will be of service. If gangrene is not only threatened, but actually sets in, the gangrenous parts should be kept as aseptic as possible by the free use of antiseptic dressings.

The question of amputation naturally is one of the most important that is raised. In gangrene of the genitals, head, neck and trunk, operation of course, is limited to the removal of the dead and sloughing tissues and especially in the promotion of the utmost cleanliness, particularly in parts of the body soiled by urine, feces or the menstrual discharge. Detergent washes and stimulating douches, the keeping of the rectum free from accumulated feces and thorough and free incision in abscesses in the vicinity of the anus are to be especially commended.

In the extremities if amputation is necessary, the time when it shall be done depends largely upon whether the gangrene arises from distinct obstruction by a palpable thrombus or embolus, or whether it arises in the peripheral vessels without such an appreciable mechanical obstruction of the main vessels. In the latter case, the line of demarcation is usually established pretty early and the disease is generally unlikely to advance beyond this line. Amputation, therefore, should be done as soon as the line of demarcation is well pronounced, and it may be done but little above this line, since there is no obstruction in the vessels higher up which would threaten the integrity of the flaps.

In the cases where a distinct thrombus or an embolus has formed, however, the obstruction is very apt to extend farther and farther as time goes on by secondary thrombosis. At what level, therefore, the limit between the tissues which must necessarily die and those in which nature can still keep up a healthy life will occur, cannot be stated definitely until the line of demarcation is well established. But the facts obtained by a study of my two series of cases aid us very distinctly in this matter. When the clot extends only up to the popliteal, the leg may escape gangrene altogether, and should it follow, I have found it limited in 21 cases to the foot six times, to the lower half of the leg once and to the upper calf in 14 cases. When the clot extended into the femoral, the gangrene extended to the upper calf in 11 and to the thigh in eight cases. When the clot extended above Poupart's ligament, the gangrene was limited in 15 cases, to the foot in one, the calf in eight and extended above the knee in six. Amputation in these cases, therefore, should not be done, as a rule, until a well-defined and probably final line of demarcation has been formed. When operating, the leg should be made bloodless by elevation and kept so by very careful digital compression. The Esmarch bandage, as pointed out by Quervain, should not be used, partly because it may injure the vessels of the stump and so favor a new arterial or venous thrombus, partly because it may break up an existing venous thrombus and give rise to a dangerous embolus. To this I would add another evident objection, that the septic fluids in the tissues should not be forced into the general circulation. The hemorrhage will be slight, since certainly the artery and often both artery and vein will be obstructed, so that the "muscles will look like meat soaked in salt and water and there will be no oozing from the marrow of the bone."⁶³ Quervain's method of operating was both ingenious and useful. After forming an anterior flap and before

making the posterior flap containing the vessels of the lower thigh, he disarticulated only the bones at the knee-joint, dissected the femur loose for twelve centimetres above the joint, and divided the bone, then exposed the vessels and ligated them and last of all formed his posterior flap. The wisdom of ligating the artery before dividing it was shown by the fact that in the amputated part, it was found to be filled with a loose clot, which would almost certainly have been dislodged by the manipulation if the flap had been made prior to ligation and so have caused considerable hemorrhage. Such patients have not a drop of blood to spare.

As a general rule, therefore, we should wait for the line of demarcation, but the operation should not be deferred long after its appearance. If danger of septic infection or speedy exhaustion should appear, immediate amputation at or above the probable limitation of the disease should be done. The extension of the disease, if the femoral be free, will not be, in the majority of cases, above the tubercle of the tibia. If the femoral be involved, necessitating an amputation of the thigh, the resources and the safety of modern antiseptic surgery would lead us in general to amputate, but in some cases it may be a serious question whether expectant treatment and a relatively long-subsequent amputation might not be less dangerous than an earlier operation.

Original Articles.

REMARKS UPON INTESTINAL OBSTRUCTION FROM KINKS AND FLEXURES AS THE RESULT OF PELVIC OPERATIONS AND INFLAMMATION, WITH ESPECIAL REFERENCE TO HYSTERECTOMIES.¹

BY MAURICE H. RICHARDSON, M.D.

INTESTINAL obstruction, both acute and chronic, sometimes occurs as the result of sharp bends or kinks in the bowel. The faulty position of the intestinal coil, is generally due to adhesions formed deep in the pelvis. The direct causes of such adhesions are inflammations of the pelvic or of the contiguous viscera, and operative procedures by which a considerable portion of the pelvic floor is stripped of peritoneum. The small intestine is usually affected, though the sigmoid flexure with an unusually long mesentery, in rare instances, may be involved. Considering the great frequency of pelvic inflammations and of pelvic operations, it seems extraordinary that acute obstructions should so rarely proceed from this source.

The remote cause is probably anatomical. A coil of intestine, with a mesentery long enough to permit its descent deep into the pelvis, becomes adherent and fixed there. No subsequent change in the position of the coil is possible. Any variation which may take place in the size, shape, or posture of the pelvic viscera to which the coil has become attached, may, by stretching or by twisting the coil, so change its position as to impede the fecal stream. A considerable diminution in the size of the uterus, as in subinvolution, for example, may put upon the stretch even to an excessive degree, a coil adherent to the fundus. A change in the position of the uterus, for example, a gradual retroflexion, may put an adherent coil upon the stretch. A

⁶³ Drewitt; Lancet, 1890, ii, 1023.

¹ Read before the Obstetrical Society of Boston, March 17, 1896.

coil adherent to the denuded surfaces of the broad ligament after a vaginal hysterectomy may, as the vaginal wound contracts, be dragged upon until a sharp bend is produced. In the natural processes of cicatrization and contraction, moreover, the coil may be partially twisted upon itself, until a kink is produced. Two or more coils caught together in a general adhesive peritonitis may be so distorted by cicatricial contractions and by uterine involutions as to produce kinks and flexures, one or both. Furthermore, a coil may become prolapsed into the raw wound remaining after vaginal hysterectomy, and be directly constricted there by the process of cicatrization. In rare instances extensive denudations incident to the ablation of large pelvic tumors may leave depressions into which a coil may make its way, and become adherent at an unfavorable angle.

The production of obstruction in cases of adhesions thus produced is purely mechanical. Fortunately, it is only under the rarest conditions that adhesions, faulty even to a marked degree, result in serious obstructions. A kink or a flexure, even if extensive, does not necessarily cause obstruction. It is only

when the adhesion is so placed that proximal distention results in a kind of valve formation that any impediment to the fecal stream can arise. In sharp bends the mesentery of the affected coil will be found tense. If the distal portion of the coil rests upon an unyielding surface, proximal distention will increase the sharpness of the angle (Fig. 1).

The greater the distention, the sharper the angle and the tighter the valve. If the distention can be overcome, the opening will become patulous, as in Fig. 2.

Under such conditions we shall find the portion of the intestine above the kink greatly distended; the portion below it, completely collapsed. That the obstruction is not due to an organic diminution in the lumen of the intestine, is shown by the fact that the bowel regains its normal calibre as soon as the adhesions have been completely freed (Fig. 2).

Though many of the obstructions under consideration come on gradually, and give full warning of their existence, others show no sign of their presence until the formidable symptoms of acute obstruction suddenly appear. In the former, attention is called to the abdomen by the intermittent peristaltic spasms which are necessary to force along the intestinal stream. At times it is possible to see distinctly the peristaltic movements, especially if the abdominal wall is thin. Moreover, the coil next the seat of obstruction is often so excessively distended that it can be seen and felt as a tympanitic tumor in the lower part of the abdomen.

In those acute cases which come on without premonitory symptoms, it is hard to see how a flexure which for a long time has done no harm, can suddenly close completely the intestinal lumen. The mechanism is probably similar to that in acute obstruction suddenly appearing in the progress of unsuspected chronic strictures. I have seen several cases of acute obstruction, for example, in which the most formidable symptoms have appeared without any premonition whatever; yet at operation I have found a stricture so small that an apple-seed or an orange-seed was sufficient to close it entirely. It seems probable, therefore, that the intestinal stream succeeds without difficulty in passing the bend until, for some reason, the proximal end becomes unusually distended, presses upon the distal portion of the coil, and closes tightly the valve.

Obstruction from kinks and flexures I have observed as the result of salpingitis and of perimetritis; in the course of extra-uterine pregnancy; complicating certain forms of appendicitis in which the appendix was situated low down in the pelvis, between the bladder and the rectum; and as the indirect result of vaginal hysterectomies.

Peritoneal adhesions are, directly or indirectly, the cause of the faulty position of the intestines which results in obstruction. Though we always expect to find adhesions of some kind after pelvic inflammations, yet in many instances these adhesions are of no importance. For example, in removing a diseased appendix, nearly a year after the evacuation of an abscess which apparently filled the whole pelvis, I found no evidence of the previously existing inflammation beyond a few loose adhesions in which the appendix was buried. On the other hand, extensive adhesions occasionally result after operative procedures unattended by peritoneal denudations or by septic complications. Considering the great frequency of inflammations in the female pelvis, it seems extraordinary that intestinal obstruction from faulty adhesions is so uncommon.

Post-operative adhesions can hardly be avoided if the peritoneum is extensively injured or if broad surfaces are completely denuded. Broad pedicles, uncovered by peritoneum, are likely to become attached to those coils of intestine which touch them. After the separation of adherent pelvic tumors, the dependent intestinal coils can hardly fail to become themselves adherent.

Perhaps the most prolific source of post-operative intestinal flexures is the vaginal hysterectomy. After removal of the whole uterus by the abdominal route, a wide opening into the vagina results, into which the intestinal coils naturally gravitate. To prevent the

prolapse and adherence of the gravitating coils, we close the raw vaginal surfaces when possible by inverting and suturing the peritoneum. The danger arising from the formation of faulty adhesions is thus reduced to a minimum. In vaginal hysterectomies, on the other hand, we are unable thus to cover in the broad denuded surfaces. They are, to be sure, approximated in some way by the ligatures or by the clamps which are applied to the broad ligaments before the uterus is freed; yet a very considerable surface remains uncovered by peritoneum. Moreover, unless we close the vagina—a procedure of doubtful utility—there is nothing to prevent the prolapse of certain intestinal coils, especially if their mesentery is long. In fact, at the completion of the operation, coils often will be seen presenting in the depths of the vaginal incision. In some instances excessive prolapse of the intestinal coils can be prevented only by packing the wound with gauze. As the vaginal orifice contracts, however, the intestines are doubtless drawn down into the scar tissue, and there, in certain instances, become adherent and sharply bent.

Bearing in mind the etiology of the condition under consideration, is it possible to prevent this unfortunate complication of pelvic operations? It is obvious that in some cases prevention is impossible; for instance, in abdominal operations upon the pelvic viscera when there are of necessity large denuded surfaces, which it is impossible to cover by means of peritoneum. The prevention of adhesions is also impossible in cases of sepsis, and whenever drainage is necessary. It is chiefly, perhaps, in hysterectomies that we can modify our technique. By the vaginal route, it is practically impossible to prevent the occasional occurrence of an obstructive flexure. By the abdominal route, the pelvic floor can be restored by inverting and suturing the peritoneum. Whether the rare occurrence of intestinal obstruction after vaginal hysterectomy is sufficient reason for abandoning that most satisfactory operation is a question which admits of considerable discussion.

In inflammations of the vermiform appendix, as well as in general and local peritonitis, the possibility of preventing faulty adhesions should be borne in mind; yet little can be done beyond placing the bowels in as natural a position as possible after removal of the appendix.

My attention was first called to acute intestinal obstruction from faulty adhesions by a case that I operated upon at the Waltham Hospital several years ago. In this case ovariectomy had been performed some years previously. Without warning, symptoms of acute intestinal obstruction suddenly appeared, which rapidly brought the patient to a condition of extreme gravity. Interference, practised as a forlorn hope, was unsuccessful. A coil of small intestine adherent to the right horn of the uterus was separated with great difficulty, and only at the expense of a tear in the bowel at the point of contact with the uterus. The intestinal wound was closed satisfactorily, but the patient did not survive.

A year or two ago I operated upon a young woman who presented the usual symptoms of acute obstruction. She was profoundly collapsed, and the operation was undertaken only as a last resort. A kink of small intestine in this case was found adherent to the right horn of the uterus and to the right Fallopian tube. Separation was accomplished only with difficulty and with laceration of the intestinal wall. The proximal portion of the intestine was enormously distended, the

distal collapsed. A sharp bend was found at the point of contact with the uterus, against which the distal-collapsed portion of the coil was firmly pressed by the distended proximal end. It was impossible for the intestinal stream to pass this sharp bend, accentuated as it was by the excessive proximal distention. There was great general distention, which not only interfered with the manipulations of this operation, but resulted in extensive extravasations of the liquid fecal matter through lacerations unavoidably made into the intestine at the point of adhesion. These were closed in the usual manner by interrupted Lembert stitches. The patient lived only a few hours.

The third case was that of a young man who had suffered for a week or more with the usual symptoms of appendicitis. He presented, in addition to the symptoms of the original lesion, those of mechanical intestinal obstruction. There was paroxysmal and painful peristalsis with gurgling. Through the abdominal walls intestinal coils could be seen to contract violently. No peritonitis was found. A kink of the small intestine was discovered low down in the right side of the pelvis. The adhesion was separated without difficulty. The fecal stream immediately passed on. The lumen of the intestine after separation of the adhesions became in this, and in previous cases, perfectly restored at the point of obstruction. This patient, too, succumbed in the course of a few hours.

A fourth case of obstruction, already published in some detail, was that of a young man upon whom I had operated during an attack of acute appendicitis. A gangrenous and perforated appendix was removed. A week or two later symptoms of acute intestinal obstruction appeared. The obstruction was not complete. Peristalsis could be seen through the abdominal wall, and a diagnosis of a faulty adhesion low down in the pelvis was made. On opening the wound the distended proximal coils were found ending in a sharp bend, beyond which the gut was completely collapsed. The coils were separated in all directions, washed with normal salt solution, and returned. This young man made a perfect recovery, and is now entirely well.

The fifth case was a vaginal hysterectomy in a woman of middle age. There was a well-marked cancer of the cervix, for which I removed the uterus by the vaginal route. The broad ligaments were carefully tied off on both sides, and the uterus delivered in the usual manner. I packed the vaginal wound with gauze. The patient made an uneventful recovery. Some months later she was suddenly seized with symptoms of acute obstruction, and died. At the autopsy a kink was found in the small intestine.

The sixth case was that of a young woman with an excoriated and suspicious cervix, who submitted to a vaginal extirpation of the uterus. The disease as in the preceding case was found to be malignant. The vaginal wound was packed with gauze. This woman made an early recovery. Some months later she was attacked with paroxysms of general abdominal pain. Dr. Brewster, who had charge of her during this attack, made a diagnosis of intermittent intestinal obstruction. The attacks of pain gradually subsided, and the bowel became patulous.

Some weeks later a similar, much less severe attack occurred, which I had the opportunity of seeing. It was evident that there was some form of obstruction. The intestinal coils could be seen through the thin

abdominal wall, the pain came on in paroxysms, and the intestinal stream could be felt with the finger in the vagina, passing with a gurgle through a coil adherent to the vaginal cicatrix. The second attack was transitory, lasting but a few days. This case, still under observation, is undoubtedly one of faulty adhesion with slight and transitory obstruction. Should the symptoms increase in severity, exploration will be indicated.

A seventh case came under my observation a year ago. A woman of thirty-five presented the symptoms of an intestinal obstruction of moderate severity. Paroxysmal pain located in the region of the gall-bladder suggested gall-stones; moderate distention with increased peristalsis, a slight intestinal obstruction. Exploration showed abdominal hemorrhage from a ruptured hemato-salpinx. A coil of small intestine, adherent to a tumor of the right tube, was drawn into a sharp bend above which there was distention, below collapse. Removal of the tumor, after separation of the adhesion, was followed by recovery. The tumor was a hemato-salpinx without evidence of pregnancy.

A diagnosis of obstruction dependent upon a flexure or a kink in the intestinal wall, can be made only provisionally. In the absence of any exciting cause of peritoneal adhesions in the pelvis, it is impossible to differentiate this form of obstruction from others. In all cases it is difficult, perhaps impossible, to make an exact diagnosis, even if the usual cause of flexures is present. The symptoms are those of acute or of chronic intestinal obstruction. When the valve action manifests itself suddenly, the symptoms will be those of acute obstruction; when gradually, those of chronic. If an acute obstruction comes on suddenly after a pelvic operation, after an acute inflammation of the tubes, the ovaries, the uterus, or any of the pelvic viscera, the diagnosis of a faulty adhesion is probable, especially if no tumor is found in the pelvis of sufficient size to compress the intestine. In no cases do the fulminating symptoms—gangrene of the bowel—occur. The symptoms are those of obstruction, pure and simple, and, as a rule, obstruction somewhere in the small intestine. I have never seen the large intestine in any way involved in this way by adhesions.

The only treatment for acute flexures is immediate exploration, with separation of adhesions. The etiology of the disease demands that every precaution should be taken at the time of the original operation to prevent the formation of adhesions. Unfortunately, this is a problem which as yet has not been successfully solved. Many methods of procedure have been recommended. All of them, however, are faulty and ineffectual. The fact probably is that those operations accompanied by extensive loss of the serous epithelium, in spite of every known preventive resource, result almost always in the gluing together of the contiguous peritoneal surfaces. As I have before remarked, however, inflammations even of the most extensive character are not invariably accompanied by adhesion formation. On the other hand, cases of comparatively slight injury may be followed by the firmest of adhesions. I operated recently upon a patient for ventral hernia—a patient from whom the tubes and ovaries had been removed some years previously. Though the recovery was uncomplicated after the first operation, I found that the intestines in all directions were firmly adherent to each other. To remove the

appendix in the interval of health I frequently have opened the abdomen a second time, after recovery from simple drainage of an appendicular abscess. In most of these cases adhesions have been absent, and yet at the time of the original operation they were presumably very extensive. In one case, in which a simple exploration of the uterus and ovaries was made, and in which suppuration followed, few if any adhesions were found. The sigmoid flexure had a small, loose adhesion to the right ovary. On the other hand, some of the simplest of abdominal operations are followed by extensive gluing of intestinal coils. It would seem, therefore, that we do not as yet understand the reasons why peritoneal surfaces adhere to each other. In plastic surgery of the peritoneum, it is well known that we aid the formation of adhesions by scratching the peritoneal surfaces which are to be sewed together. But if septic material gets between the opposed surfaces, close union is interfered with, or prevented altogether. This statement is exemplified by the giving way of sutures and the resulting extravasations seen in end-to-end sutures of the intestine. Contamination of the peritoneum in most cases, doubtless, results in an immediate exudation by which the opposing surfaces are kept apart. With the absorption of the fluid adhesions are formed.

It is clear, therefore, that sepsis is a by no means insignificant element in the solution of the question. Peritoneal irritation without sepsis doubtless promotes to a considerable degree adhesion formations. The irritation may be mechanical or chemical. Raw surfaces also act as irritants. Could we find some safe method of preventing the formation of adhesions, we should not only avoid the formation of kinks or flexures, with the deplorable symptoms of acute obstruction, but we should doubtless do away with many of those obscure abdominal pains which are so frequent after abdominal operations and diseases.

In abdominal operations the general technique should be so shaped as to avoid as far as possible the known causes of adhesion formation. Manipulations must be as gentle as compatible with the necessities of the case. If extensive regions are denuded they should be covered in, if it is possible to do so, by inverting the edges of the peritoneum and making a smooth surface. The extensive denudations in abdominal hysterectomy can be most satisfactorily covered by uniting transversely the folds of the broad ligament, and the anterior and posterior uterine flaps taken from the cervix. The projecting stumps of the ovaries may be buried in the folds of the broad ligament. Many cases arise, nevertheless, in which it is impossible thus to cover the surface which is likely to become adherent.

It is always important in abdominal operations to disturb the intestines as little as possible. If it is impossible to prevent the escape of numerous coils through the wound during the operation, they should be protected as well as possible by covering them with warm, moist gauze. Moist gauze seems less irritating than dry when used for this purpose, because the dry fibre sticking to the peritoneum tears it off when finally removed. Exposure and manipulations show their effect upon normal intestines long before the operation is finished. The coils become congested and swollen, the peritoneum rough and sticky. I have seen adhesions of considerable strength form during the brief manipulations of an end-to-end suture,

as illustrated in the following case of intestinal resection. To control the feces, I had placed in the proximal portion of the intestines a wad of gauze, which I forgot to remove until the suture was completed. It became necessary to remove a number of the sutures. After their removal the joint was so firm and tight that some force was necessary to separate the freshly agglutinated surfaces.

The replacing of coils which have escaped during the operation, or which have been delivered for purposes of inspection can be accomplished best by lifting up as high as possible the edges of the abdominal incision, and allowing the intestines to return in their own fashion. Beyond this, it seems to me, little can be done.

With reference to prophylaxis, it is a question whether gauze does not act as an irritant, and cause extensive adhesion. If the fibres of the gauze have been left any length of time in contact with the normal peritoneum, they leave their imprint upon it. The effect is precisely that of artificial irritation for the purpose of making two surfaces adhere more readily. It has occurred to me many times that gauze used in this manner may excite peritoneal adhesions. To dispense with gauze, however, is not practicable, for in many abdominal operations the peritoneal cavity must be walled off from a septic field. Moreover, in practically all pelvic operation, large gauze wads are essential to hold the intestines up and out of the way. The peritoneal irritation from this cause can be reduced to a minimum by keeping the original pieces in position without change.

The use of chemical solutions in the abdominal cavity to prevent the formation of adhesions, seems to me of doubtful utility. The least trouble from the gluing together of the peritoneal surfaces will follow those operations in which the asepsis is absolute, and in which the manipulations are as gentle and brief as the exigencies of the case permit.

Whatever the cause of acute intestinal obstruction, the treatment is obvious. Unless the symptoms are mild and transitory, an exploratory laparotomy should be performed as soon as the diagnosis is made. Bad results, almost without exception, are due to delay. In those cases of acute obstruction in which the lesion must cause necrosis of the bowel wall, the prognosis is practically hopeless. This list includes volvulus, intussusception, mesenteric thrombosis, internal strangulation, and, in fact, all conditions in which the circulation of the intestine is cut off. Fortunately in the disease under consideration, the circulation is unaffected, and the prognosis ought therefore to be good. The trouble in this, as in many other acute abdominal conditions, is that the patient is watched so long in the hope either of a favorable turn, or of a clear diagnosis, that the propitious moment for operation is lost. This error is conspicuous in perforation of the vermiform appendix, in the perforation of gastric and of typhoid ulcers, and in various other lesions in which an early operation means recovery — a late operation, death. As soon as the exploration is made, the diagnosis will be confirmed by the presence of distended coils in one part of the abdomen, and of collapsed ones in another part. To find the obstruction, it is best generally either to seek directly the seat of the original lesion, or to follow down the collapsed coil. As soon as the flexure is discovered, the greatest care must be taken not to tear the distended coil.

From my experience, which as I have shown above is a limited one, it is extremely difficult to separate a sharp bend without opening the lumen of the intestine. If two intestinal coils are thus glued together it is especially difficult, if not impossible, to separate them without opening either one coil or the other. In case, however, the adhesion is to the horn of the uterus, or to the side of the pelvis, or to the abdominal wall, by making the separation at the expense of the viscus to which the intestine is attached, we can be sure of not opening the lumen of the intestines. To open accidentally, or in spite of every precaution, the intestine, is a very serious complication, for the proximal coils excessively distended with liquid feces, empty themselves over the field of operation the moment the tear is made. Not that the escape of fecal contents is invariably fatal, for I have known of many cases in which such contamination has not been followed by serious results. Yet this complication must by every means possible be avoided. As soon as the adhesion is separated, the operation is finished. If, by any chance, a tear has been made in the intestine, it must be closed, preferably with the Lembert interrupted suture, either in one or in two layers. As already remarked, the lumen of the intestine at the point of constriction, as a rule, will be found unimpaired. The prognosis in these cases is of necessity grave, from the fact that in most cases the operation is performed too late.

As a post-operative complication, acute obstruction seems to result most frequently from flexures or kinks after vaginal hysterectomies. By the vaginal route it seems impossible to prevent the prolapse of intestinal coils into the funnel-shaped raw surface left by the removal of the uterus from below. Even if the vagina is closed, the denuded surfaces remain.

The question of route in hysterectomies seems therefore to be influenced somewhat by the possibilities of post-operative obstructions. In many cases of uterine disease the abdominal route is the only practicable one. These are tumors too large to be removed by the vagina, or cases in which the uterus is so fixed that the vaginal route is more dangerous than the abdominal. Were it not for certain disadvantages connected with the abdominal route, I should perform hysterectomy always in that method; if for no other reason than the conspicuous one that everything by that means can be seen. Hemorrhages can be controlled, — the ureter can be seen and avoided — there is no blind groping about among anatomical regions filled with structures of the greatest importance. But, on the other hand, there are many cases of uterine disease which can be treated most successfully by the vaginal route, — cases in which the body of the uterus is affected, perhaps, by malignant adenoma, or cases in which the cervix is but slightly involved; cases in which the uterus can be easily brought down and the broad ligament tied. In such cases, the vaginal route, it seems to me, is preferable as far as the technique is concerned, for we can hug closely the uterine body, and avoid the ureters; we can tie the broad ligament. The only disadvantage is that of the possible formation of kinks and flexures, with subsequent intestinal obstruction.

It seems, therefore, a fair question for discussion whether, in those cases which are particularly suitable for vaginal hysterectomy, it is worth while to do the operation by the abdominal route for the sake of avoid-

ing the possibilities of an acute obstruction from a kink. My method of finishing a vaginal hysterectomy is as follows: As soon as the uterus has been separated, and careful examination shows that there is no hemorrhage, I pack the wound in the depths of the vagina by means of sterile gauze, or in some cases by means of iodoform gauze. This fills in the funnel-shaped opening left by the removal of the uterine body. As soon as the uterus is removed, coils of small intestine are usually seen in the depths of the vaginal wound. These are pushed up out of place by the gauze. The two cases which have occurred in my practice, one an undoubted case of obstruction, as shown by the autopsy, and the other a probable case, have followed hysterectomy by this method. The only modification that could possibly be made to prevent this accident would be the closure of the vagina. I have never resorted to this because it seems to me that the good results following vaginal hysterectomy have been due partly to the constant drainage of the gauze. It does not follow that the closure of the vaginal outlet will prevent the formation of the kink, for this would be merely closing the lower end of the ragged wound, not the upper. If additional experience should show that vaginal hysterectomy is likely, in a considerable number of cases, to be followed by intestinal obstruction, it seems to me that this route will have to be abandoned.

THE INFLUENCE OF OVERWORK IN SCHOOL
IN THE PRODUCTION OF NERVOUS DISEASES
IN CHILDHOOD.¹

BY PHILIP COOMBS KNAPP, A.M., M.D.

“MUCH of our school system,” said Dr. Edes, in the third volume of these reports, “seems almost expressly designed for the manufacture of nervous invalids from material only too easily worked, and too abundant, in the form both of scholars and teachers.” True as this criticism was, and still is, in many cases, it seems somewhat too sweeping. I have therefore studied a number of cases of nervous disease in school-children, in order to determine, if possible, how far the school system, or, rather, overwork due to that system, was responsible for the trouble.

The number of my own cases available for such study is, unfortunately, rather limited. In the first place, cases which were not suffering from distinctly nervous affections were excluded, and only those cases were considered which were still enrolled in school. Excluding such cases, I have examined 150 consecutive cases of nervous disease in children between the ages of five and fifteen who have been under my own observation in the out-patient department at the City Hospital. As the severer structural diseases of the nervous system are likely to incapacitate a child from attendance at school, only a comparatively small number of such cases are included. The first of the following tables will show the various affections from which the patients suffered.

The second table shows the distribution of the cases according to age.

Above the age of fifteen so few children of the out-patient class attend school that they need not be considered.

¹ This paper will appear in the Medical and Surgical Reports of the Boston City Hospital, Seventh Series.

With patients of this class, too, certain factors which tend to produce disease are more potent than with children of the better class who are seen in private practice. To the unsanitary conditions which are only too apt to obtain in our school-houses are often added the unsanitary conditions of their homes. The evils of improper feeding and of bad cooking are also more pronounced.

TABLE I.

	Boys.	Girls.	Total.
Diseases of the Nerves and Cord.			
Peripheral paralysis	3	3	6
Diphtheritic paralysis	2	2	4
Anterior poliomyelitis	2	..	2
Diseases of the Brain.			
Hemiplegia	5	4	9
Tumor of brain	1	..	1
Concussion of brain	2	..	2
Feeble-minded	4	..	4
Functional (?) Affections.			
Chorea	45	50	95
Epilepsy	6	5	11
Hysteria	4	2	6
Cephalalgia	2	3	5
Insanity	2	..	2
Torticollis	2	1	3
Total	80	70	150

It is perfectly plain that the question of the causation of nervous affections in school-children is far from simple. The school system may have a direct influence by compelling the child to do too much mental work, and it may and does have an indirect influence by exposing the child to bad air and unsanitary surroundings, by compelling him to remain in cramped positions on unsuitable seats and at unsuitable desks, by straining the eyes by imperfect light, by limiting the opportunities for proper exercise, by increasing the chances of exposure to infectious disease, and by many other conditions. These indirect influences, however, although important, are due to removable causes which obtain only in certain schools, and are not due to any inherent defects in the school system itself.

TABLE II.

Age.	Boys.	Girls.	Total.
Five	1	1	2
Six	3	9	12
Seven	4	7	11
Eight	9	8	17
Nine	9	5	14
Ten	13	13	26
Eleven	15	2	17
Twelve	9	5	14
Thirteen	8	10	18
Fourteen	5	6	11
Fifteen	4	4	8
	80	70	150

In addition to the injurious factors due directly or indirectly to the school system, other factors wholly independent come into play. Heredity, injury, infectious disease and bad food are all of great importance. Only too often, however, we see such factors ignored, and undue stress laid upon some comparatively insignificant, or at any rate subordinate, factor. We all know how the laity prefer to attribute any nervous trouble in children or in adults to a fall or to overwork, rather than to admit a bad heredity, evil habits or an invalid brain. In children between five and fif-