

## Clinical Lectures

ON THE

### BORDERLAND OF EPILEPSY.

#### III.—MIGRAINE.\*

DELIVERED AT THE NATIONAL HOSPITAL FOR THE  
PARALYSED AND EPILEPTIC,

By SIR WILLIAM R. GOWERS, M.D., F.R.S.,  
PHYSICIAN TO THE HOSPITAL.

GENTLEMEN,—Not long ago I pointed out to you that epilepsy, though usually a well-defined malady, presents features that are also met with in some other affections. These symptoms common to epilepsy and to what we may call borderland diseases, involve a resemblance to it in aspect, and sometimes in character, which easily causes confusion. Indeed, the resemblance may involve the nature, as well as the character, of the common symptom, while occasionally there is an actual blending which may involve a transition from one to the other, so that cases beginning outside epilepsy may pass within its boundary. We then considered that province of the borderland of which vertigo is the prominent feature. To-day I will ask you to consider another region—that occupied by migraine and of other forms of periodical headache.

We cannot separate the unilateral pain in the head to which the term "migraine," by its etymology, is strictly applicable from other forms of paroxysmal headache. Both occur with the same associations, have a similar course, and may occur in the same subject. One may pass into the other. An inevitable result of this is that the word migraine is losing its original use—that is, its application to strict "hemicrania," and is employed as a name for all forms of paroxysmal headache. Some may regret that a word should lose its strict significance, but the fact that localization cannot be made a reason for distinction, because it has nothing to support it, makes regret futile. When names are based on unessential features their meaning has to change.

Some of you may be surprised that migraine has any relations to epilepsy, but it is a malady of which the student gains little practical knowledge in the course of his hospital work, unless he is so unhappy as to learn from the most effective of all instructors, personal suffering. Migraine is hardly ever found, except by accident, in a hospital ward, and cases are few even among out-patients. It is common enough, but seems, to most of its subjects, by long experience so much an inevitable part of life that few seek relief. In private practice you will often meet with the more severe and more varied forms; some of these are sure to cause you perplexity. The details I shall have to mention to you of those cases that come into the borderland of epilepsy will be instructive. If you consider them carefully they will help you to recognize the nature of features that differ in character, and to discern that they are of the same nature. The facts of cases are too often allowed to flit past the mental vision: in proportion as they are considered and comprehended they educate as well as instruct.

#### ALTERNATION.

Migraine comes into the borderland of epilepsy in many ways. One relation—which may seem a disconnexion rather than a connexion—is that the two affections sometimes alternate in the same patient. Migraine may cease when epilepsy develops. I have met with so many instances of this that it seems almost superfluous to cite any, but it is better not to treat anything as superfluous. A woman of 32 had become subject at the age of 8 to periodical headaches—general, not one-sided; each was preceded by dimness of sight, and usually ended, after some hours, with vomiting. At the age of 30 she became subject to epileptic fits—severe, with loss of consciousness and tongue biting. The headaches, which had continued, ceased entirely when the epilepsy began, and remained absent until she came under treatment. By this the fits were arrested, and during eighteen months she was under treatment she had only one batch of two or three attacks.

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But the headaches returned soon after the arrest of the fits, and they were of greater severity. The pain extended from the head down the sides of the face, and lasted the whole day. During these headaches—not before them—she often had brief impairment of sight for a short time, sometimes in one half of the field, sometimes in both. This fact also makes the case worth mention. We shall see other instances of the fact that the sensory disturbance which usually precedes the headache may also occur during its course.

Another example of alternation was presented by a member of our own profession, who was 38 when first seen. There was a family history of gout and migraine, not of epilepsy or insanity. He had suffered from characteristic migraine, which began at the age of 15; the headache was preceded by visual spectra. At the age of 7 he had some brief attacks of micropsy, in which objects seemed small and far away, without headache. (This is an occasional aura in epilepsy and may occur alone.) When 20 he had attacks in the early morning, consisting of a peculiar flavour and a brief dreamy sensation for a few seconds. After these had gone on for a few weeks a distinct epileptic convulsion occurred in the afternoon, but no more. Other minor attacks followed, now a sense of smell, not of flavour, and a brief confused feeling, instead of a "dreamy" state. These ceased and the headaches returned, which had been absent during the epileptic period, but they were no longer preceded by the visual sensation. They ceased, however, on the return of still slighter minor attacks without any sensation, consisting only of a brief inability to speak, so brief as to be seldom noticed. After a time these also ceased, and with no recurrence of the headaches.

Sometimes we find epileptic attacks and headaches continuing together, but in such cases the latter is seldom definitely hemicranial, unless the epilepsy is only the minor form. The alternation is often so pronounced as to be significant, although we can only conjecture what its meaning may be.

#### PREMONITORY SYMPTOMS.

The most frequent prodroma is visual, as you all know. It is so characteristic as not to lead to confusion with epilepsy. But its features should be noted. The most frequent among the many forms is that of a small star near the fixing point; it enlarges towards one side, its rays expanding into zigzags, often coloured—the "fortification spectrum." Within it vision is dimmed by bright scintillation. It becomes faint when it has almost reached the periphery, and ends in various ways which are not relevant to our present object. It lasts a quarter of an hour or more, and as it ceases the headache comes on, usually on the opposite side of the head. Sometimes the visual disturbance is central and bilateral. Many other forms are described and illustrated in my Bowman Lecture on "Subjective Visual Sensations."<sup>1</sup>

These symptoms are familiar. It is not so, however, with another premonitory symptom which occurs in the arm. A sensation of tingling, often like "pins and needles," is felt in the hand and slowly ascends the arm as a zone, leaving behind it "numbness," diminished sensibility. It occupies about a quarter of an hour in passing up the arm, and as it ceases the headache begins, on the opposite side of the head. The ascending zone of tingling obviously corresponds to the expanding luminous zigzag in the field of vision, and the impaired sensibility left behind it is similar to the dimness of sight within the zigzag. We can scarcely doubt that the symptoms are due to the same process in different regions of the brain, in the visual centre, and in that for sensation in the arm. The latter concerns us now on account of its resemblance to the aura of the epileptiform fits that are caused by organic disease of the cortex, active disease—as a tumour—or an old stationary lesion, in what may be termed "organic epilepsy." The resemblance is important for many reasons, practical and pathological. One practical reason is obtrusive; the symptoms of migraine may be mistaken for those of epilepsy, or at least of epileptic discharge; since the mistake may be made by men of experience, the causes of such error need consideration.

The process which precedes the headache of migraine is very mysterious, whether it is referred to the eye or the

arm; there is a process of intense activity which seems to spread, like the ripples in a pond into which a stone is thrown. But the activity is slow, deliberate, occupying twenty minutes or so in passing through the centre affected. In the region through which the active ripple waves have passed, a state is left like molecular disturbance of the structures. There is a subjective sense of "numbness" in the arm and a peculiar scintillation in the field of vision. The structures are less susceptible to stimuli reaching them from without, so that there is dimness of sight in the eyes and defective sensation in the arm; they slowly subside to the normal condition. Then comes on the pain, often so intense, on the side opposite to the peripheral symptoms. We must refer the latter to disturbance of the cortical centres of the brain, but we know nothing of the precise nature of the process. It has been conjectured to be due to local arterial spasm, but of this we have no proof. Contraction of the peripheral arteries commonly attends the pain as it develops, causing pallor and coldness of the surface, but this is apparently an effect of the pain, as the arteries of a frog's foot contract when its brain is injured. A peculiar spreading disturbance of the nerve structures is evident; that it depends on arterial spasm is an assumption which may or may not be true. The opinion is difficult to reconcile with the character of the "discharge," so uniform in its general character, so orderly in its disorder. Not less mysterious is the pain, so intense, often so restricted, and felt at the seat of the disturbance which causes the peripheral symptoms, in the side of the head opposite to that to which the sensory derangement is referred. But the pain does not concern us now.

#### DISTINCTION FROM EPILEPSY.

The important fact is that a sensation beginning in the hand and passing up the arm occurs, not only in migraine but as the aura of convulsions due to organic disease of the cortex, although the two differ in their duration. The epileptic aura occupies a few seconds, the premonition of migraine is almost always many minutes, often twenty, in its deliberate course. Another point of resemblance is that a sense of weakness may accompany the sensory disturbance in each malady. Each may have headache as its sequel, but the pain of severe migraine is incomparably greater than the headache which follows a minor epileptic seizure which does not develop to convulsion. When the right arm is the seat of the sensory disturbance, in each disease there may be some degree of transient aphasia, another source of confusion. But the duration of the symptoms affords a decisive indication. In the following case this was so clear that I should hesitate to mention the facts to you were it not that the nature of the case was actually misconceived. The patient was a boy of 13, belonging to an intensely gouty family. For several years he had been subject to periodical headaches, formerly general or vertical, but of late they had been only on the left side. (Here we have an illustration of the fact that, as I have said, we cannot separate the periodical headaches that are bilateral from those which are "hemicranial.") When the pain in the head became limited to one side, each attack was preceded by a sensation in the right arm, the characteristic tingling, beginning in the hand, passing up the arm, and leaving numbness behind it. It occupied a quarter of an hour in its transit, and with it there was distinct aphasic difficulty in speaking. As it ceased the left-sided headache began; and it lasted some hours. These symptoms were typical; and yet an experienced physician had expressed the opinion that the case was one of focal epilepsy, "Jacksonian epilepsy," probably due to a tumour of the brain, and had advised an operation. The diagnosis of migraine was entirely confirmed by the subsequent course of the case.

Besides the difference in duration there are other distinctions. The sensory disturbance in migraine may affect both hands, but this is never the case in Jacksonian epilepsy. The aura of this may start in the foot or the hand; that of migraine never begins in the foot, and seldom involves the lower limb. At least, I have never met with onset in the foot; it is always unwise to affirm a universal negation. I have only once known the pre-migrainous sensation to pass to the leg, and never down the trunk, whereas the sensory aura of epilepsy often passes from one limb to the other, down, or up the trunk. The

epileptic aura, ascending the arm, may seem to pass to the face or the head, but that of migraine is never thus described. Often, however, after ascending the arm, or even simultaneously, it is felt in the lips, and usually in both sides of the lips, sometimes also in the tongue. This is of interest, because the lips are essentially bilateral in function and are closely related to the tongue. You cannot narrow your lips without also narrowing your tongue, and vice versa.

Although it is rare for headache with premonitory visual symptoms to be thought to be epilepsy, the mistake was made in the case of a man, 38 years of age when seen, who had suffered from nocturnal fits since 17. They were general, and occurred at intervals of several months. He was thought to suffer from minor seizures also, because attacks of migraine were regarded as epileptic. These began by "haziness over his sight, with bright specks in front of him," impairing vision sufficiently to compel him to stop what he was doing. There was no zigzag spectrum or hemianopia. This generally lasted for only five minutes, but sometimes longer, even for an hour. Before it ceased, headache commenced, slight at first, but gradually becoming intense. It began in the occipital region, and "worked round the head, to fix itself at last in the right eye." It often lasted two or three days.

The same mistake of regarding the symptoms of migraine as those of epilepsy was made in another case, but with more excuse. A boy of 16 had suffered for a year from attacks which were regarded as certainly epileptic. Each began by the appearance of misty blotches in his sight, without colours or spectra of definite form. This amblyopia continued for half an hour; as it passed off, pain came on in the left side of the forehead, increasing to great severity. After two to four hours vomiting occurred and immediately the pain lessened and soon passed away. So far the symptoms are typical. But a few minutes before the vomiting, after the headache had lasted some hours, a sensation of "pins and needles" was felt across the upper lip and in both hands. In the earlier attacks the sensation was felt only in the first and second fingers, but in the later ones it had spread over the whole hand. It accompanied the vomiting and ceased with it. This is another instance of the occurrence of sensory symptoms during the course of the headache, and this unusual feature helped to give rise to the diagnosis of epilepsy. It seems to have preceded the discharge of nerve-tension by the vomiting which often frees the sufferer from the pain. Such bilateral symptoms do not often precede a headache that is on one side. As in the previous case, the sensation in the lip was bilateral. The limitation in the hands, quite symmetrical, is one of the peculiar features of the sensory disturbance of migraine, and when bilateral it is distinctive. The case illustrates also the fact that the variation in the order and character of the symptoms is often a cause of perplexity. We shall see other examples of this, and their consideration will enable you to discern the nature of other diverse symptoms of this most variable disease.

#### ISOLATED PRODRAMAS.

It is important to remember that the sensory prodroma of migraine may occur alone, without succeeding headache to emphasize its nature. Any form may be thus isolated, and may sometimes give rise to perplexity—the visual symptoms, indeed, rather curious than misleading. When they occur alone, they are often excited by some peculiar visual impression—a gleam of light, or the thrilling sensation which quickly-moving objects cause, or the rapid alternations of light and shade produced by double palings. This may be connected with actual visual impressions. In a strange case I have described a coloured zigzag circle was sometimes seen around an object, for example, a plate that was before him; he raised his eyes to the window, and it was still before him, but slowly disappeared. He described it: "I looked up and the phenomenon was still before me, but it went out of the window." He was a mechanical draughtsman, and depicted what he seemed to see in quaint drawings, which are in the possession of the Ophthalmological Society.

The error of mistaking the visual prodroma for minor epilepsy has some excuse when the visual sensation occurs without a succeeding headache. This often happened in a patient whose symptoms presented other features of interest. He was a man of 24, who began to

suffer from migraine at 16, and had two epileptic fits during the six months before I saw him. The headaches had always been preceded by hemianopia, often on the left side, lasting ten or twenty minutes, followed by pain on the right eye and right side of the head. Still more frequent, however, was transverse hemianopia, loss of the upper half of the combined field. (This remarkable feature I have met with in a few other cases of migraine.) The loss, whether lateral or transverse, was attended by a "flickering" but never by a zigzag spectrum, although occasionally there was a spectrum "like a Catherine wheel." The succeeding headache lasted two or three hours or longer, even the rest of the day. Afterwards he frequently had the visual symptoms with very slight and brief headache, and often with none. They were induced by a sudden change of light, especially by going into bright sunlight; sometimes by going into a darker place. When thus induced, and without headache, they were much briefer, lasting sometimes for a minute, and often less than five minutes. In such detached form they might easily have been thought to be minor epileptic seizures, but the identity of character with those that preceded the headaches made their nature certain. He afforded, also, an illustration of the real difficulty which such cases sometimes cause. He had one attack unlike the others. Suddenly, voices seemed far away, his field of vision became lessened on each side, and he was extremely pale, as if fainting, but presently recovered. He had no others like it, and its nature is uncertain. He had only one more epileptic fit, and his headaches became much less frequent during the eighteen months he was under observation.

The cases in which such isolated sensory disturbance is in the arm, especially in the right arm, and is attended with definite aphasia, may give rise to great perplexity. This is not quite relevant to my present subject, but nothing that is important is irrelevant to your needs. The symptoms seem like those of sudden arterial obstruction in the brain, causing transient hindrance to the blood supply. The fear is specially aroused, if there has been no previous similar attack. This is not improbable in medical experience, because it is then more likely that the patient will seek advice. Subsequent headache if it occurs, may not lessen the concern. The difficulty is greater if the patient presents conditions favourable to arterial obstruction, if he is in the degenerative period of life, if he has had syphilis, or presents any sign of heart disease. The guiding points are the following. In most cases the sufferer has been liable to paroxysmal headaches, with or without preceding visual spectra. The sensory symptoms in the arm predominate, and their peculiar character, as I have described it, is really distinctive, if only you know the fact. So also is a sensation in the lips, subsequent or simultaneous. Lastly, the symptoms seldom last more than half an hour, and at the end of an hour all is normal, unless some headache remains. It requires courage on the part of a doctor, confronted with such symptoms for the first time, to dismiss them as functional, because he knows that he will be blamed should they be the harbinger of grave disease. In the degenerative period of life, indeed, symptoms of this nature may have the feared significance, but then they are not so transient. A few days since I heard of a lady whom I saw some time ago, who was in late life the subject of migraine with a visual premonition, and had sudden weakness in the right arm and some aphasia. They did not pass away until a week afterwards, and were evidence of a slight organic lesion. But the arm was weak, not tingling, and the duration of the symptoms was clear proof of their nature.

#### VERTIGO BEFORE MIGRAINE.

It is not common to meet with vertigo as a premonitory symptom of headache, but when it occurs its rarity may render it a cause of perplexity. It is usually slight, but in those who are subject to it, is occasionally more severe, and its nature may then be easily misunderstood. Even when severe enough to involve actual instability, it is seldom so definite in character as to permit a description of its features. The following case is an example of prodromal vertigo, and also of another feature, the variation in duration of the premonitory symptom in the same patient. In this case they were generally much shorter in duration than they are in most patients.

A man of 30 had been subject to migraine since he was a boy. The headaches were bilateral and preceded by loss of sight, sometimes general, sometimes hemianopic, which lasted only a few minutes before the headache came on. Sometimes, instead of the affection of sight, there was numbness of the lips or of the tongue or of both, equally brief. These symptoms occasionally occurred without a succeeding headache. With them there was often a slight vague sense of giddiness. On one occasion, two months before I saw him, there was a much more prolonged warning. It began with giddiness, and, although he could not describe it, the intensity was such that he could not stand. It was attended by flushing of the face with a pricking sensation in it and in the right limbs. After half an hour it lessened so much that he could stand, but in a few minutes it returned with renewed and more severe "pricking" in the right limbs; this seemed to cause weakness in them. The symptoms gradually lessened and passed away, but before the giddiness had ceased, the headache began, of the usual character: at first a sense of pressure at the vertex, gradually passing into severe pain, much more intense than he usually experienced, which continued for twelve hours.

Such a long prodroma bears a resemblance to the symptoms of an organic lesion, rather than to epilepsy, and this was increased by the weakness that attended the sensation in his limbs. It is important to remember that any sensory discharge may exert an inhibitory influence on the motor centres, although the usual effect is to cause a sense of weakness rather than actual loss of power. In this case, a mistake should have been prevented by the fact that the symptoms differed only in degree from the usual premonition, and by the perfect resemblance of the character of the headache to that from which the patient had habitually suffered. The brevity of the premonitory symptoms in the ordinary attacks may seem a resemblance to epilepsy, but their character was distinctive. Tingling in the lips or tongue on both sides is confined to migraine, as I have said. Lateral hemianopia is a symptom which, strange to say, seems to be unknown as the aura of an epileptic attack, although a brief transverse loss is occasionally met with. In one case the aura of the fits was a sudden green colour in the lower half of the fields of vision, from side to side; to the patient it seemed as if "he was standing in a field of grass." It was this case that led me to investigate the colour-fields in relation to the area of the testing object, and I found that with a sufficiently large object the fields for red and green extend almost to the limit of the field for white.<sup>1</sup>

#### SYMPTOMS DURING PAIN.

Another class of symptoms which may sometimes bring migraine near epilepsy, and frequently seem to do so, is disturbance of other brain functions during the pain. As I have said, we do not know by what mechanism the pain is caused. The fact that when unilateral it is on the side of the head opposite that to which the sensory symptoms are referred, must indicate a direct relation to the substance or membranes of the hemisphere. The fact that it seems to have a cortical origin, and is not due to derangement of the lower centres, is all that concerns us now. It enables us to understand that signs of other disturbance of function of the cortex should sometimes coincide with the pain. They seem to result from its intensity, as they do not from pain in other parts, however severe, and they always coincide with its extreme degree. One such effect is very common—the over-sensitiveness to sensory impressions which accompanies all severe attacks. The pain itself is increased by light and sounds, so that darkness and silence are needful for endurance of the suffering.

#### SOMNOLENCE IN MIGRAINE.

A very rare and very merciful effect of the pain is sleep. It is so rare that it may not be right to speak of it as an effect, although it has this semblance; it may be another manifestation of the brain disturbance that causes the pain. When it occurs it entails peculiar difficulty in the diagnosis, and may even make it hard to say whether the malady is or is not epilepsy.

This difficulty existed in the case of a boy who was 11 years old when I saw him, whose symptoms had been confidently ascribed to epilepsy. A year before, at a party, he struck his head against that of another boy. The blow was near the left parietal eminence, but not severe. He had immediately some difficulty in speaking and headache

came on quickly. A few hours afterwards a doctor saw him; he could then speak well, but the pain was severe, and he had begun to vomit. There was no sign of injury to the head. He went to sleep, and next day was quite well. He continued so for six months, when, one morning, he started alone for a walk along a country road, and was afterwards found by the side of the road, fast asleep. He was roused with difficulty and taken home; at once he went to sleep again and slept for several hours. He then said that he had had a little headache on starting; it increased, he felt he must lie down, and at once went to sleep. A month later, headache began in the morning, slight at first, gradually becoming severe, and again he went to sleep for several hours; when he woke up he was violently sick and then was better. Half an hour after the headache came on he felt a sensation of tingling in his lips and spoke with difficulty; his lips seemed contracted and could not be moved properly. This lasted about an hour, and passed off before he went to sleep. After another, he was feverish, with a pulse of 120. The headache always began at a spot just behind the left parietal eminence, and spread thence forwards and backwards, but never went to the other side.

That the case was one of migraine admits of no doubt, and was confirmed by the effect of treatment. It presents many instructive features. The excitation of the first attack by a slight blow on the head is unusual, and was misleading; the immediate symptoms might reasonably be ascribed to damage to the brain. The deep sleep in the second and subsequent attacks bore a suspicious superficial resemblance to the post-epileptic sleep, and vomiting is not uncommon after convulsive attacks. But severe headache never follows attacks too slight to be noticed; while vomiting is not a sequel to such slight seizures, nor does it follow prolonged post-epileptic sleep. It occurs soon after the attack. The occurrence of the lip sensation after the onset of the headache, instead of before it, reminds us of the similar relation of the symptoms in a case already mentioned, and it is probable that the difficulty in speech was due to an inhibition of the lip movements rather than to actual contraction. A similar inhibition may attend the sensory symptoms in the hands, as we have already seen. It is difficult to ascertain whether there is real inability or only a sense that it exists. One other feature also deserves note, though it is not connected with our present subject. It is the feverish symptoms which attended one attack. I think that there is no doubt that in young children migraine is represented by feverish attacks, with headache, which bear an alarming resemblance to meningitis, but pass off in about twenty-four hours, to recur after a few months. These attacks may be replaced by simple headaches in later childhood. Apart from this, the case shows how easily the features of migraine may mislead. The first attack, indeed, excited by a blow, could scarcely have been interpreted aright.

#### DELIRIUM IN MIGRAINE.

The intolerance of sensory impressions which the pain causes may pass into more pronounced cerebral disturbance. The intense suffering may induce a state of stupor, in which the pain seems to be felt as acutely as ever, but is not afterwards remembered. The condition is often attended by quiet delirium of which nothing can subsequently be recalled. The patient is usually said to be "unconscious." It must be remembered that the word "unconsciousness" is used as loosely as "giddiness," and is applied to delirium as often as to stupor. Such delirium was presented by a married woman, aged 30, whose mother suffered from headache, and father from gout. "Sick headaches" began when she was a girl, and became more severe at 23, and gradually more frequent. They began in the morning suddenly; the pain was at first occipital and later extended forward over the eyes. No sensory symptoms preceded the attack, but sometimes double vision occurred just before the headache. An unusual feature of the pain was that it compelled her to sit up, being greater when she lay down. As it grew most intense she became paler, her hands and feet extremely cold, and she passed into a delirious state, making strange statements, of which she afterwards remembered nothing. Her condition was described by a doctor who saw her as resembling epileptic mania. As the pain lessened, her mental state became normal.

A similar condition, more variable in duration, occurred

in another woman, who was 28 when first seen; her headaches were then attended by a similar delirium, and ten years later it still accompanied them. As in the last case, there was a family history of headaches, of gout, and also of rheumatism. The day before one of her headaches she always felt particularly well; although easily tired as a rule, she then felt as if she could walk any distance. (This antecedent is often described by the sufferers from migraine.) Her headaches began suddenly, without any preceding sensory symptoms, with pain at the back of one eye, either right or left. It spread through that side of the head and then invaded the other side, without ceasing on that first affected. When at its height she often had a strange feeling that she was going to say or do something odd, and immediately began to ramble in her talk. This wandering state often continued for an hour or more; sometimes it lasted only three or four minutes. It passed away with a dazed feeling, not with any sense of faintness. Afterwards she remembered the strange initial sensation that she was going to talk nonsense, but absolutely nothing of the period of delirium.

#### EPILEPSY FROM MIGRAINE.

Such delirium as I have described may not only resemble the post-epileptic state in its character, but its nature may, perhaps, be similar. We ascribe the automatic action, and also the hysteroid state met with after slight epileptic seizures, to transient loss of control of the structures involved. We can conceive that the intense pain may produce a similar effect, inhibiting the controlling centres. It can only be a conception, because we know nothing of the actual mechanism of the pain. But the influence on the cerebral functions is important for our present subject because it may be more profound. We have seen, from the last case, that the mental aberration may be brief. Such a condition, if more profound, might produce a loss of consciousness very similar in aspect to that of epilepsy. The case I am about to mention shows that such a state may result from this disturbance.

A married woman of 47 had suffered for a long time from occasional headaches ending in vomiting. During some of these, when the pain had become very intense, she lost consciousness for a few moments, the loss being preceded by a sense of falling, attended by pallor of the face, and followed by cold perspiration. It was probably more than syncope, for consciousness returned through "dazedness," not by a sense of faintness. After a time, she occasionally had a similar attack when she had no headache. Thus it seemed as if the effect of the pain had produced a tendency which became independent of its excitant. Such a case passes out of the borderland of epilepsy, over the border line.

Equally distinct was the relation of epilepsy to migraine in the case of a married woman of 38 without neurotic heredity, who had suffered from periodical headaches since the age of 6. For many years they occurred at intervals of about three months, but they subsequently became more frequent. The headaches were chiefly frontal, severe, lasting all day, without any sensory prodroma. For many years, when the pain became most intense, she suddenly felt a peculiar sensation at the epigastrium, which passed up through the chest to the head, and seemed to spread over the whole head. It continued for ten minutes, and ended as suddenly as it began, but with an eructation of flatus. During the sensation she was unable to see, or to speak, or to understand what was said to her. She heard the words as sounds but could not tell their meaning. When the sensation ended sight returned, and her power of speech came back gradually; at first, on trying to say a word, she could not utter it correctly. This arrest of cerebral function at the height of the pain, following a sensation resembling the epigastric aura of epilepsy, is sufficiently remarkable, although consciousness was unimpaired. But it proved to be more than a resemblance. Five years before she was seen, at the age of 33, this sudden state became a definite epileptic fit. When the headache reached its height, she lost consciousness, and fell if she was upright, without warning; general convulsion occurred, with tongue biting and micturition. These fits had become her chief trouble, but they always occurred during the course of the headache. Thus the development of the epileptic

attacks from the cerebral disturbance during the pain, apparently as its effect, is clear. Unfortunately, I saw the patient only once; but she was intelligent, and gave a clear account of her symptoms. The facts are in close harmony with those of the preceding cases.

#### PRODROMAL CONNEXION.

Another remarkable illustration of a relation between migraine and epilepsy is afforded by a case in which the headaches did not cease when epilepsy set in, but became preceded by the aura of the fits. The aura was visual, and the headaches at once appropriated it. This is the only interpretation we can put upon the facts. The patient was a girl—16 when seen—in whose family there was a history of gout on the mother's and insanity on the father's side. From about the age of 5 she had been liable to periodical headaches, general. When 13½ she had an epileptic fit during sleep; since then three others had occurred—two during sleep and one when awake. Since the first fit the headaches had continued, but preceded by a brief, very definite, visual spectrum, and the single epileptic attack which occurred when she was awake was preceded by precisely the same aura. The headaches had been frequent, at intervals of about six weeks, and the preceding visual spectrum was always of the same character, so that she was able to give a precise description of it. A bright object appeared a little to the right of the fixing point; it was not quite a star, although it had projections which were in constant movement. To illustrate this movement the patient moved her fingers just as cilia move. These projections were each of a different colour—yellow, blue, and red, never green. It was so bright that she called it "fiery," and behind it there was a misty dimness, not blackness. At once it began moving to the left, and when it had passed to a place about half-way from the fixing point to the left edge of the combined fields it stopped and moved to the right, passing above the fixing point, obliquely downwards to the extreme right edge of the field, "as far as she could see to the right," and she felt compelled to follow it. Then it passed again to the left the same distance as before, and again to the right, although not quite so far. The movements were repeated two or three times, and then the object suddenly disappeared, she could not say where. The duration was estimated at "a minute." It left for a time dimness of sight in the region through which it had passed, the middle and right parts of the combined field. For instance, she said that immediately after it had disappeared, if looking at a person's face who was near her, she would only be able to see the ear that was on her left side. As soon as it ceased, pain in the head came on; sometimes it was bilateral and frontal, from temple to temple, lasting most of the day, and ending with vomiting; more often it was left-sided, and especially intense just above the eyeball, at a spot indicated as midway between the eyeball and the eyebrow. The pain here began as soon as the luminous spectrum ceased, and continued for several hours. During a year the patient was under observation she had no more fits, and the headaches became slight, but the spectrum occasionally occurred before them.

This case is specially instructive. The visual sensation resembled in its brevity an epileptic aura rather than a prodroma of migraine; it was similar also in its movement as a whole, in its change of place but not of character, and likewise in the sense of a compulsion to follow its movement across the field. The visual process seems to have been introduced into the brain disturbance by the development of epilepsy and immediately to have attached itself also to the attacks of migraine. It preceded these after the first fit, which was during sleep, and some time passed before the single attack in the day revealed its relation to the epilepsy. Although as brief before the headaches as before the fits, there was no trace of any minor attack after it, and the succeeding pain was characteristic of migraine. A focus of pain behind or above the eyeball is common in these cases, and its mystery is increased by the fact that, like the one-sided cranial pain, it is on the side opposite to the preceding peripheral disturbance. In this case, the visual spectrum was in the region of the combined field subserved by the right eye. It did not invade the left portion of the fields subserved only by the left eye and the right hemisphere. This agrees with the occurrence of the localized pain on the left side.

#### ELABORATE PREMONITION.

The premonitory symptoms of headache sometimes attain a high degree of intensity and of complexity, far exceeding the common forms. Such cases are very rare, but may give rise to great difficulty. The following case is an example; I have reserved it to the last because it combines with other features many of those already described, and its proper position in the series we have considered is not easily assigned. Its importance arises from the fact that it shows what strange and diverse combinations may be met with, only to be understood by discerning their character, and especially their relation to succeeding headache. The chief diagnostic danger is that this pain may be regarded as the secondary consequence of the disturbance, which is really the elaborate forerunner of the headache. The case is further important as presenting motor symptoms as part of the prodroma, but they really emphasize the significance of their general absence. The symptoms, indeed, belong, in part, to some other sections of the borderland yet to be considered, but it has close relations to the region we are now concerned with.

The patient was a married woman, aged 31, who had suffered since 18 from headaches, about once a fortnight. They were very intense, limited to the right side, and ending with sickness. Three years before, at 28, a sorrow befell her, the death of her mother. Since then the headaches had changed in character, and an elaborate prodroma had preceded each. First her sight was lost, not on one side, but in front of her, where "a black curtain seemed to have dropped down, brilliant with thousands of golden points." In a "minute" the luminous points disappeared, and were replaced by a feeling that the whole room was turning towards the right, though she was still. This was followed by a sense that her limbs, arms and legs, and also her jaw, were being fixed—"drawn" was her expression; apparently they passed into a state of rigidity, like that of tetany in character, but not in form, since the fingers were flexed at all joints and not in the tetany position. After this had continued for "ten minutes," she became "unconscious" (apparently really so) for about a quarter of an hour, but this state was sometimes replaced by a sense of faintness, followed by general tremor, with chattering of the teeth. Then the headache came on; the pain was felt at first in both mastoid processes, and passed up to the top of the head and thence down to the throat. At a later date it began in the ears, as before, and extended to the vertex, but then passed to the middle of the cervical spine, where it was very intense. It always continued for several hours. In connexion with the aural seat of the pain, a curious fact was described. There was some reduction of nerve-hearing on the left side, but each membrana tympani and meatus was normal. The day after each attack of pain she almost always had a yellowish discharge from the meatus. This is quite credible, as a "flux," the effect of the pain, analogous to the subcutaneous swelling of the forehead, etc., met with in cases of neuralgia.

In spite of the unusual prodromal symptoms they were dominated by the pain, most intense and prolonged. Although complex and strange, they were only an elaborate premonition of the pain, and the discernment of this fact and recognition of its significance afford the most important lesson the case can teach. It should prevent a misapprehension, even of the disturbance of consciousness, most rare as a part of the premonition, and then so easily mistaken for a symptom of epilepsy. It should even prevent a mistake as to the nature and meaning of the motor symptoms, regarding which a word more must be said. Although the contracture was not like tetany in the posture of the hands, it probably was so in nature; in true tetany the fingers are sometimes in flexion. Such contracture may be due to a state of the motor centres similar to that which, in the sensory region, causes the subjective "numbness," and surprise may reasonably be felt that it does not often accompany the sensation. Such general fixity of the limbs is a condition quite different from epileptic spasm, and should not mislead, even apart from its position in a series of functional states, leading up to the headache.

#### CONCLUSIONS.

In connexion with the cases described their chief lessons have been pointed out, but it may be well briefly to enumerate the more important facts they illustrate. I



have thought it better to confine myself to my own personal observations, and as I claim no novelty in what I have adduced, it has been unnecessary to encumber the lecture with references to the observations of others. Yet an allusion should be made to the classical work of Dr. Edward Liveing,<sup>2</sup> which, as a medical monograph, has few rivals on any subject. In it will be found an impartial account of the speculations that have been put forward regarding the nature of the process, some upon grounds so insecure as to enable opposite opinions to be urged with almost equal plausibility. Great as would be the advantage could we compare the real nature of the morbid process in epilepsy and migraine, we must wait for the advantage until the necessary knowledge is obtained.

It is, indeed, somewhat curious that the most frequent relation of migraine to epilepsy that we have encountered in our survey of the facts is as a source of error. The danger of this is greater than I anticipated when I began to consider the cases which brought the two maladies together, and to lessen this has become of greater importance than I expected. That there is some relation between the two we cannot doubt, and yet the actual evidence of it is very slight. It is clearly indicated by their frequent alternation, by the fact that, in so many cases, migraine lessens when epilepsy develops. But of the strongest evidence of a direct relation—that of the same premonition being followed by an attack either of epilepsy or of migraine—I have been able to adduce only a single instance. We are hardly justified in saying more than that in each malady a state of nerve tension seems slowly to develop, which is at last relieved by a violent functional disturbance. In the two diseases this disturbance differs so much in character that we should, perhaps, not be surprised to find that there is so little evidence of a direct relation between them.<sup>3</sup>

We cannot regard the occurrence of epilepsy during the intense pain of migraine as evidence of a direct relation. The connexion it establishes is close but indirect. The pain has this effect, as any other source of intense disturbance might have, and the result does not prove a special relation of cause and consequence. There is not even evidence that unilateral pain causes unilateral fits. The effect of the pain on cerebral function may be traced through slighter disturbances, stupor, delirium, and loss of consciousness, to definite epileptic symptoms, as in the cases considered—clear evidence of the secondary indirect character of the relation between the two affections.

The differences between migraine and epilepsy are definite and distinctive. Their antecedents differ. When heredity is to be traced in epilepsy, the antecedents present either the same disease or insanity. These are seldom to be heard of in the case of migraine, in the more marked forms of which parental or ancestral gout is seldom absent, and generally is pronounced; and there is often also a history of severe headaches or neuralgia. However difficult it may be to understand, observation makes it certain that the offspring of gouty parents are specially liable to the painful neuroses, and this is especially true of those who are of the female sex. These antecedent relations are, of course, true only of the majority of cases. Other differences have been emphasized in connexion with the cases that illustrate them. The difference in the duration of the premonitory sensory symptoms is especially important. The brief warning of the epileptic fit, lasting only a few seconds, is not met with before pure migraine, and to this the deliberate disturbance, lasting ten to twenty or thirty minutes, is confined. Rarely it is over in five minutes, but in such cases the same prodroma on other occasions endures for a much longer time, and the variations indicate its nature. The character of the forerunning disturbance is generally also distinctive. In the arm, the zone of tingling, slowly passing up the limb, is never described in epilepsy, of which any clonic spasm is distinctive, and unknown in migraine. The visual symptoms which so often precede migraine similarly differ in duration from those that constitute the warning in epilepsy, and they usually differ also in character. Dimness or loss of sight is general in epilepsy, and is momentary; in migraine it is blotchy and irregular, or one-sided and prolonged. A more definite sensation has a mechanical elaboration, and consists of an angled line, simple or

multiple, straight, curved, or expanding, which may limit an area of loss. A stellate body, still or moving, may occur in either affection, but the simple flash of light, or multiple momentary bright "stars," so common in epilepsy, are not known in migraine. In this, also, we never meet with the elaborate psycho-visual sensation—a face, a figure, a scene, or the like, which are not rare in epilepsy. The contrast is curious between this form of elaboration and that which is so common in migraine, which I have called "mechanical"; it suggests that the latter is due to a disturbance in a region of the cortex that is at a lower level of function than that in which the epileptic process occurs, or that the mode of disturbance is quite different.

The special characters of the pain are also important. The severe degree and long duration common in migraine are never met with after an epileptic attack of minor character, with which alone the symptoms of migraine can be confused, nor is severe headache, even after a convulsion, one-sided. Vomiting occurs soon after the fit in epilepsy, not after the headache has lasted some hours, as in migraine. The occasional occurrence of prodromal symptoms during the headache may be a cause of error, but this should be prevented by a knowledge of the fact. The effects of the pain itself, stupor, somnolence, delirium, and loss of consciousness, also need only to be known for the due recognition of their nature and significance.

I hope to deal separately with the subject of the treatment of these borderland cases, but its effect has been mentioned in connexion with some of the cases, as affording confirmation of the diagnosis of their nature. Bromide, so often effective in epilepsy, has much less value in migraine, in which nitroglycerine is of service, especially in combination with strychnine. This may be held to support the opinion that the symptoms depend on vasomotor spasm, but the conclusion is scarcely justified. It is not for the attack itself that it is useful; its service is obtained by continuous administration between the attacks, combined with whatever other agents are indicated by the condition and history of the patient. I will end with an illustration of one sufferer's conviction of its value, although I know full well how little weight we can wisely attach to the belief of a patient. A young man, whose life had been almost transformed by the reduction to a trifling degree of severe and frequent migraine, said that if I stopped his nitroglycerine mixture, he should get a lump of dynamite, carry it in his pocket, and nibble it from time to time.

## REFERENCES.

<sup>1</sup> Bowman Lecture on Subjective Visual Sensations, *Trans. Ophth. Soc.*, 1895, reprinted in *Clinical Lectures*, Second Series (London: Churchill, 1904). <sup>2</sup> *Megrim, Sick Headache*, etc. (London: J. and A. Churchill, 1873). <sup>3</sup> In a short article on Epilepsy and Migraine (*Lancet*, August 11th, 1888), Sir Samuel Wilks has seized, with characteristic precision, the general significance of the facts, although his conclusion is more absolute than is justified by the cases considered in this lecture.

FRENCH SOCIETY OF MILITARY MEDICINE.—The foundation of this Society was mentioned in a recent issue of the BRITISH MEDICAL JOURNAL. It owes its initiation mainly to Medical Inspector Delorme, Director of the Val de Grace, who in 1903 induced the late Ministers of War, General André and M. Berteaux, to accept the proposal in principle. Now it is duly constituted with the Ministers of War, Marine, and the Colonies as honorary presidents. The Society held its first meeting on November 15th, when Dr. Delorme was elected President; Dr. Primet, of the Colonial Service, Vice-President; Médecin Principal de Ire Classe Mareschal, General Secretary; Surgeon-Majors Huble, Sallet and Lamoureux, Secretaries; and Lafeuille, Treasurer. The objects of the Society are purely scientific; it will devote itself to the study of questions relating to military hygiene, epidemiology, medicine, and surgery; and to military law in its bearings on the medical service. Among the leaders of the medical profession in France who joined as honorary members are Professors Bouchard, Roux, Lannelongue, Berger, Landouzy, Lucas-Championnière, Chauffard, Reynier, Segond, Picqué, Schwartz, and Lejars, of Paris; Forgue, of Montpellier; Jeannel, of Toulouse; Lacassagne, of Lyons; Lagrange and Verdet, of Bordeaux; Le Fort, of Lille; Freille, of Algiers; Bosquet, of Clermont-Ferrand; and Monprofit, of Angers, ex-President of the French Surgical Society. The Society has already a membership of 400.