THE NERVOUS AND MENTAL SEQUELÆ OF INFLUENZA.

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One of the striking features of the recent epidemic of influenza was the predominance of symptoms referable to the nervous system. This predominance, to be sure, was no new thing. In the epidemic of 1580 in Germany some of the victims became violently insane and wandered over the hills in their delirium (Schweich[66]), and nervous symptoms have been prominent in every epidemic since. Comparative statistics are lacking to show whether the recent epidemic has been more prolific in nervous disorders than the epidemics of the past; but, in view of the greater vulnerability of the nervous system at the present day, as shown by many statistics, such an event is not improbable. Clouston[13] found neuro-muscular symptoms in ninety-seven per cent. of his cases. Taking the single symptom of headache, Stintzing and Weitemeyer[70] found that it was present in 335 patients out of 405, and Schultz[65] noted it in seventy-five per cent. of his patients. Such figures give some color to the hypothesis of Schmitz[63], who claims that influenza is primarily a disease of the nervous system, and that the respiratory and circulatory symptoms are secondary.

It is not my purpose, however, to discuss the theories as to the nature of influenza, and I shall touch but briefly upon the nervous symptoms which may accompany the attack. Most of you have seen more of those than I, and my observations have had to do chiefly with the sequelæ of the disorder.

I hardly need to cite the common nervous symptoms of influenza itself; the profound exhaustion, the aching and

pain in the head, the back, or the limbs, the extreme mental depression, the persistent insomnia, and many minor symptoms. In the severe cases we may find all these exaggerated, and in addition vertigo, delirium, a typhoidal condition, subsultus tendinum, convulsions, somnolence and coma,—the last, under the name of nona, giving rise to many alarming statements in the daily press. These last symptoms are fortunately rather rare, and are due, probably, to serious brain complications which will be touched upon later.

Influenza seems capable of exciting most forms of disease of the nervous system. I shall therefore consider the various classes of diseases in order, the diseases of the peripheral nerves, of the cord, of the brain, the neuroses, and the different forms of insanity.

Affections of the peripheral nerves are not uncommon. Mills[48] thinks that no single affection has been so common as neuritis,—a statement, however, which I am disposed to question,—and all forms of neuritis have been reported. Most commonly, apparently, the disturbance of the nerves takes the form of a severe and persistent neuralgia. Krehl[39] found neuralgia in about four per cent. of the cases, a percentage which Bidon[7] thinks too small. The neuralgia is apparently most frequently observed in the trigeminal, the intercostals, and the sciatic, but other nerves may be affected. In some cases herpes zoster has occurred. In addition to neuralgia cases of distinct neuritis have been reported. One case of mild neuritis of the ulnar nerve, which I saw, came on two weeks after an attack of influenza. Here the motor symptoms were most marked, and the neuritis was not severe enough to cause anæsthesia. Oculo-motor paralysis, especially paralysis of accommodation, has been reported by a number of observers,—Fukula[25], Uhthoff[72], Bergmeister[6], Pflüger[54] and Goldflam[27]. The latter believed his case to be due to a polioencephalitis rather than to a neuritis. Curiously enough I had under my care at the outbreak of

the epidemic a lady with rheumatic paralysis of the external rectus, who, during recovery, came down with influenza, without increasing the eye trouble. Pflüger[54], Bergmeister[6], Schöler[64] and Stöwer[71] have reported cases of optic neuritis or post-neuritic atrophy. A case of atrophy has come under my own observation, but as it was associated with other symptoms I shall speak of it later. Neuritis of almost any nerve may, in fact, be due to influenza.

A few cases of multiple neuritis have been reported (Homèn[32], Brosset[10], Bruns[11], Lojacono[46], Mills[48]). Considering the frequency of influenza it is apparently much less common than is multiple neuritis after other acute infectious diseases, notably diphtheria. Several post-diphtheritic cases have come under my observation during my term of service at the City Hospital this spring, but I have not seen a single case of pronounced multiple neuritis from influenza in that time. I have seen two or three cases, however, where a slight tenderness of the nerve-trunks and a persistent tingling in the extremities without any paresis have led me to believe that there was a slight disturbance in the peripheral nerves. A woman, whom I had seen in several attacks of exacerbations of multiple alcoholic neuritis, had another outbreak after the influenza. She did not, however, come under my observation in this attack, but it is fair to suppose that the old cause, alcohol, had something to do with it, as she undoubtedly continued to indulge.

Affections of the spinal cord as a result of influenza are rare. Among the more frequent is myelitis of the anterior horns, which occasionally develops after the acute infectious diseases (Eisenlohr,[19] Drasche[17]). I have already cited Goldflam's kindred case of polioencephalitis. Determann[16] cites two cases of undoubted spinal disease without autopsy, in one of which he thinks that there was hemorrhage, in the other meningitis. Bidon[7] and Fiessinger[23] report cases with the symptoms of meningitis. Herzog[31] reports two

cases of spastic paraplegia. Feréol[22], Laveran[43], Bennett[5] and Foa[24] all cite cases of probable myelitis, and Mills[48] reports a case where bulbar paralysis developed soon after an attack of influenza. In cases of a gradual onset, however, it is a question whether disease may not have existed before. In a hospital patient, for example, there was an obscure history of disturbances of micturition and of sensation in the feet; after influenza this increased to actual paresis of the legs. Priester[57] and Kaumheimer[34] report cases of somnolence, nona, which they believe due to changes in the central gray matter of the medulla and pons. Müller[51] attributes a similar case to meningitis.

I have already spoken of some of the more severe cerebral symptoms which may attend the attack of influenza. Helweg[30] and D'Abundo[15] have found very pronounced congestion of the brain at the autopsy of several patients dying of influenza. This congestion may explain such symptoms, although we know too little of the symptomatology of cerebral congestion to speak definitely. Cerebral or cerebro-spinal meningitis has been noted by a few observers, Ayer[1], Leyden,[45] Ewald[21], Bäumler[3] and others, but the affection is less common than many imagine. Bristowe[9] reports several cases of probable abscess, one of which was confirmed by autopsy. With congestion it is not improbable that a diseased blood-vessel may rupture, giving rise to an ordinary attack of apoplexy, as in cases reported by Mills[48], and Prentiss.[56] Eichhorst[18] has noted aphasia, the cause of which is uncertain. Erlenmeyer[20] reports a case of Jacksonian epilepsy, which he thinks due to capillary hemorrhage. A possible similar case has come under my observation, which, from its unusual character, I will briefly report.

A Polish Jew, thirty-four years of age, without any previous taint, was seized, after an attack of influenza which lasted two months, with a curious feeling in the right foot, as of a cramp. This soon passed off, but he had for two

years similar attacks, with greater frequency and greater severity. A week before I saw him he fell unconscious in a fit. Since then he has been very nervous, emotional and apprehensive. In the attacks, as I saw them, he groans, complains much of his foot, but it is not rigid and there is no spasm in it. Nothing could be found abnormal during his attack, and physical examination was negative. The attacks, however, have diminished in frequency and severity under bromide.

Cases of general degenerative disease of the central nervous system are rare, and we can seldom be safe in ascribing them to influenza. I have seen one case, referred to me by Dr. Wadsworth, in which influenza was the only cause that could be ascertained. A man of thirty, with no history of trauma, syphilis, or excess in alcohol, but who had suffered from headache, had influenza two years ago. Since that time he has noted that his general strength has failed, that he has lost twenty pounds, and that his vision is growing very poor. His headaches are much fewer. He had much vertigo and tinnitus, and his hearing had failed. He was nervous and irritable. His bowels were obstinately constipated, and his digestion was poor. He had a constant desire to micturate, but it is hard to start the stream, and his control is poor. The sexual power is much diminished. He has a tired feeling, his legs feel prickly, the right hip aches, and he feels often as if some one had hit him sharply back of the knees. Examination revealed optic atrophy, slight nystagmus on lateral movements, some uncertainty in using his hands, a rapid pulse (110), and a diminution of the skin reflexes on the right side. The knee-jerks were normal. Motion and sensation were not impaired. The pupils were equal and reacted normally.

In a few instances, too, vaso-motor and trophic disturbances have developed. Blake[8] has spoken of certain rather well-marked vaso-motor disturbances in the ear. Krause[38]

and Bidon[7] report cases of swelling due, as they think, to vaso-motor disturbances, and cases of zoster and acute bed-sores have also been attributed to the epidemic. Mills[48] found a myxœdemoid condition in one patient. Lojacono[46] reports a case of exophthalmic goitre. Various circulatory and respiratory troubles, angina pectoris, palpitation, etc., have been attributed to nervous derangements.

It is, however, with the neuroses that influenza has the greatest influence. Bidon,[7] Van Deventer[73] and Grasset[28] report various cases of hysteria following influenza, but, although I have seen patients who were emotionally unstable, hysterical in common parlance, I have not seen grand hysteria following influenza. This is to be expected considering the rarity of grand hysteria in this country. In three cases of chorea there had been a previous attack of influenza, but the causal influence of the disease seems doubtful. Villard[74] and Eichhorst,[18] however, report cases where chorea followed close upon the epidemic disease. Van Deventer[73] and Landgraf[42] report cases of epilepsy. Here we must, as in so many other cases, be very sceptical, for we can seldom exclude the possibility of previous petit mal or nocturnal attacks.

The chief effect of influenza upon the nervous system is the production of that condition which we term neurasthenia. Under this heading may be grouped a vast number of symptoms of various sorts due to unknown conditions of the nervous system. Many of them, it is true, may be referred to exhaustion or asthenia. Many of us have had personal experience of that condition of prostration after influenza when the grasshopper became a burden. In many cases, after a little, the victim has been able to attend to the routine of daily work, but it was done with increased effort, new undertakings appeared formidable, and any pretext to shirk them was readily seized. Slight mental or physical effort produced unusual fatigue. In more marked

instances there was a condition of hypochondria, and slight disturbances produced apprehension of some impending disease; mental irritability and depression have been common. Headache, insomnia, and nervous dyspepsia have been prevalent. The capacity for mental and physical labor has been diminished, or if it could still be done it was followed, as I have said, by profound and unusual exhaustion. In my own experience, for example, I found that, three months after a very slight attack of influenza, although I could still work as rapidly and apparently as easily if the pressure were great enough, if the work were kept up until one or two o'clock in the morning sleep was disturbed.

It it hardly necessary to cite the various writers who have noted the neurasthenic conditions. A case or two from my own observations will suffice to show the common condition.

An old man worked for a week through a mild attack of influenza. After it he became very nervous, he had pain in the side and palpitation, his appetite and digestion failed, he had vertigo, he felt weak and miserable, and complained of persistent insomnia. Physical examination was negative. He slept some under sulfonal, but convalescence was slow.

A young married woman, naturally nervous, whom I saw last February, had influenza two years ago. Ever since then she has been weak and more nervous. She has some headache and a little indigestion, and complains much of soreness and pain in the chest and back, and darting pains in the arms and legs. There were various hyperalgesic spots on the trunk. She had a good appetite and slept well. There were no disturbances of motion or sensation, the reflexes and pupils were normal, and an examination of the chest revealed nothing but a rapid action of the heart. She improved quite rapidly under treatment.

A lawyer, aged fifty, had begun to get nervous under very hard work. Then he had influenza, and after it had some very important and difficult work on his hands, work-

ing late at night. After a fortnight he had swimming in the head, vertigo, and a "paralyzed" feeling in the legs and arms, and he staggered a trifle on walking. At times he had a numb feeling in one foot or one hand. He had a little headache, and slept worse than usual. After a month's rest at the seashore, and five months after his attack of influenza, he went to pieces nervously; he had intense nervous paroxysms in which he walked the floor, "feeling as if he should fly." His appetite and digestion failed. His bowels were very costive. His tongue at times felt thick and he had more or less swimming in the head. His will power was diminished, but he had no confusion of ideas or mental impairment. He was depressed and wretched. Examination of the chest, the urine, the eyes, the reflexes, sensibility and mobility revealed nothing of importance. He made a good and speedy recovery.

If we were to judge by the reported cases, mental disease is probably more frequent than nervous disease as a sequela of influenza, but I think this is to be explained rather by the fact that more interest has been taken in the mental sequelæ, and that more of the cases have been reported. Through the kindness of Drs. Elliot, Dewey and Noyes, I have been able to collect statistics from the Danvers, South Boston and McLean hospitals, which may supplement those of Dr. Harrington,[29] which he reported to this Society two years ago.

To Dr. Harrington's twelve cases at Danvers Dr. Elliot adds ten, two mania, two melancholia and six confusional insanity. Out of one hundred and seventy-five admissions at the McLean, five were possibly due to influenza, three melancholia, one delusional insanity, and one mania. Here influenza was only one of various ætiological factors. Of eight cases at South Boston two were mania, two melancholia, one epileptic insanity, one senile insanity, and two post-apoplectic insanity. Out of three hundred cases that I have

collected, including the above and my own personal cases, I find ninety-three set down as melancholia, sixty as mania, forty-four as acute confusional insanity, twenty-nine as acute delirium, fifteen as delirium tremens, where influenza proved the exciting cause, nine as dementia, eight general paralysis, six febrile delirium, seven paranoia, and five hypochondriasis, the rest being divided among the other forms of insanity. The figures for acute confusional insanity are doubtless too small, as it is often mistaken for other troubles. Clouston notes particularly an increased percentage of melancholia as compared with mania since the epidemic began. Excluding the cases of acute delirium, which may be referred to conditions of profound congestion, the majority of the other forms of insanity may be regarded as of asthenic types.

In regard to the more chronic forms of insanity or to organic affections, like general paralysis, I feel sceptical, although a few are reported. I am more inclined to believe, with Mills,[48] that the influenza has stirred up some old syphilitic process or exaggerated some previously unnoticed defect, although Krypiakiewicz[40] reports one case where the ætiology seems fairly clear.

In an obscure case of my own, influenza was only one cause. The patient was a man of thirty-five, who lost his situation as a painter four years before. This made a profound impression on him, but influenza made matters much worse. There was for a time nocturnal enuresis, memory failed, he became depressed and irritable, dwelt on the inconsistencies of life, was nervous and hypochondriacal, but withal he did not seem to realize his financial situation or to be anxious about it. For six months the speech had been hesitating and nasal, but the hand-writing was unimpaired. The pupils were unequal and failed to react to light. Otherwise the physical examination was negative.

The action of influenza upon those already insane is,

curiously enough, not very marked. The insane seem, for some reason, to be less susceptible to the epidemic. At South Boston, Danvers and Somerville a larger percentage of the attendants than of the patients were attacked. Cantarano[12] found 7.28% of the insane patients, and 62.9% of the infirmary patients at Palermo were attacked. At Sales 9.28% of the insane and 31.48% of the infirmary cases suffered. Sander[61] considered that at Dalldorf the insane had a more benign form of influenza. Perhaps the greater exposure and harder work of the attendants have something to do with these figures.

In some cases insanity is little influenced by influenza. In other cases it is made worse. Snell[68] found at Hildesheim that in two cases out of eighty-two the insanity grew worse. Robertson and Elkins[59] found that the influenza increased the mental symptoms. Mispelbaum[49] found similar conditions. Cantarano[12] found little change, although at times the patients were exalted by it. Helweg[30] thinks that in the stable forms of insanity influenza has little influence, but in progressing cases it may cause an outburst of symptoms. In cases where the brain has very little activity, as in tumours or advanced general paralysis, influenza may bring the little activity to a standstill. Influenza may also change the type of the insanity; thus Morselli[50] noted the first apoplectic seizure in a general paralytic after an attack of influenza, and that the phases of folie circulaire were suddenly changed by it. Bartels[2] states that a quiet paranoiac became confused, excited, refused food and finally died. In a few, rather questionable cases, it seems to have worked beneficially. Dr. Elliot writes me that a patient at Danvers had general paralysis, alleged to be due to influenza; while in the hospital he had another severe attack of influenza which has caused a very pronounced remission, so that he is considered well. Roller[60] and Metz[47] report alleged cures of paranoia.

There is another action of influenza of which I have thus far spoken indirectly. Enough has been said to show that its action is that of a depressant. It lowers the entire plane of the individual, mental, moral and physical, and in this way he becomes more vulnerable to other injurious influences. Thus there have been several patients in the City Hospital with syphilis, but in a latent state; after the influenza the syphilitic symptoms began to manifest themselves, but yielded to the appropriate treatment. I have already stated that insanity may be rendered worse by it. All observers agree, however, that the essential factor in all these cases of insanity alleged to be due to influenza is predisposition. Dr. Cowles states that influenza is but one factor in the production of insanity in the cases at the McLean, and in my own cases heredity, trouble, and excess had an important share in the ætiology. In lowering the plane, influenza has given other factors a chance to work, or has lessened the patient's resistance to morbid conditions already existing. I could cite several cases of neurasthenia where the progress to recovery has been materially checked, and one case of traumatic hystero-neurasthenia which has been reduced from a condition of tolerable comfort to a state of invalidism. In other cases, as in insanity, influenza has seemed to have little effect on the original trouble.

We see from what has been said that there is no special form of nervous or mental disease which is the specific product of influenza, nothing even which bears the close relation to it that pharyngeal paralysis does to diphtheria or tabes to syphilis. The chief nervous sequelæ are peripheral nerve troubles,—neuritis or neuralgia,—and depressive asthenic conditions, which may be classed under the vague general heading of neurasthenia. The mental states are most commonly exhaustive states, represented by acute confusional insanity (acute Verwirrtheit), which Krypiakiewicz[40] thinks is commoner in young persons, depressive states, melancholia,

which is commoner in those of more adult years, and mania. With profound febrile conditions and intense congestion we may have acute delirium. Pronounced mental disturbance demands, as I have said, some individual predisposition. If the individual be previously sound the nervous sequelæ are usually slight and the prognosis is favorable. Where other factors come into play of course their influence must be considered.

These conditions, however, are by no means specific. They occur after any of the acute infectous diseases. Neuritis, as is well known, may follow typhoid, pneumonia or diphtheria; neurasthenic conditions, of a much more severe and protracted type, are common after typhoid and other diseases; and the various psychoses may also occur. Cantarano[12], indeed, believes that the percentage of insanity due to influenza is smaller than that due to the other acute diseases.

Much has been said, especially in common talk and the patent medicine advertisements, to lead us to believe that nervous affections have been unusually prevalent as a result of the epidemic. Clouston[13] states, that the nervous tone of Europe has been lowered by it. "The influenza epidemic," says Mills[48], "has impaired the *morale* of the community. Lack of spirit in work, and an apprehensiveness with reference to health, business, and all matters of personal interest have been abnormally prevalent. The hysterical have become more hysteric; the neurasthenical more neurasthenic. Hypochondria has displaced hopefulness in individuals commonly possessed of courage and fortitude. In brief, certain neuropathic and psychopathic features have been temporarily impressed upon the community." With these opinions I would agree. Influenza has undoubtedly been followed by a general weakening of the entire system, but the percentage of true nervous troubles due to it is, I believe, very small. I have seen in the past

three years, for instance, more cases of post-diphtheritic neuritis than I have of neuritis following influenza. In my service at the City Hospital, embracing each year the months from February to May inclusive, just after the violence of the epidemic was over, I have found that the epidemic had after all but little influence on the number of cases or the character of the nervous troubles. In only a few cases of the many seen during the service did it exert any marked influence. When we consider that, according to Shattuck's[67] estimate, forty per cent. of the adult population was seriously affected during the first year of the epidemic, such a statement has some bearing on the question. The only statistics which have come in my way are those of the German army[26]; here nervous sequelæ, chiefly in the form of neuralgia, were noted in only 0.53 per cent. of the cases.

Of course, if we take into account all the nervous disturbances of the attack itself, the pains, headache, etc., Kirn's[26] statement that in no other acute infectious disease do we meet with so many nervous disorders, may be regarded as approximately true, but if we consider merely the nervous and mental sequelæ we must admit that, as influenza is one of the milder acute infectious diseases, so its sequelæ are less frequent and less severe than those of the other affections. It has taken heavy toll from the aged, the degenerate, the neuropathic and the alcoholic, but its effects on the healthy, considering its prevalence, have been mild.

A final word as to the causes of the nervous disturbances. Kirn[26], Nägy[53] and Ladame[41] lay some stress upon the fever of influenza. This, however, is usually slight, and in many cases seems inadequate, for the symptoms often do not develope until several days or even a week or two after the fever has subsided. It is undoubtedly a factor in causing the delirium of the attack, and perhaps in producing the subsequent congestive conditions. The most probable cause of the symptoms in the majority of cases seems to me to be the poisonous effect of some ptomaïne formed by the bacterium of the disease.

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