LUMLEIAN LECTURES

ON THE

PATHOLOGY OF THE PNEUMOGASTRIC NERVE.

Delivered at the Royal College of Physicians.

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LECTURE III.—*Concluded.*

WE pass on to consider *pain* and perverted sensation connected with the stomach as expressive of pathological change in the pneumogastric nerve. These changes may be traced to central disturbance, or to local or peripheral mischief. It is well known that in some conditions of mania patients swallow the strangest substances; but, without any disturbance of the mind, we may find the appetite perverted; sometimes an excessive craving is produced, with gnawing pain at the stomach; the appetite is not satisfied, but the pain is relieved by food. These instances occur without any alteration in the urine and without the presence of any sugar. These patients are often spare and cachectic, nervous and irritable, and the disease is one of disordered nerve-function. So also is the intense neuralgic pain which sometimes comes on at the stomach quite unconnected with organic disease, but often due to disturbance of the uterine function, as we have mentioned in connection with vomiting. The pain is often very severe, and in young and weakened subjects the pain may be intense; but, if the attention of the patient be completely absorbed, the pain is forgotten; it comes on at irregular intervals, with or without vomiting, and not necessarily in connection with food; there may be great demonstration of pain when the hand is placed on the abdomen; but, by careful manipulation, it is found that the pain is not deeply seated; there is no real tenderness, the bowels are generally confined, flatulence is often present, and menstruation is disturbed.

We believe that we justly refer these cases to the state of the pneumogastric on account of the alternating manner in which other branches of the nerve become affected, although there can be no doubt that the whole nervous system is disordered. The diagnosis of these cases is sometimes extremely difficult; the fear is of ulceration of the stomach; but, by careful examination, it is found that there is an irregularity of the symptoms which we do not find in organic disease, the pain is not especially after food, and the symptoms are increased by the sympathising attention of friends; vomiting can be controlled, and the pain disappears if the attention be thoroughly absorbed. Steel medicine is often of service, given in one of the milder forms or in effervescence; bromide of potassium, valerianate of zinc, and assafoetida, are of service; and also bismuth with alkalies. Sometimes the pain is so severe that the hypodermic injection of morphia is of great value. It is very desirable that these patients should not be allowed to remain in bed and to brood over their malady. Fresh air, and even horse-exercise, greatly promote restoration to health. A young lady, aged 16, tall and thin, and of delicate constitution, had suffered from neuralgia in the face, but otherwise had enjoyed good health. About the beginning of May, she took cold, and soon afterwards was seized with severe pain in the region of the stomach towards the right side, about the pyloric region, and at the scrobiculus cordis. She was free from headache and from cough, and there was no evidence of any disease about the lungs or the heart; there was no vomiting till the later period of the complaint, and no evidence of gastric hæmorrhage either in the matter vomited or in the motions. There was no disease of the spine; the abdomen was contracted; and, although she complained of pain on superficial pressure at the scrobiculus cordis, there was no consciousness of pain when the attention was absorbed. The pain came on in severe paroxysms, and it was accompanied with great demonstration of suffering, but was not aggravated by food; the tongue was white, the bowels were confined, the motions were pale and clayey, menstruation was scanty. The urine was of specific gravity 1020, and for a few days contained a trace of albumen; this, however, soon ceased; and there was no irritability of the bladder nor pain in the loins, no blood in the urine, no symptom of renal calculus nor of renal disease. The pulse was rapid, sometimes 140 to 150 per minute. The temperature varied from 98.4 deg. to 100 deg. The bowels were very confined, and required strong aperients to act upon them. This state was continued for several weeks, and was unrelieved by bismuth, bromide of potassium, steel, etc.; every medicine appeared to aggravate the pain. The hypodermic injection of morphia

by Mr. C. Hunter offered great relief, and certainly promoted recovery. Still, the symptoms persisted week after week; irritability of the stomach came on, but it was observed that, by a strong effort of the will, the patient could both take food and retain it. She was not allowed to remain in bed, but was dressed and taken out in a carriage; every effort was made to prevent her mind from dwelling upon her own weak state of health and upon her pain; she was then allowed to take horse-exercise, and the pain soon afterwards entirely ceased.

The diagnosis of this case was at first obscure; the presence of albuminous urine suggested the idea that she had renal calculus, but there was no evidence of persistent renal irritation, and the trace of albumen soon subsided; although menstruation was scanty, there was no proof of any ovarian disease; again, the fear of gastric ulcer was present to our minds, but the pain was irregular in its onset; it was not increased by food, and for many days there was no vomiting, and sometimes the symptoms entirely ceased. Neither was there anything to indicate spinal disease, for the fresh air in carriage and horse exercise relieved the suffering. It was evident that, as the general strength failed, the nervous system became more irritable, and the pain increased. The disease was due to the state of the nervous supply of the stomach, and it is probable that spasmodic contraction of the muscular coats took place. The vaso-motor nerve of the abdomen was affected, but it was manifest that the pneumogastric was especially implicated. The case was different from what has been described as hysterical stomach, in which food is quickly rejected, but it was a severe case of functional gastralgia. If the patient had been allowed to brood over her suffering, and to abstain from nourishment, the disease would have persisted, or might have terminated fatally. This spasmodic pain is, however, not confined to young and delicate women; it is found in men of mature age, and in some instances leads to a fatal result. The pain is severe and paroxysmal, and somewhat resembles that of gall-stone. In a gentleman between sixty and seventy years of age, this form of gastric affection terminated fatally; but, after death, no organic disease of the stomach, pylorus, liver, or gall-bladder could be detected. The symptoms suggest also the idea of aneurism, disease of the spine, etc. Hour-glass contraction of the stomach has sometimes been found in these cases without any evidence of ulceration. Again, severe neuralgic pain at the stomach comes on in organic disease of the heart, quite independently of mere flatulence or congestion of the mucous membrane. The continuance of these attacks of pain, and their recurrence almost at the same period of the day, indicate that they do not arise from thrombosis, and come on unconnected with food.

We have especially spoken of those cases in which there is spasmodic or other irritation of the par vagum producing pain or vomiting, but have now to turn to that condition in which there is *diminished power*, and in which we find (1) *anorexia* and (2) *dilatation of the stomach*: here, also, we have states which may be due to central disturbance, or be caused by local or by peripheral mischief.

The mere loss of appetite may be a symptom of febrile excitement, or be due to varied causes; but in the cases to which we refer, and which have been graphically described by Sir William Gull as "*anorexia nervosa*", the appetite fails, food is not taken, and the body wastes to an extreme degree, the countenance has a distressed appearance, the eyes are sunken, the cheeks hollow, and the whole system impoverished: the body has fed upon itself, and all superfluous fat has become absorbed. This condition may be entirely due to the state of the brain, and the disease has been correctly described as one affecting the will. Some of these instances are cases of religious melancholia. One admitted under my care into Guy's Hospital appeared like a case of enteric fever, in the dry and brown tongue and in the expression of the countenance; there was, however, no febrile disturbance, and the symptoms had extended over several years; the young patient completely recovered when made to swallow milk and other food. In another case of extreme emaciation in a man, aged 50, also admitted into Guy's, the patient had symptoms which had been attributed to organic disease of the oesophagus; he stated that he was unable to swallow, but it was soon found that the disease was in the will; he would not make the attempt, and when fed by the stomach-pump soon recovered. Some months after leaving the hospital, his mind completely broke down, and symptoms of mania were developed. These cases are frequently found in asylums for the treatment of mental disease, and may necessitate the introduction of food for months, and even for years, by means of the stomach-pump or nasal-tube.

There is, however, another class of cases in which the *anorexia comes on after gastralgia*; the patients, often young women, state that food produces severe pain, and gradually less and less of it is taken; the strength necessarily fails, and the digestion, as a consequence, becomes also more feeble, and in proportion, as the strength fails, the nervous susceptibility increases. Some of these patients become completely

blanched, thin and weak, and for months may have taken very little more than bread and water. Many of them rapidly recover, partly from the use of chalybeate medicines, but still more from the encouragement to persevere with food, although pain is produced; the assurance that pain will lessen as strength is regained and the stomach is restored to power assists the patient to bear the pain of digestion. As regards the diet, although we are often told that milk disagrees, it is well to use it in one or other form; it is important also to vary the dietary, and to give vegetable or fruit; and in most cases of this kind good draught ale or porter is much to be preferred as a stimulant, when that is necessary, to any form of ardent spirit or wine.

Another condition, due to a weakened state of the pneumogastric nerve, is *dilatation or distension* of the stomach. In a healthy state, the stomach contracts upon its contents, and by its vermicular action facilitates the movements and churning of the contents, by which their thorough mixture with the gastric juice is promoted, their solution accomplished, and the resulting fluid propelled onwards through the pyloric valve. The pneumogastric nerve regulates these movements, and when it is paralysed these movements are more feeble, and distension readily takes place. Great distension occurs, however, from several causes; it may arise from an exhausted state of the nervous supply, both of the pneumogastric, as mentioned by Traube, and also of the vaso-motor nerve. In these instances, no peristalsis of the stomach is observed, for the muscle is weakened; this form of distension may be due to long fasting, or to hysteria, or to nervous shock. The distension produces distress and breathlessness from pressure upon the diaphragm, sometimes severe pain at the stomach and through to the spine, or across the upper part of the chest. It would seem that long continued vomiting may induce this form of nervous exhaustion, and it has been recognised in diseases of the brain and spinal cord, in typhus, in cholera, and in puerperal fever; again, the fulness of the stomach sometimes in phthisis, and the flaccid condition in which it is found after death, may be due to this gradual exhaustion of the pneumogastric nerve.

In reference to distension due to local change in the stomach itself, we have those which are consequent on obstruction at the pylorus, and those in which sudden formation of gas and enormous distension render the muscular coats powerless to contract, and so cause paralysis. We have just referred to paralysis causing distension; but in these cases the distension causes the paralysis. It is at the pylorus that the muscular fibre, especially the circular coat, has its fullest development. When there is any obstruction at this part, particularly if it be gradual at its origin, the muscular coat becomes proportionately increased; and, when the muscular contraction is unable to overcome the hindrance, then dilatation takes place, and gradually attains an enormous size. Bamberger quotes a case in which ninety pounds of fluid filled the stomach. As the muscular coat endeavours to overcome obstruction, peristaltic movement may be observed through the abdominal wall; a small quantity of food or of water taken into the stomach may suffice to produce this contraction.

But the sudden formation of gas from fermentation or other cause may lead to enormous distension. The dilatation is then so great, that the very distension is the cause of the paralysis, as just mentioned. Attention was drawn to this condition of distension by Sir William Gull many years ago in a case under his care, in which the stomach filled the abdomen, and thus led to a fatal result. It has also been well described by my colleague Dr. Hilton Fagge in a communication to the *Guy's Hospital Reports* of 1872. The form of abdomen is peculiar in this kind of distension; it is full in the left hypochondrium, but hollow in the epigastric space, the curve of the upper portion of the stomach being dragged obliquely downwards, and the pylorus being situated low down on the right side or near the pubes; whilst the greater curvature of the stomach describes an arc from the left hypochondrium following the curve of the abdomen. The distension may resemble an urinary bladder, or hydatid cyst, or distended colon. It is partially resonant; but, on percussion, a splashing sound may be produced from the admixture of air and fluid.

This state may come on suddenly, or be very gradual; in a lady under my care the symptoms have extended over eighteen months, and sometimes great relief is afforded by removing the contents of the stomach, and thereby allowing the distended viscus to contract.

In other cases, it would appear that branches of the sympathetic nerve, by their connection with the pneumogastric and by reflex action, lead to this weakened condition of the muscular fibre of the stomach; thus we find it in peritonitis—in a remarkable case recorded by Dr. Fagge, from abscess behind the ascending colon and opening into the duodenum. In other cases, empyema has been the apparent cause of the exhaustion and distension. However induced, the condition is one which indicates weakness of the pneumogastric nerve, and of the muscular coat of the stomach to which it is supplied.

The function of the *liver* is a complex one; it has to do not only with the secretion of bile, but it is intimately associated with the maintenance of the healthy blood condition, and it possesses a glycogenic function as described by Claude Bernard, and still further developed by the experiments of our colleague Dr. Pavy. It is not our intention to dwell upon these subjects; but the action of the pneumogastric upon the liver is of the greatest interest; branches of this nerve may be traced in unison with the vaso-motor to the fissure of the liver, and into its substance; and it is also closely connected with the fibrine in the ganglion upon the vena cava. The glycogenic function of the liver, as well as the secretion of bile, may be greatly affected by the condition of its nervous supply, and it is well known that puncture of the root of the nerve at the floor of the fourth ventricle produces a saccharine condition of the urine, so also division of the sympathetic nerve in the neck; this change in the urine may be referred to the altered blood-supply in the pneumogastric, affecting the lungs and the heart; but this hypothesis does not satisfactorily explain the symptoms, and the nerve appears to have a more direct action upon the secreting structure of the liver than can be explained in this way, for there are many and decided changes in the state of the circulation of the liver connected with heart disease which do not produce glycosuria. We find many instances of transient glycosuria from functional disease of the liver, especially where the nervous system is implicated; and the instances of almost sudden jaundice being produced by severe nervous shock are notorious, and have often been recorded. In a hospital patient of mine, a poor washerwoman, jaundice was at once produced when she found the clothes she was engaged to wash had taken fire whilst hanging up to dry; and, again, it is well known that acute yellow atrophy of the liver is often connected with great mental depression. In these instances, the influence of the pneumogastric nerve is inseparably associated with that of the great nerve of organic life, the vaso-motor or sympathetic.

To describe fully the pathological conditions of the pneumogastric nerve would lead us into nearly every branch of clinical medicine, and into nearly every organ of the body, if we considered its wide-spread ramifications. As succinctly as possible we have reviewed its more important connections, and, as we noticed the several structures immediately controlled by it, we have seen that each one may be directly influenced by mischief at the cerebral centre. Those parts which are most remote are often the first to express the central disease; it may be, that, the restraining power being less effective in the more remote structures, the irritability consequent on morbid change is more manifest. In ordinary hemiplegia, we find the extreme muscles of the limb the last to recover their power; so in the pathological symptoms due to disease at the cerebral centre of the pneumogastric, the branches to the stomach and to the abdominal viscera are often especially disturbed. Equally do we find that disease affecting one group of nerves may manifest reflex action upon those supplied to other organs. That restraining power which in health controls the functional activity of separate parts of the body is best seen in its beautiful adaptation and beneficent design, when we contrast the quiet harmony of health with the disorder in the whole economy when that restraint is taken away.

AN EASY METHOD OF EXTRACTING A BROKEN CATHETER FROM THE URETHRA.

On visiting a patient about eighty years of age, I found he had retention of urine, caused by the catheter he had been accustomed to use having broken in his urethra in the act of introducing it. On examining the other portion, I found it to be a No. 8 silver catheter, about nine inches in length. The point of breakage was beyond the beginning of the curve; it was darkened in colour by chemical action, was broken obliquely, and presented two thin sharp-pointed spicula three-eighths of an inch long. On further inquiry, I found that the catheter had been repaired by a watchmaker a few weeks before. On external examination, the urethra was tender; and the broken portion lay about seven inches from the meatus, and was movable only in the direction of the bladder. I then took the eyes off a No. 11 catheter, passed it down to and over about an inch of the broken end, when, on making an angle with No. 11, No. 8 became locked, and was easily withdrawn. This illustration of a simple method of extraction may be worthy of remembrance, and be employed with modification in the extraction of other foreign bodies. The size of the tube to be used will only be limited by the size of the meatus. On fixing the object to be removed by external pressure, the tube slides easily over it, and may, by manipulation, be extracted without any wounding of the mucous membrane, and without having recourse to an operation.

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