A symbolic wish fulfillment formed the basis of both as shown by dream analysis. In the one case freedom from taking care of the younger members of the family represented the wish. In the other there was a typical Oedipus complex in the process of formation, a desire on the child's part to continue its relations with its mother.

D'Espine¹⁶² reports a case of astasia-abasia in a child 9 years old, due to hysteria. There was no evidence on examination of any organic lesion. The fundi were normal. The Wassermann reaction on the blood and spinal fluid was negative.

Strong¹⁶³ reports a case of hysterical paralysis in a child 2½ years old. During play in the physician's office, the condition entirely disappeared.

Stern¹⁶⁴ applies Freud's teachings to the explanation of pavor nocturnus.

Anxiety neurosis is discussed by Katz.¹⁶⁵ He reports five cases in girls ranging from 6 to 10 years. There was no past history of illness. The children became pale and weak, seemed tired and melancholic, and looked sick. There was loss of appetite. During play they would pause and either sit still dreaming, or would get up and run back and forth. After five or ten minutes they would resume their play. In two cases the girls seemed to have been frightened by details of war. In the other three the same story was elicited on subsequent interroga-

159. Coriat, I. H.: *Boston Med. and Surg. Jour.*, 1915, clxxiii, 20.

160. Batten, F. E.: *Quart. Jour. Med.*, 1914, vii, 444.

161. D'Espine, M.: *Rev. méd. de la Suisse romande*, 1914, xxxiv, 379.

162. Strong, M.: *West. Med. Rev.*, 1915, xx, 28.

163. Stern, A.: *New York Med. Jour.*, 1915, ci, 951.

164. Katz, O.: *Berl. klin. Wchnschr.*, 1914, li, 1835.

tion. Katz states that in children the cause of an anxiety neurosis is easier to ascertain than in the adult. Four of these patients had nervous parents, one was the child of a severe neurotic, a mother who had hallucinations.

Farnell¹⁶⁶ and Stier¹⁶⁷ discuss the psychopathic child.

Cordes¹⁶⁸ notes the rarity of psychoses in children and reports four cases.

Drysdale¹⁶⁹ reports a case of juvenile psychosis in a boy of 11 years. Psychopathic antecedents seems to be the strongest factor in the etiology of this condition. Anything which produces a mental or physical strain may be an exciting cause.

Rhein¹⁷⁰ reviews the literature on insanity in children and records several cases. The manic-depressive form is the most common variety seen.

Terman¹⁷¹ reviews the recent literature on juvenile suicides. In France 150 suicides a year is the record for those under sixteen years. In all other countries the situation seems to be growing worse. An analysis of the causes shows the school to be the greatest factor. Terman pleads for a "pedagogy founded equally on psychology, physiology and neurology."

In addition to the references given in the footnotes, the following will be found of interest:

Hermann, C.: *Arch. Pediat.*, 1915, xxxii, 902.

Hume, W. E.: *Rev. Neurol. and Psychiat.*, 1914, xii, 281.

Stevens, H. C.: *Jour. Am. Med. Assn.*, 1915, lxiv, 1636.

Stoos, M.: *Rev. méd. de la Suisse romande*, 1914, xxxiv, 614.

Wolfsohn, J. M.: *Arch. Int. Med.*, 1915, xvi, 257.

165. Farnell, F. J.: *Arch. Pediat.*, 1914, xxxi, 684.

166. Stier, E.: *Deutsch. med. Wchnschr.*, 1916, xli, 794.

167. Cordes, F.: *Kinder Arzt*, 1915, xxvi, 81.

168. Drysdale, H. H.: *Jour. Am. Med. Assn.*, 1914, lxiii, 1283.

169. Rhein, J. H. W.: *Am. Jour. Insan.*, 1915, lxxi, 471.

170. Terman, L. M.: *Jour. Abnorm. Psychol.*, 1914, ix, 61.