

two days elapsed between their respective onsets. It happens, however, that one street has an Irish population, while the other is peopled by Hebrews. Each community may therefore be regarded as socially exclusive toward the other.

Two other cases had both visited on the same street at about the same time, and were taken ill only four days apart. One, however, showed pneumococcus while the other was meningococcus infection. A week later another case of pneumococcus infection developed on the same street.

Most interesting of all in this connection, is Case V, an aged woman living almost in seclusion, in the third story of a building in the business section and who had not been out of her apartments for three weeks — an impossible period of incubation. Practically the only person with whom she came in contact was a nephew who was employed in the same store in which Case II worked at the time he was taken, but seventeen days had elapsed, and so far as could be learned the nephew had been well in the meantime.

From the length of time elapsing between cases, in several instances greater than the span of life of one generation of the organism, it is evident that the organism lived without causing meningitis. Since it is not known to exist as a true saprophyte it seems necessary to assume here, as has been proven possible in certain cases elsewhere, that it lived in the nasal, oral, or nasopharyngeal cavities, and perhaps middle ears of individuals who showed perhaps no greater evidence of its presence than rhinitis (Lord) or otitis media (Westenhoeffer).

In the light of the irregular distribution of the cases, and especially of such an instance as Case V, it seems fair to assume that under some conditions the organism may retain its vitality when deposited as expectoration, sufficiently long to be air-borne as dust to susceptible individuals. Indeed Westenhoeffer quotes Jaeger and Germano as having recovered the meningococcus from sputum after seven days' drying.

In view of this probability the prophylaxis is obvious and may be summed up in a word: Careful cleanliness of the upper air passages, absolute prohibition of promiscuous expectoration, and clean streets.

One noteworthy peculiarity of the disease, noted in all epidemics, is its remarkable selective propensity. It rarely attacks more than one member of a family, and when it strikes, it very commonly seizes upon the apparently most active and robust of the children. To explain this Westenhoeffer, discreetly abetted by Elser, advances a tentative theory based upon his autopsied cases, that the presence of naso-pharyngeal adenoids and the status lymphaticus are of importance as determining the susceptibility of individuals to this infection both by offering an avenue of entrance to the organism, and by the well-known lack of resistance characteristic of the lymphatic state. Two of our autopsied cases (14 and 18) favor the belief so far as two cases may be taken as evidence.

**Conclusions.** — From the evidence contributed and compiled in the preceding pages, it may be concluded (I) that the diplococcus intracellularis meningitidis of Weichselbaum is the essential etiological factor in epidemic cerebrospinal meningitis, and (II) that the diagnosis may be positively made in nearly all cases by the examination of the spinal fluid obtained during life by lumbar puncture, and in no other way; (III) that it is probably an inhalation disease, and is therefore preventable.

In closing, the writer wishes to extend his thanks to Drs. Chase of Shrewsbury and McKibben of Worcester for data in Case I, as well as to the members of the visiting and house medical staff of Worcester City Hospital for the majority of the clinical material upon which this study is based, also and especially to his chief in the pathological department, Dr. Baker, for confirmatory observations and helpful suggestions.

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## Clinical Department.

### TWO CASES OF LEAD PALSY. DANGERS FROM USE OF LEAD PIPE IN WATER SYSTEMS.\*

BY HENRY C. BALDWIN, M.D., BOSTON.

THE two cases shown to-night are cases of chronic lead poisoning occurring in children. In both instances, the lead poisoning followed the introduction of town water. The State Board of Health was notified in each case, and the investigation by the board showed that in both towns there was an epidemic of lead poisoning due to the action of the water upon the lead pipe that was used to carry the water from the main to the house. This epidemic of lead poisoning had not been recognized by any of the local physicians previous to the reporting of these cases to the State Board of Health, and the subsequent investigation. The sufferers had been treated for colic, indigestion and debility. As a result of the investigation of the State Board of

\* Read May 17, 1906, before the Society of Psychiatry and Neurology.

Health, and of the dangerous conditions found, changes ought to be made in the material of the pipes used to convey the water from the mains to the house.

E. K., eleven years old. Resident of Milford, Mass.

Patient came to the hospital Dec. 15, 1896, with a letter, stating that for two years she had been suffering from hysteria and indigestion.



E. K. Shows condition of patient when first seen. Extensor paralysis of arms and legs.

The patient was a delicate looking girl, who gave the following history. Up to five years ago, she drank water that came from a well. For the past five years, city water had been used, and the State Board of Health found that there was a hundred feet of one-half-inch lead pipe which connected the main to the tap in the house.

Two years ago she began to have nausea, vomiting, abdominal pains, and pains in her feet and legs, with swelling and tenderness on pressure. Her hands became weak, and her toes dragged so much that she could not walk. Her muscles wasted in her arms and legs, and she cried nearly all the time. For five weeks she could not feed herself. The past year she has been gaining. She has partially regained the use of her hands, but cannot stand.

The patient had the most marked lead line that I have ever seen, which was on both upper and under jaws, outside and inside the teeth as well. It is only in the most marked cases of lead poisoning that one sees the lead line on the inside of the teeth on the upper jaw, — probably because the tongue keeps the gums at the roof of the mouth clean, so that the sulphide of lead does not form in consequence of the decomposition of food. It is interesting to note that though a lead line usually disappears pretty quickly under

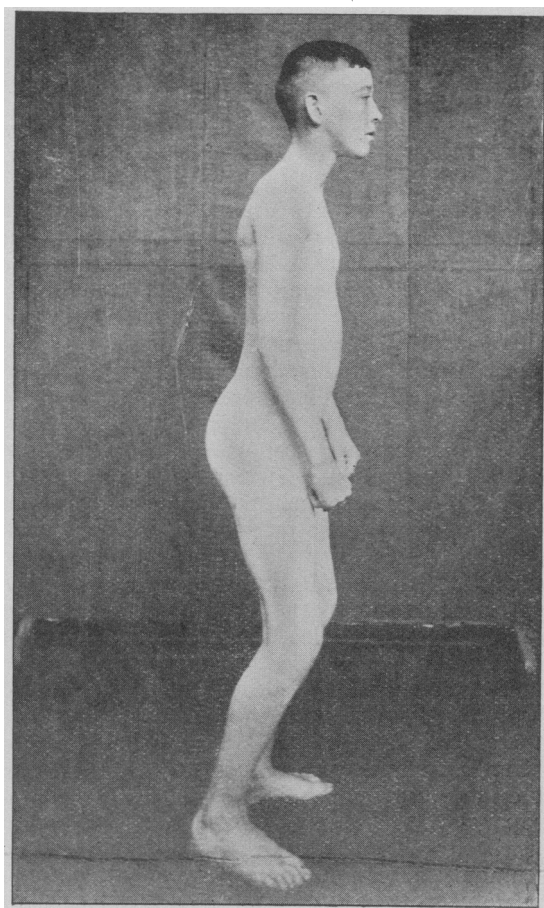
treatment, in this instance a lead line could be seen three years later.

The extensor muscles of the arms and hands were wasted, and there was complete wrist-drop. The extensor muscles of the legs were also atrophied, and there was complete toe-drop. The patient was sent into the hospital and put on iodide of potash. Later, both the Achilles tendons were cut in order to relieve the contraction of the flexor muscles.

The patient has continued under my care ever since. She has recovered the use of her hands and, although the extensor muscles are not up to the normal strength, the electrical reactions are normal. She has not recovered the use of the extensor muscles of her legs, and presents the picture of a case of anterior poliomyelitis, and the muscles do not respond to electricity.

The lead poisoning checked her growth. She comes from a family of tall people, but she has not grown any in height since I first saw her ten years ago.

The State Board found that there were seventeen grains of lead to a gallon, or 0.295 parts per 100,000 in the water as it passed through the pipes, the limit of



E. A. F. Shows attitude of patient when first seen. Rigidity of flexor muscles, paresis of extensor muscles of arms and legs.

safety of lead in water being .05 per 100,000. It is interesting to note that the mother and two younger sisters had marked lead lines at the time when I first saw the patient.

E. A. F. Fifteen; resident of Norwood, Mass.

July 16, 1904, came to the Massachusetts General Hospital. He stated that for a year and a half he had noticed that his hands and feet were getting stiff and weak, and that he had cramps in his abdomen.

Physical examination showed that both his hands and arms were held in the position of flexion, and that there was wrist-drop. He stood with his knees bent, walked with a stiff gait, and had toe-drop to a moderate degree, *i.e.*, there was paralysis of the extensor muscles of the arms and paresis of the extensor muscles of the legs. The reflexes were normal. There was marked myokymia.

Examination of the gums showed nothing except that the boy took remarkably good care of his teeth.

Lead was suspected, and a sample of urine, which was examined by Dr. E. S. Wood, showed the presence of lead. Stipple cells also were found in his blood.

The case was reported to the State Board of Health, and upon investigation, an epidemic of lead poisoning was found to exist at Norwood. Suffering the fate of many would-be reformers, my information was not well received in Norwood, one of the commissioners complaining to the engineer of the State Board of Health, that "some fool of a doctor had said that there was lead in the water."

The presence of lead in dangerous quantities in the water explained the great benefit that some of the townspeople received from a change of air. A lady for several years took a trip abroad each summer. While she was away, she was free from all digestive disturbances; at home she was troubled with severe attacks of colic, indigestion and anemia. A change of water relieved all symptoms after the presence of lead was known.

Both these cases are interesting in that they show a condition that occurs with children, but occurs rarely in adults, namely, a paralysis of the extensor muscles of the legs as well as of the hands. It was the paralysis of the extensor muscles of the legs in this second case that enabled me to make the diagnosis of lead palsy before the examination of the urine and blood confirmed the diagnosis.

In the present year's report of the State Board of Health, the amount of lead pipe used in the different water services in the various cities and towns of Massachusetts has been published. From this table it appears that three cities, Chelsea, Everett and Fall River, use service pipe of lead. In 23 other cities and towns, lead is chiefly used; no lead whatever is used for service pipes in 83 cities and towns.

The cause of the action of water upon lead pipe has been found to be the amount of carbonic acid which is present in the different waters, and this amount varies under certain conditions, so that a water which at one time may be comparatively harmless becomes dangerous. Ground waters, as a rule, contain more carbonic acid than surface waters, and the greatest number of lead cases investigated have occurred in Fairhaven, Kingston, Lowell, Milford and Milton where ground waters are used. Surface waters are also dangerous, and the town of Norwood is an illustration.

There seems to be no law that forbids a person to continue to take poisonous doses of lead in drinking water after the danger has been pointed out, and there seems to be no law to prevent cities and towns from installing a dangerous water system, and continuing the same system in use after the effects of its use have become

manifest. It is to be hoped that some change will be effected either through the intelligent efforts of the physicians in the community or in consequence of the liability of such delinquent cities and towns to lawsuits for damages.

## Medical Progress.

### RECENT PROGRESS IN SURGERY.

BY HERBERT L. BURRELL, M.D.,

AND

H. W. CUSHING, M.D., BOSTON.

(Concluded from No. 17, p. 477.)

#### INDIVIDUAL EXCISION AND SUTURE IN OPERATING FOR THE REMOVAL OF HEMORRHOIDS.

LEWIS S. PILCHER<sup>16</sup> has used the method described at the Seney Hospital, in Brooklyn, during the past few years. He is much pleased with it. He considers that it is simple and free from unpleasant complications. He does not claim originality, but simply considers that the method is not sufficiently well known. The patient is prepared as for any hemorrhoid operation. A projecting mass is seized with forceps so as to put the parts at the base wall upon the stretch. Incision is made through the mucous membrane on either side, or at the muco-cutaneous junction. Beginning with the apex of the little triangular flap of skin, dissection is made up from the fibers of the sphincter to the base of the pile. The narrow pedicle of the pile is then controlled by a hemorrhoidal clamp, and the pile is tied off and cut flush with a clamp, by knife, or scissors.

Pilcher states: "Remembering that the chief blood supply of this pile descends into the submucous tissue vertically from above, if underneath the fold of mucous membrane which is just above the point reached by the clamp, a curved needle, armed with ligature threads, is passed well into the submucous tissue, and, being drawn through, carries such a thread, when it is tied the main blood-supply of the parts below is cut off.

"This is the key to the situation, — the passing of this needle through the fold of the mucous membrane just above the point reached by the clamp, and the application of the ligature at this point, tied tightly.

"For this ligature chromicized catgut is to be preferred, and it should be long enough to serve not only for this primary point of ligature, but also for the subsequent suturing now to be described.

"The needle, still armed with the long end of the ligature thread, is now carried as a running suture around the mass in the grasp of the clamp, passing through the mucous membrane and the tissues underneath the arms of the clamp two, three or four times, as the extent of the disease may seem to require, until all of the tissues grasped by the clamp have been included. The clamp is now loosened by slight manipulation,

<sup>16</sup> Ann. of Surg., vol. xlv, no. 2, Aug., 1906, p. 275.