Fever was an inconstant symptom. When present it was of early occurrence, and might be high on the second day. On the contrary, the temperature might be normal on the first day and subnormal on the following day. Delirium was present in three cases.

A tympanitic swelling of the abdomen was of no infrequent occurrence. It was usually general, or in the upper abdomen, and was rarely localized in the lower abdomen. In one case, thought to be of intestinal obstruction, a swollen, intestinal convolution was to be felt in the right side.

Symptoms of collapse were almost invariably present, and usually directly preceded death.

This occurred as follows:—

On the 2nd day in.....	3 cases.
" 3rd "	5 "
" 4th "	3 "
" 5th "	1 "
" 6th "	1 "

It took place after a few or several days, each in one case.

The diagnosis lay between intestinal obstruction, perforative peritonitis, and an irritant poison.

The pancreas was found enlarged, either throughout or at one extremity, usually at the head. The gland was frequently doubled in size, and might seem still larger when abundant fat-tissue was present. The enlargement has been compared to the size of a man's arm.

The gland was generally dense, sometimes friable, and has been noticed to be of diminished consistency.

The existence of hemorrhage was usually suspected by the appearance of the surface, which is of various shades of red. On section, however, the color may be dark-red, reddish-brown, violet, reddish-black, or even black. The modification in color may be uniformly distributed, or lie in patches, or in specks. The patches correspond with nodules which may project above the surface. These discolored patches may show white specks or streaks, and the red color may lie in the interlobular tissue of the pancreas.

The color of the section may be affected by the presence of associated alterations, one of which is accidental, the other may be incidental. The former is due to an excessive quantity of fat-tissue in the pancreas, sometimes appearing to form nodules as large as hazel-nuts and to treble the size of the gland. Bands and spots of a translucent yellow are thus produced which are mottled with shades of red. The incidental appearance is due to the presence of opaque white specks, spots, and streaks, which are generally known, since the publication of Balser's³⁷ article, by the term fat-necrosis.

These were seen in six of the cases, and it is not improbable that the granular exudation described by Löschner may have been of the same nature.

The pancreatic duct may contain a bloody, ichorous fluid, and its branches may be plugged with clotted blood. The duodenum and jejunum may show swelling, injection, and ecchymosis.

The hemorrhagic infiltration may be found beyond the pancreas, both in the parapancreatic tissue, mesentery, meso-colon, and in the omentum. It may extend downwards behind the descending colon, nearly to Poupart's ligament, and may be found at the outer border of the left kidney.

³⁷ *Loc. cit.*

The splenic artery and vein are usually free from changes. The latter may contain a thrombus. The portal vein has been found free from thrombosis.

The conditions of the other organs is essentially negative.

The heart may contain liquid blood, or a differentiated clot may be found in the right ventricle.

The spleen may be small, with wrinkled capsule, or it may be slightly enlarged and injected.

The peritoneum usually shows no alterations, although evidence of recent peritonitis may, at times, be found.

The microscopical changes consist essentially in the evidence of an extensive hemorrhagic infiltration limited more particularly to the interlobular tissue. Also in the presence of cellular and fibrino-cellular formations in the same tissue. Smaller accumulations of round cells and hemorrhages may be found within the lobules, and the ducts may be filled with indifferent cells. The appearances characteristic of a coagulative necrosis, also thrombosis of the smaller veins, are to be found in many lobules as early as the third day, as are all the other changes above described. The spongy condition of the hemorrhagic region and the numbers of associated bacteria are indicative of putrefactive changes. Whether these are of ante- or post-mortem origin the evidence at hand does not decide.³⁸ Finally, the discovery by Osler and Hughes' may be mentioned, where an increased number of leucocytes was found in the semilunar ganglia, and an indistinctness and cloudiness of the ganglion-cells.

In summing up the clinical and anatomical characteristics of these cases we have the following brief description of an affection which wholly justifies the term acute, hemorrhagic pancreatitis.

It is a disease which may take place without any well-defined cause, but is most likely to occur in persons who have had previous attacks of gastric or gastro-duodenal dyspepsia.

It begins with intense pain, especially in the upper abdomen, soon followed by vomiting, which is likely to be more or less obstinate, and not infrequently by slight, epigastric swelling and tenderness, with obstinate constipation.

A normal or subnormal temperature may be present and symptoms of collapse precede by a few hours, death, which is most likely to occur between the second and fourth days.

The gross lesions are due to hemorrhage in and about the pancreas, and the microscope shows cellular and fibrino-cellular exudations in its interstitial tissue and necrosis of its lobules.

(To be continued.)

A CASE OF ACUTE FATAL NEURITIS OF INFECTIOUS ORIGIN;

WITH POST-MORTEM EXAMINATIONS. ¹

BY JAMES J. PUTNAM, M.D.

Changes in the Deltoid Muscles and Diaphragm.—Pieces of the deltoid muscle were examined, both in a fresh state, with and without osmic acid, and after hardening in Müller's fluid. In the fresh specimens the only change observed was that now and then a fibre was seen that had entirely lost its

³⁸ Case XXIX.

¹ Concluded from page 163.

transverse striation, the rest of the fibres being apparently perfectly healthy. The examination of the hardened specimens was more fruitful. The cross-sections showed the size of the fibres to be uniform and normal. There was no trace of the vacuolization or so-called serous atrophy, and apparently no deposition of fat either within or between the muscular fibres.

The morbid changes were the following:—

First, loss of transverse striation, limited in extent, sometimes occupying only a small part of a fibre, the appearance presented being that of fine granulation, sometimes with traces of transverse striation here and there in the midst of the altered substance.

Second, marked infiltration of cells in the connective tissue and around the vessels.

Third, a localized increase in number of the muscle nuclei, which sometimes, but not always, appeared to be more marked at the place where the transverse striation was wanting.

Fourth, the intramuscular nerves, as far as could be judged from the few which appeared in the sections, were almost entirely destroyed.

Out of the whole number of fibres making up a small nerve bundle, one or two atrophied axis-cylinders might be seen, as dark, shining points, in picrocarmine sections, the rest of the bundles being represented by altered fragments of myeline with numerous, granular, round cells lying amongst them.

Fragments of the diaphragm were examined, fresh and with osmic acid, and granular fibres without transverse striation were here and there noted.

Of the central nerve system, the medulla and spinal cord were examined. The brain was preserved, but has not been examined.

In the medulla and spinal cord the following changes were observed. First, in the membranes and in many of the nerve-roots, both anterior and posterior, there was an infiltration of round cells both around the vessels and amongst the fibres, and in other respects the nerve-roots were more or less changed, the degree of alteration being less than in the peripheral nerves.

This infiltration was rather greater in the lower dorsal region of the cord than in the lumbar or cervical region, or most parts of the medulla.

The blood-vessels, both of the membranes and of the central axis, were everywhere crowded with blood. This I take to have been, in part, the result of the asphyxia with which the patient died; in part the sign of an inflammatory process.

Within the substance of the cord the vessels were surrounded here and there with a moderate number of cells contained in the perivascular sheath, and the central canal was filled with similar cells.

The nerve-cells, so far as I could judge, were essentially normal. Here and there was one with a shrunken or otherwise altered nucleus; but there was nothing, in my opinion, that might not be accounted for by post-mortem changes. The only other pathological appearance in the cord was that here and there at the periphery, especially in the lateral column near the post. cornua, and in the ant. column in the nerve-root zone, greatly enlarged axis-cylinders staining feebly with carmine.

The condition of the medulla was carefully examined, in the hope of finding a satisfactory cause for the multiple pulmonary hæmorrhages. There was a general filling of the vessels, large and small, and here and there an accumulation of lymphoid cells in the perivascular sheaths, and occasional slight hæmorrhages from the capillaries and smaller vessels.

These disturbances of circulation were, in most of my sections, more marked in and near the sensory nucleus of the vagus and glossopharyngeus than elsewhere, and the hæmorrhages were in fact only seen in this neighborhood. It could not be asserted, however, that the nucleus appeared to have been materially injured.

The vagus nerve roots were affected in varying degrees, and one section shows a more excessive infiltration than perhaps any other nerve-root that I have seen.

It is easy to arrange this case in its proper pathological position up to a certain point. It evidently belongs with such cases as were reported by Eiehhorst in *Virchow's Arch.*, vol. 69, 1876, and Rosenheim in the *Arch. f. Psych.*, vol. 18, which the latter has discussed so ably; and with the other acute fatal cases of multiple neuritis, none of which, I think, have been of shorter duration than this.

In Rosenheim's and Eiehhorst's cases, to be sure, hæmorrhoids existed in the nerves, visible to the naked eye, indicating a more intensely active process than here. On the other hand, nothing could be more intense than the congestion in this case; and the evidences of minute hæmorrhages and cellular infiltration were more extensively present than in most of the other cases, involving the muscles, spinal roots, membranes, and even the central nervous axis to a certain extent, as well as the nerves.

It would be interesting to know whether, if the patient had not died, the spinal changes would have assumed a greater prominence, and a poliomyelitis or a diffuse myelitis have developed itself.

Certainly the topography of the lesions suggests this possibility; but it is to be noted, as regards the question of poliomyelitis, that the posterior nerve-roots were quite as much affected as the anterior. The facts that the changes in the white columns (enlargement of axis-cylinders) were mainly confined to the periphery, and more marked in the neighborhood of the nerve-roots than elsewhere, but they did not seem to occur in the posterior columns. The amount of accumulation of lymphoid cells in the perivascular sheaths of the central gray matter was perhaps not great enough to count as the first step in an inflammatory process, though it may have been of that character; but, to say the least, one can hardly doubt that it would have taken little more to precipitate such an event, especially in view of the fact that in the medulla minute hæmorrhages had actually occurred.

The questions of chief importance in connection with this case are: first, as to its etiology, and especially if we can gain through it any light upon the supposed toxic origin of generalized neuritis; next, as to whether these acute, fatal cases exhibit clinical features which will enable us to detect them at their onset.

With regard to the first point, the reasoning, as clearly expressed by Rosenheim, and indorsed by

Leyden in his recent address before the Militär-ärztliche Gesellschaft of Berlin, is that the great majority of these cases are truly of toxic origin, the source of the poison being the bacteria of tuberculosis or other constitutional disease, or some mineral or other poison. The bacteria are, however, not supposed to themselves be present in the nerve, but only the poisonous substances to which their growth gives rise.

In this way the distinctly infectious cases are brought into a parallel with the cases due to metallic poisoning.

Strümpell, moreover, in a recent paper upon degenerative changes in the spinal cord, although not speaking especially of neuritis, suggests another method in which these processes of poisoning may be started or propagated, namely, through the action of the products of decomposition of the nervous tissues themselves. Dr. Spitzka suggested last year a similar cause for the outbreak of delirium grave.

In Rosenheim's case it was believed that the primary source of the infection was tuberculosis, with which the patient was affected, although at the time of his attack in good nutrition; and he further remarks that, in his opinion, scarcely a case of multiple neuritis has been observed in which no infectious constitutional disease was present. With this view I cannot wholly agree; nor is it maintained, so far as I can see, by Leyden, who himself reports the onset in one of his rapidly fatal cases as being apparently due solely to a condition of exposure and fatigue.

In my case the patient was not the subject of any contagious disease, so far as could be ascertained, and the wetting to which he was exposed was the only cause which could be discovered. Nevertheless, the pathological signs of infection are even stronger in my case than in Rosenheim's and others. In them those signs consisted almost solely in the acute onset and generalized character of the disease, together with the fact that hæmorrhages were present in the nerves. In my case, a marked hyperplasia of the spleen was also present, such as has been observed in several cases of Landry's disease, but not often and never to this extent, so far as I know, in cases of multiple neuritis. In Rosenheim's case the spleen was reported as measuring twelve centimeters in length, and being soft in consistency.

To what cause to attribute the multiple and nodular hæmorrhages scattered through both lungs, in the present case, I am unable to decide. In view of the absence of hæmorrhages in other regions of the body it would be hardly probable that those were due to the local action of the toxic agent, although this is not to be set aside. It seems more probable that they were of the same origin with the multiple hæmorrhages described originally by Brown-Séquard as due to certain injuries of the medulla, and probably of vaso-motor origin. It is possible that the neuritis of the vagus nerve may have given rise to them, although, so far as I know, such a result has not previously been demonstrated.²

² Otto Dees (Arch. für Psych., etc., 1888, p. 97), the latest writer on the anatomy and physiology of the vagus nuclei, mentions incidentally as his opinion that the large "dorsal" nucleus is vaso-motor in function. It cannot, unfortunately, be stated whether in the present case the fibres and ganglia of the sympathetic system were healthy or diseased.

It is noteworthy that in this, as in other important cases of similar kind, the toxic agent, whatever its character, has not given sign of its presence in a diffuse way, but only here and there in foci of limited extent. This is very likely due to the fact that the means of examination at our command do not enable us to detect the first signs of toxic influence. Even if we had any such evidence as that afforded by the examination in Landry's disease, which seems to be universally considered as most probably of infectious origin, to show that loss of function may precede noticeable alteration in structure, yet we should still, from abundance of facts, be ready to consider that this was possible.

The fact that such a large proportion of the nerve fibres in the affected districts preserved a healthy appearance cannot be taken as a proof that they were performing their functions in a normal manner.

It would not be out of place, before leaving the subject of infection and its possible sources, to refer to the group of symptoms characterized as a new infectious disease and described recently by Weil and others in the *Deutsches Arch. f. Klin. Med.*, 1887, 1888.

Taken as a whole, this is not to be confounded for a moment with neuritis, the high temperature and the jaundice characterizing it as belonging in a different category. It is, however, noticeable that in several of the cases, severe muscular pain and other signs of alteration of the peripheral nervous system were present.

As regards the clinical aspects of the case, I would only mention one or two points.

In the first place, the absence of fever throughout the sickness is noteworthy. This was also noted in Rosenheim's case, and referred to by him as being sometimes present and sometimes absent in the other cases that he describes.

The mode of death seems to have been by respiratory rather than cardiac paralysis. At any rate, the respiratory symptoms were the striking ones; and although shortly before death the pulse had risen to 120, it is reported by Dr. Morris as having been full and regular, while the respiration was scarcely perceptible.

The distribution of the muscular symptoms deserves a moment's comment. Pierson has advanced the opinion that the paralysis of the cranial nerves is characteristic of the acute cases. This, however, is not indorsed by Rosenheim, who points out, very properly, that these paralyses are seen also in chronic cases, and not necessarily in acute cases only, although when present they indicate a wide generalization of the disease, and may be of bad import. In the present case, the signs of paralysis of the cranial nerves which were noticed, consisted in the difficulty in swallowing and the tenderness over both facial nerves.

The fact that the left shoulder muscles were so early and so severely affected was to me of special interest, because I have been recently collecting cases in order to test the diagnostic value of this distribution of symptoms. There seems to be no doubt that although the extremities are usually the first to be involved, in the multiple neuritis of every cause, yet the larger muscles uniting the limbs and trunk are sometimes affected very early.

Finally, I will call attention to a point which should, perhaps, have guided us to the recognition of the serious import of the case, which was early presented, namely, the restless, anxious, and agitated mental condition of the patient, which seemed at first out of proportion to the severity of his symptoms.

THE VALUE OF MERCURIC CHLORIDE AS A PRACTICAL DISINFECTANT.

A REPLY TO DR. V. C. VAUGHAN.

BY WILLIAM B. HILLS, M.D.,

Assistant Professor of Chemistry, Harvard Medical School.

THE Committee on Disinfectants of the American Public Health Association, in their report published in 1885, recommended, among other substances, mercuric chloride as a suitable agent for certain processes of disinfection. As a result of their conclusions this substance has since occupied a prominent place in the list of disinfectants employed in this country, replacing to a large extent all others for certain purposes. At the annual meeting of the Massachusetts Medical Society, held in June last, I presented, under the above title, a paper which subsequently appeared in the pages of the *JOURNAL*,¹ in which I called attention to certain chemical properties of mercuric chloride which had been disregarded by the committee in their investigations: properties which were likely to render this substance unreliable for some of the purposes for which it had been recommended by this committee: and I further characterized the report of the committee as contradictory, obscure, and, in general, unscientific, so far as it related to mercuric chloride. In my paper I suggested that the failure to take into consideration the chemical changes this substance undergoes when it is added to the material to be disinfected was due to ignorance regarding any such changes or to forgetfulness arising from hasty investigation. But a recent article² by Dr. V. C. Vaughan, of Ann Arbor, Mich., a member of the committee, in which he criticises my paper, and defends the conclusions reached by the committee, suggests very strongly that, while ignorance or forgetfulness were probably in part responsible for their omissions, there may have been in addition a willingness to suppress or misrepresent such facts as might have an unfavorable bearing on the conclusions published by them. I am well aware that this is a severe criticism. To show that it is a just one, I propose to notice the points raised by Dr. Vaughan in his paper, considering them as nearly in their order as possible.

In my paper I stated that corrosive sublimate "undergoes chemical changes, when brought into contact with organic matter. It is immediately converted by albumen to the insoluble albuminate of mercury. For this reason, albumen is recognized as the most efficient antidote in cases of poisoning by corrosive sublimate." These statements Dr. Vaughan denies. He maintains first, that the albuminate of mercury *is* soluble in solutions containing organic matters. "I endeavored," he says, "to show in the report, which Dr. Hills criticises, that the albuminate of mercury *is* soluble in solutions con-

taining organic matter," and he then states that I place my opinion regarding this question against his (Dr. Vaughan's) experience. I have looked carefully through the report of the committee in search of the experience which Dr. Vaughan refers to, and find that it comprises *one* experiment in which he shook up mercuric oxide with albumen, filtered, and detected mercury in the filtrate. This is all very well so far as it goes. Dr. Vaughan does not, however, tell us *how much* mercury the filtrate contains; but as he says a little later that the albuminate is freely soluble in an excess of albumen, he evidently intends his readers to infer that the amount was large. If Dr. Vaughan will investigate this matter quantitatively he will find that the amount of albuminate of mercury thus dissolved in albumen is comparatively small. Dr. Vaughan says that the albuminate of mercury in solution is diffusible. Very likely, so long as it undergoes no change: but as I said in my first paper, it is likely, in masses of decomposing excreta, to be at once converted to the insoluble sulphide of mercury by the sulphuretted hydrogen present. This last statement, which Dr. Vaughan also denies, I shall refer to later.

Dr. Vaughan then quotes Merck, and Nothnagel and Rossbach, and gives the formula of Filehne's preparation to support his own statement that the albuminate is soluble in an excess of albumen. Filehne's solution is not, however, a solution in an excess of proteids. The albuminate in this is held in solution chiefly by ammonium chloride, in which it *is* soluble. Dr. Vaughan says "Filehne's solution contains more than two and a half drachms of the bichloride. This amount would hardly be called very small." These statements, which are well calculated to deceive the careless reader, furnish a good illustration of the peculiar methods employed by Dr. Vaughan in the discussion of this subject. Why does not Dr. Vaughan complete the statement, instead of leaving it in such a form that it may create a misunderstanding in the minds of his readers, — and say that Filehne's solution contains two and a half drachms *in each* 2250–4500 *cubic centimeters*, approximately (assuming that he gives the strength correctly), and that it is a solution of albuminate in ammonium chloride essentially? Evidently because these facts, when fairly stated, do not support his assertion that the albuminate is freely soluble in an excess of albumen. That they may *appear* to do so he suppresses a part of the truth, trusting apparently that such suppression may escape the reader's notice. Such methods, other instances of which appear in Dr. Vaughan's article, do not appear well in the discussion of scientific questions. Dr. Vaughan says: "When Dr. Hills says that albumen is recognized as the most efficient antidote in cases of poisoning by corrosive sublimate, *on account of the insolubility of the albuminate of mercury*, he teaches a doctrine which, I must admit, is wholly new to me." Dr. Vaughan has, presumably, never investigated the solubility of the albuminate of mercury himself, but has accepted the statement of Nothnagel and Rossbach without any question. This idea that the albuminate of mercury is freely soluble in excess of albumen is one the origin of which I am not quite certain of. Christison, Tardieu, Wharton, and Stillé, and Taylor all accept it, but they give no

¹ August 25th, 1888.

² Boston Medical and Surgical Journal, January 3, 1889.