Lecture.

CHANGES IN THE BLOOD-SUPPLY OF THE BRAIN.

BEING THE SUBSTANCE OF LECTURES DELIVERED AT THE HARVARD MEDICAL SCHOOL, AND A CHAPTER FROM A BOOK NOW IN PRESS.

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CEREBRAL ANÆMIA.

AMONG the conditions of the brain most difficult for diagnosis are those in which there is irregular blood-supply. There are several reasons for this: 1. An over-worked brain is an exhausted brain; not only are the proper cerebral nervous elements exhausted, producing irregular action, but the vaso-motor nervous supply also may have become irregular from exhaustion of the vaso-motor nerves. 2. Another cause for mistake is that a badly nourished brain is irritable. Hence many of the symptoms of exhaustion and of malnutrition resemble those found in congestion or stimulation from excess of blood. 3. Poor blood, that which is not suitable for nourishment, may be sent in large amount to the brain, and there will still be practically anæmia; the nervous structures may have lost their power of absorbing the nutrient materials from the blood, and the same results follow.

Under anæmia it is intended to comprise all those conditions wherein there is insufficient nutrition of the brain, owing to defect in quantity or quality of the blood.

ETIOLOGY.

When there is general anæmia or chlorosis, the brain usually suffers more or less from an insufficient supply of healthy blood. Those conditions, then, are causes of cerebral anæmia which give rise to general anæmia, as hæmorrhages, deficient supply of food, bad hygienic surroundings, exhausting discharges, whatever causes a poor appetite or poor digestion, etc.

A hindrance to the flow of blood to the brain, as pressure on the arteries, obstruction of their caliber by atheroma, arteritis, spasm, embolism, thrombosis, may give rise to a deficiency of blood-supply in the brain as a whole, or their influence may be local, and limited to a small area. The same result follows a weakening of the heart's action, so that the blood is not sent with sufficient force to fill the cerebral vessels.

Deficient oxidation, absorption of poisons, over-heating by sun or artificial heat, hyperpyrexia in fevers, etc., cause a defect in the quality of the blood, rendering it unfit for the healthy nutrition of the brain.

Though not immediately acting upon the supply of blood nor its quality, it is necessary to consider the conditions under which the patient has lived. Not only do anxiety and worry, but overwork, mentally or bodily, and loss of sleep, by exhausting the nervous system, have a tendency to give rise to an irritability of the brain, which causes it to show the effects of deficient blood-supply more quickly.

There are very few cases where diminished blood-supply alone is the cause of the symptoms. It is only in the acute cases following sudden hæmorrhage that this is true, and even in these there is subsequently deficient quality of blood. Generally, changes in quality concur in causing the symptoms. Some of the diseases in which the symptoms of cerebral anæmia may be

found, caused by changes in the nutrition of the blood, are dysentery, diarrhoea, gastric catarrh, phthisis, purpurative diseases, syphilis, typhoid and other fevers, and malarial poisoning.

PATHOLOGICAL ANATOMY.

There is simply paleness of both white and gray substance, comparative emptiness of the blood-vessels, and, excepting there be compression from some cause, moisture of the cut surface. The lymph-spaces are filled with serum or lymph to compensate for the diminished fullness of the blood-vessels. In chronic cases there is, undoubtedly, change of nutrition; but our means of examination do not enable us to recognize such change.

In local anæmia from obstruction of blood-vessels, changes occur which will be more properly considered elsewhere.

SYMPTOMS.

The symptoms vary according as the anæmia is acute or has come on gradually. If the patient has been exhausted by previous disease, the symptoms will be less violent than if he has been in vigorous health. Whether the brain has been overworked and excited must also be taken into consideration.

When a rapid hæmorrhage causes cerebral anæmia, the attack is acute, there is a loss of mental power, vertigo, dimness of sight and of hearing, tinnitus, sensation becomes blunted, the pupils are contracted, then dilated, the skin is cool, consciousness is lost, and convulsions occur. Respiration is accelerated, then slow; pulse small, frequent, and of diminished tension. This combination of symptoms may be seen not only in severe hæmorrhages, as in surgical and obstetrical practice, but less completely developed where a patient greatly exhausted rises from the bed too suddenly; also in ordinary fainting from whatever cause.

The description of more chronic forms of cerebral anæmia is rendered difficult by the fact that very few cases are uncomplicated. Nervous exhaustion, from anxiety, worry, fatigue, or overwork of brain, serves to intensify or change the symptoms; also the symptoms of anæmia and hyperæmia of the brain are very similar — so similar that it is oftentimes impossible to decide which condition is present without regard to preceding circumstances. Again, an irritable brain, anæmic as a whole, may be locally congested, or may receive temporarily an increased supply of blood, though a supply below that appropriate for health, and, owing to its abnormal irritability, be excited, as if hyperæmic.

In chronic anæmia, thought is an effort, sustained mental exertion is impossible, memory is uncertain, the patient is drowsy; occasionally after rest there may be flashes of brilliancy, but they are brief. If effort is absolutely necessary, the patient may have learned that a very small amount of wine or spirit is a temporary aid. Headache is one of the most annoying symptoms, and is very persistent, and may incapacitate for the ordinary duties of life. After lying down long and being quiet, the headache may be relieved, but recurs on attempting to go about. Perhaps, in part owing to the headache, in part owing to the malnutrition of the nerve-centres, there is likely to be a change of disposition; irritability of temper, fretfulness, and peevishness are seen. Sometimes there is dizziness; more frequently there are noises in the head, tinnitus aurium, also various disturbances of vision, muscæ

volitantes, dimness, even amaurosis, though the latter is rare. Respiration may not be much changed, but there may be a feeling of discomfort, as if not air enough were inspired, and so there is sighing. The pulse usually varies only slightly from the normal, unless there is present some disease to account for an increased rapidity, as phthisis. The same is true of the temperature; it is usually about normal or a little below, but may be elevated if any febrile affection exists. General weakness is almost always seen, but rarely complete paralysis. Convulsions are not seen in cases of chronic anæmia.

When the anæmia is very great, there may occur delirium; if the anæmia has come on with moderate rapidity in a rather vigorous person, without previous disease, the delirium is usually active, the patient may even be maniacal, and may have hallucinations, hearing voices, and holding conversations with imaginary persons; he may not recognize his friends, or may desire to escape. This feature of cerebral anæmia has so much the appearance of excitement from hyperæmia that many refer it to such a condition, supposing that there is local congestion; but the active delirium is seen only when the affection has been developed rather rapidly, and is probably owing to the state of irritable weakness, to which reference has already been made. When the anæmia occurs during the course of an exhausting disease, either as a result of the disease or of insufficient feeding, the delirium is more likely to have a quiet character. Finally, the mental powers may be entirely lost.

DIAGNOSIS.

In forming a diagnosis of this affection, it is necessary to take into consideration the previous circumstances of the patient. The diagnosis from hyperæmia may be very difficult, and, as the treatment would be quite different, it is important to be as nearly correct as possible. If there is a history of long-continued privation, with worry and anxiety, or of hard work, physical or mental, and loss of appetite, or exhausting discharges, it is probable that the condition is anæmic, although there may be much excitement. It is sometimes more difficult to decide, where there is active delirium, whether it is insanity or anæmia. Here, also, the previous history will be of assistance; but, as anæmia may lead to change of structure in the nerve-cells, it may pass over into insanity, and without mania it may pass into melancholia. In insanity induced by cerebral anæmia there is not a long-continued period of excitement; the condition is rather one of depression, with occasional attacks of irritability.

To recognize that delirium in febrile diseases is owing to cerebral anæmia is all important. Especially in children with gastro-intestinal affections the symptoms resemble those of serious organic brain disease; the previous history must not be overlooked; it would be disastrous to treat a child with anæmia for meningitis. During typhoid fever in adults there may be a similar mistake. It would seem that care in watching the patient—not only the fever, but also the feeding of the patient—might prevent such an error. Excessively high temperatures may give rise to symptoms similar to those of anæmia: a careful use of the thermometer will guard against this mistake.

PROGNOSIS.

If there is no serious complications, as cardiac or Bright's disease the prognosis is favorable, provided

sources of exhaustion can be removed. The prognosis in the case of other disease may be favorable for the anæmia, though unfavorable for the primary disease.

TREATMENT.

If the case is one of acute anæmia, or of extreme weakness after protracted disease or exhausting discharges, it will be very important to keep the head low; perhaps the foot of the bed should be raised; the body should be kept warm, by artificial means if necessary; stimulants may be necessary; food in a form easily digested, in small amounts, frequently repeated.

The chronic form needs methodical rest and feeding. As many of the symptoms are due to exhaustion of the nervous system, the effort should be made to withdraw the patient from all such influences as tend to exhaust him. In many cases the course of treatment recommended by Weir Mitchell in "Fat and Blood" will give excellent results. In every case the best tonic is food. The food must be easily assimilated, not in too great quantities, and should be taken at short intervals. Milk is one of the best to begin with; not only is it easily digested and contains all the constituents of the body, but is largely composed of water. Fothergill's remarks about water in anæmia are deserving attention.¹ Among drugs, arsenic, iron, and quinine are valuable.

When there is restlessness, sleeplessness delirium, it may be necessary to give chloral and bromide of potassium, or paraldehyde. Small doses of these are worse than useless; even if frequently repeated, they are not efficacious; less than twenty grains of each is not sure of giving rest; in many cases it may be necessary to give thirty or even forty grains at one dose. Yet chloral should be given with caution, and not administered every time a patient does not sleep; it is often given injudiciously. Spirit will sometimes aid sleep. Opium is a valuable agent, and may often be given to advantage in small doses—a tenth or twelfth of a grain—the object being rather to obtain its stimulating effects. Sleep may sometimes be produced by a grain or two of quinine at bedtime, or by a dose of phosphoric acid, or by a light lunch just before retiring. A cup of beef-tea during the night may overcome the habit of lying awake.

CEREBRAL HYPERÆMIA.

When the arteries are distended; or there is an increased flow of blood through them, there is active hyperæmia; when the veins are over-distended, it is passive. The latter condition may, in reality, be one of anæmia, so far as concerns the state of the circulation in the brain.

Some authors deny the existence of cerebral congestion.

CAUSES.

Probably a predisposition to cerebral hyperæmia is constitutional with some persons, just as some blush more easily than others; the predisposition may be acquired. Whatever has a tendency to cause a fullness of the cerebral arteries, and keep the blood flowing rapidly through the brain, may give rise finally to a predisposition to cerebral hyperæmia. Excessive and often-repeated emotional disturbances, excessive and protracted brain-work, are among these agents. But it must be kept in mind that these also produce ex-

¹ "Handbook of Treatment," pp. 51, 52.

haustion, and so irritability, which may lead the brain to respond unhealthily to the normal amount of blood, or to be excessively excited by less than the normal amount.

Among other influences may be mentioned a low temperature: thus, most cases are said to occur in winter. A very high temperature is also said to cause congestion, and especially if the sun shines directly upon the head; but the symptoms following such exposure are rather due to elevation of temperature and change in the quality of the blood.

Increased activity of the heart is also said to be a cause of cerebral congestion; hence violent exertions may give rise to it.

Certain drugs may cause cerebral hyperæmia, as nitrite of amyl. Opium and belladonna have been thought to do so; but this is not certain. Alcohol may act as a cause, but only acutely; chronic alcoholism acts rather by producing changes in the quality of the blood, and so changes in the nerve-structures.

Malarial poison may excite congestion of the brain; indeed, probably every attack of chills and fever is attended with cerebral hyperæmia, and this may be one cause of danger in severe malarial diseases.

Passive congestion may be caused by any interference with the return of the blood from the brain.

PATHOLOGY.

In acute cases very little change may be expected; much or most of the blood drains off post-mortem. Yet even then, and with rather more frequency in cases of long standing, the smaller vessels in the cerebral substance show with unusual distinctness upon section. The surface of the section is thickly sprinkled with bloody points, the gray substance is darker, and the white substance may have a decided pinkish color, from the fullness of the minutest vessels. In chronic cases the constant dilatation of the vessels may lead to changes around them; the perivascular sheaths may contain granules of blood pigment. There are seen, also, cavities in the brain containing the transverse section of a vessel. These are thought by some to be caused by dilated perivascular sheaths, by others to be dependent upon dilatation of the vessels. The latter may act as one agent in their production, another may be shrinking of the cerebral substance, a slight atrophy which causes a dilation of the perivascular sheaths.

Constant and repeated hyperæmia must interfere with the nutrition of the nervous structures; the high blood-pressure is unfavorable for the interchange of elements. The changes thus resulting occur slowly, but finally may be very serious and may lead to insanity. These changes will also explain why it often requires so long a time for recovery from symptoms which seem insignificant. In this connection it must be remembered that not only do the proper structures of the brain suffer, but also the walls of the blood-vessels and their vaso-motor nerves undergo changes — at least functional changes, and probably slight organic changes.

SYMPTOMS.

Many of the symptoms of cerebral hyperæmia are the same as are found in cerebral anæmia, and many which are usually ascribed to hyperæmia are quite as dependent upon exhaustion from overwork, anxiety, etc. It is impossible to entirely separate the two classes of symptoms in giving an account of the affection.

If not severe, there may be a sense of heaviness, or pain in the head, with tinnitus (though this is more common in anæmia), dizziness, sleeplessness, more or less agitation, perhaps at times a tingling sensation in the fingers or feet, as if they were "asleep." These symptoms at first recur only occasionally, but may become more permanent.

There may be more serious symptoms: the temperament may be changed and the patient be fretful and irritable, the mental power diminished, and there may be absolute inability to apply the mind in certain directions. When an intense application of the mind to one class of questions has brought on the affection, there is inability to apply the mind in that direction. A teacher cannot teach; the effort to do so may cause such confusion that he will have no command over his speech; or a lawyer may be unable to try a case before a jury, the attempt to do so being preceded by sleepless nights, and accompanied by such distress, or even semi-delirium, as to make it impossible. It would seem as though in these cases there is a local irritability of the nerve-centres relating to such pursuits, which, when an attempt is made to use these centres gives rise to an increased flow of blood not only to them, but to other parts of the brain also. It is interesting to note that the use of other centres has not this effect: thus, the lawyer who cannot try a case in court may be able to attend to other business (though it is not by any means safe to allow it); the merchant may not be able to keep the run of his goods, but he can attend to his garden and care for his country residence without distress.

Memory is affected: there is confusion, dullness, wrong words are used in talking; there may be delirium, or the excitement may run into mania. At times there may be weakness of the limbs, twitching of muscles, especially of the face; paralyses almost never occur; convulsions belong rather to anæmia or epilepsy; and also disturbances of sight and hearing are more frequent in anæmia; vomiting is rare. Respiration is little affected; the pulse is usually full and resistant, perhaps rapid, possibly moderate. The face is usually flushed or ruddy, is rarely pale, and the conjunctivæ may be injected.

Many authors describe a form of this affection attended with convulsions, which, however, Trousseau refers to epilepsy, and this explanation is now generally accepted.

There is a condition which I have met a few times which seems to be dependent on congestion rather than anæmia. I have only seen it in women run down nervously; so nervous exhaustion is one element in causing it. The patient, after some emotion or shock, only slightly more severe than usual, or after some exertion, as ascending stairs, feels weak, is unable to stand or sit, has distress in the head, then loses all power of motion and speech; lies as if in a faint, but the face is flushed; the heart beats vigorously, perhaps not more so than normal; respiration is little, if at all affected. If the attack is not severe, the patient may lie utterly helpless, unable even to move an eyelid, yet know all that is said and done. In severer cases, consciousness is lost. I have known such an attack to last two or three hours. There is no spasmodic action. Recovery is gradual, then respiration may be sighing; subsequently there is great distress in the head and confusion of thought for several hours.

These attacks may occur during the night, either in

consequence of a dream or from the previous day's exhaustion and the recumbent position. One gentleman told me that, after learning that his wife had these, the peculiar respiration, in her case noisy, aroused him. These attacks differ from epilepsy in that a definite cause can be so frequently traced that it is reasonable to think such a cause always exists; they recur as irregularly as the causes which give rise to them.

DIAGNOSIS.

It is not always easy to distinguish congestion from anæmia or from simple nervous exhaustion. Sometimes it is necessary to suspend judgment for a while to watch the course of the symptoms. A superficial examination of the patient will be as likely to lead to an error in diagnosis as to give correct results.

Some physicians recognize hyperæmia in almost every obscure morbid functional state of the brain; others disbelieve in it entirely.

The previous history of the patient will assist materially in diagnosis. Has the patient been well fed, or poorly? been happily situated, or miserably? had prosperity or poverty? have there been exhausting drains upon the system, frequent small hæmorrhages, or severer hæmorrhages? Is the patient full-blooded or generally anæmic? Is the face ruddy, flushed, or pale? Did the attack come on as the result of excitement, or during the strain of some intense mental effort, or during a violent physical exertion? All these inquiries will assist in forming a correct diagnosis when the symptoms are uncertain.

A diagnosis depending upon the symptoms may be made in many cases with some degree of probability. In anæmia, the symptoms are those of excitement only in rare cases, and then the excitement is not of long duration; as a rule, in the more chronic cases there is depression. In hyperæmia, excitement and exaltation predominate, and there is apparent depression only when the brain is overpowered by the severity of the attack, or the congestion is passive. The headache is more acute in anæmia; more of a feeling of painful fullness in hyperæmia. The pulse is fuller and more bounding in hyperæmia. These peculiarities, with attention to the whole group of symptoms as described above under both these affections, will, in most cases, lead to a correct diagnosis. It would be easy to pick out typical cases of both these conditions from actual practice and describe them, but such cases are not easily mistaken, and, unfortunately, form only a small proportion of the cases we see. As in many other diseases, a careful examination and consideration of all the circumstances are necessary to a correct diagnosis.

Other affections which must be separated from cerebral congestion are cerebral hæmorrhage, cerebral embolism and thrombosis. These will be better considered under these affections. Vertigo from disease of the ear and from derangement of the digestive organs also needs to be distinguished.

The most important affection, next to anæmia, to correctly recognize is epilepsy. Some forms of epilepsy are so obscure, especially in the commencement of that affection, that it is no uncommon circumstance to have it overlooked, and the patient, his friends, and perhaps the physicians, consider the attack is a mere passing rush of blood to the head. This will be more intelligently considered under epilepsy.

A reasonable care in the examination of the urine

will suffice to distinguish Bright's disease, which may give rise to symptoms closely resembling those caused by disturbance of the cerebral circulation. The urine should be examined more than once if the diagnosis is doubtful.

PROGNOSIS.

The danger from an attack of cerebral congestion depends upon the severity of the attack and its suddenness. The brain may be completely overpowered by the sudden influx of blood, consciousness may be lost, and, if the medulla is also affected, life may be extinguished at once or very soon. Walter Moxon, however, finds no satisfactory post-mortem evidence that acute congestion is ever a cause of death.

But generally the patients do not die at once, and in chronic cases there seems to be no immediate danger to life. Recovery, however, is tedious. Almost always there have been various circumstances in the patient's history acting as predisposing causes, and this is one reason for the slow recovery. Where there is no complication, a recovery may be expected in time, provided the patient will submit to proper treatment.

Among other complications, the most unfavorable is organic change in the nervous elements of the brain. This may give rise to insanity.

TREATMENT.

Congestion of the brain may be accompanied with so severe symptoms, with such immediate danger to life, with unnatural fullness of the arteries, with such strong action of the heart, that general bleeding is indicated. These cases are, however, rare, and such bleeding would not be advisable in any except a robust and plethoric patient. Local bleeding by cups or leeches would be beneficial in a larger number of cases. In the severer forms, when it is not desirable to withdraw blood, means may be taken to increase the flow of blood to distant parts of the body, as by hot foot-baths or mustard foot-baths; or to diminish the amount of blood by acting on the bowels, saline cathartics, croton-oil, etc.; or by promoting copious sweating by hot-air baths, steam-baths, hot-water baths, keeping ice on the head. Jaborandi acts especially on the skin; but as it frequently gives rise to violent vomiting, it would be hardly safe, lest the straining in vomiting should increase the congestion.

Cold applications to the head—ice, a rubber tube coiled up, with cold water running through it, evaporating lotions—may give relief; but to be of much benefit, the application must be continuous.

When there is violent delirium, mania as one of the most marked symptoms, it will be frequently found that there have been circumstances tending to render the brain excitable. The measures already mentioned may be employed; sometimes a wet cup to the back of the neck taking a few ounces of blood aids in giving relief; sometimes a dry cup gives equal relief. Bromide of potassium and chloral, in doses sufficient to produce sleep, are especially indicated; from thirty to sixty grains of each. Small doses of chloral repeated hourly have no effect, but rather aggravate the symptoms, and the combination of the two drugs is more efficacious than either alone. Hyoscyamus will often procure sleep and quiet if given in large doses. In cases of mania from cerebral hyperæmia, opium should not be given, but during delirium from anæmia it may be beneficial.

Where the hyperæmia is chronic and has been produced by excessive mental application, or by constant emotional excitement, the first indication is to remove the cause. The patient should drop his studies, his business, whatever has intensely occupied him, and withdraw from all associations which give rise to emotional disturbance. A quiet, regular, systematic life, with easily digested, mild food, is the most favorable. Bromide of potassium, without chloral, fifteen or twenty grains, three times a day. Bromide of sodium, lithium, calcium, or ammonium, have been used instead, and are more agreeable to some patients. Ergot, either as fluid extract, half a drachm to a drachm, or ergotin, three to five grains, three times a day. Ice to the back of the neck will sometimes relieve the discomfort in the head better than when applied to the head directly.

Most cases of chronic cerebral hyperæmia are also complicated with nervous exhaustion, and it may be desirable to give tonics to counteract the exhaustion. The vaso-motor nervous system is at fault, and requires not only a temporary stimulant to cause the arteries to contract, but it needs also to be permanently strengthened. A systematic course of hydrotherapy may be of value in this direction; also the ordinary tonics.

The chief object of these remedies is to restore the normal action of the arteries and the vaso-motor nerves. To do this, iron, strychnia, arsenic, quinine, zinc, nutritious but unstimulating food, are the most valuable agents. Spirituous liquors are to be avoided; tea and coffee taken only in moderation, if at all; tobacco should be forbidden. It is scarcely necessary to mention that the digestive and other functions should be kept in a normal condition.

Those who have had attacks, or who seem liable to attacks of cerebral congestion, should avoid public gatherings, where the air is liable to become impure and heated, and where there is more or less excitement, as theatres, concerts, balls, etc. They should be quiet in all their movements, avoiding exertions which would cause an increase of blood-pressure in the brain, as running, lifting weights, straining at stool, and venereal indulgence. They should sleep in cool, well-ventilated rooms; better on a hair mattress, with head elevated. They should take exercise in the open air, but avoid being chilled in cold weather. All intellectual efforts which produce the least discomfort in the head should be avoided. As one cannot stay at home surrounded by familiar objects, without the mind running more or less in its old ruts, and being recalled by old associations into old trains of thought, it is especially important to break up all such associations in cases of chronic hyperæmia, and, where the patient's health permits, travelling or a sojourn away from home is very desirable. Often it is the method whereby quickest relief can be obtained.

— A penetrating pistol shot wound of the abdomen, successfully treated by laparotomy and suture of the intestines, is reported by Dr. John B. Hamilton, Supervising Surgeon General of the Marine Hospital Service, in the *Journal of the American Medical Association*. Eleven wounds requiring suture were found in the small intestine and two in the ascending colon.

Original Articles.

SUCCESSFUL CASE OF LAPAROTOMY FOR INTESTINAL OBSTRUCTION.

BY JOSEPH B. HEALD, M.D., WESTFORD, MASS.

On Tuesday evening, July 21st, 1885, J. H., aged twenty-five, farmer, of Irish parentage, a man of excellent habits, came to my office with the following history: On the Saturday previous he had fallen from a load of hay, catching one foot in the reins as he fell, and striking the ground on his hands. By considerable muscular effort he raised himself and freed his foot. He had no pain directly following the accident, and attended a ball, dancing ten or twelve times in the evening. Sunday he was conscious of not feeling quite as well as usual, but there was nothing distinctive, and he attributed his feelings to the wrench received in his fall. His bowels moved so slightly Sunday, that he took a tablespoonful of Epsom Salts, thinking to relieve the feeling of distress and uneasiness in the abdomen. Monday the cathartic had not moved the bowels, and he repeated the dose. The pain and distress were very severe during the forenoon; but about noon he became easier, and worked in the hayfield some in the afternoon. In the morning he passed a small amount of feces with considerable effort and straining. Tuesday the pain was worse again, and in the afternoon he vomited three or four times. Monday and Tuesday he had no appetite for food, but took small quantities of gruel, milk, toast, and eggs. He referred his pain to the hypogastric region, three inches to the right of the median line, and two and a half inches below the umbilicus. Its area was not more than two inches in diameter. I gave him three comp. cath. pills, and directed him to repeat the dose in six or eight hours if needed, and also gave him some morphine pills one-eighth grain, to be used every four hours if in pain.

Wednesday morning at four o'clock, I was called to see him. As he had slept fairly well until midnight, and the pain was not severe, he had not used any of the morphine, but had taken three more comp. cath. pills at one o'clock. Had tried repeatedly to get an evacuation of the bowels, there being a continual desire to strain and force a passage. About two o'clock, the vomiting returned, and until I saw him at four o'clock he had vomited every fifteen or twenty minutes. There was severe pain in the spot above referred to, and I found marked tenderness on pressure at that point. Could discover no tumor. The abdomen was considerably distended by gas, but not tender to pressure; he had passed no gas from the bowels, nor had they responded to the cathartic pills. From the history of the case, the steady localization of the pain, and its limited area, I decided upon intestinal obstruction from some cause. I then gave hypodermically morph. sulph. 1-4 grain, atrop. sulph. 1-150 grain, and tried large enemas of warm water, but with no effect; the water was passed with no discoloration from feces. I kept the patient for the next twenty-four hours thoroughly under the influence of morphine and atropia, 1-8 grain of former and 1-200 grain of the latter every four to six hours as needed. Wednesday evening, he having been ten hours without voiding urine, I used the catheter, and was obliged to resort to it every eight or ten hours for the following five days.

Thursday A.M. Patient looking badly, eyes sunken, countenance anxious, breathing thoracic, body covered