

intestinal juices, the secretions of the liver and pancreas, are reduced below the normal, a necessary stimulus to intestinal action is removed. As the peristaltic movements are derived from the contractility of the circular and longitudinal fibres of the bowel, it follows that, when their power of contraction is impaired, constipation results. In certain states of the nervous system, the secretions of the mucous membrane and the contractile energy of the muscular fibres of the intestinal canal are both affected, with the result to render the intestines exceedingly torpid. Affections of the mucous membrane, disease of the liver and pancreas, the use of food leaving no residuum, over-action of the skin or kidneys, the state of anæmia or chlorosis, etc., lessen the proper action of the bowels by altering the character or reducing the amount of the proper secretions. The muscular contractility is impaired by a sedentary habit, by allowing the contents to accumulate, and disregarding the call to evacuate the canal, by the use of warm purgatives, and by a depressed state of the nervous system. As the condition of the trophic and vaso-motor systems must have a direct effect on secretion, it follows that constipation may be produced by all causes depressing these functions, as despondency, protracted mental activity, certain metallic poisons, notably lead, and diseases of the spinal cord.

Pathogeny and Symptoms.—The degree of fecal retention which constitutes constipation is not the same for all individuals. There are many—a majority, probably—who have a daily evacuation; others have two, and it is by no means uncommon for those in full health to have a movement on alternate days. After considerable observation, my conclusion is, that the tendency to constipation is less harmful than the opposite condition. There are instances in which a state of health has coexisted with a very considerable degree of constipation—with an occasional movement of the bowels—once a week, once in two or three weeks, or at longer intervals, indeed. Such instances are exceptional, but they are sufficiently numerous to justify the expression of the belief that the existence of constipation has not the deleterious effects often ascribed to it. Every individual must be regarded as a law unto himself, and his condition must be studied by the illumination afforded by his peculiarities in this respect. That which is a condition of constipation and of evil omen in one individual, may be a state of relaxation and of apprehension from this cause to another.

Constipation is accompanied by the symptomatic disturbances of the various maladies with which it is associated. We are here not concerned with these, but with the symptoms properly pertaining to the state of constipation. The tongue is usually coated, often heavily so, and the large papillæ at the base of the organ are swollen and prominent. The breath is heavy or fetid. The sense of taste is rather

dulled, and the appetite is indifferent or voracious (bulimia). Very often the appearance and odor of cooked food excite a sense of disgust. When the stomach is empty, a feeling of depression is felt, and, after food, uneasiness, weight, and oppression. If any considerable fecal accumulation has occurred, the evidence may be afforded by the physical signs. Dullness of percussion along the course of the cæcum and colon, especially over the cæcum and above the sigmoid flexure (descending colon), will indicate the existence of fecal accumulation. Digital exploration of the rectum will disclose the amount of accumulation in that part of the canal. While, then, along the course of the colon a flat percussion note will be returned, around the umbilicus (over the small intestines) there may be a tympanitic sound. In cases of considerable accumulation, the whole abdomen may return, on percussion, a dull, even flat sound. The condition of other organs contributing to the constipation must be discussed elsewhere.

When the desire to have an evacuation is experienced, some pain is felt, and the movement is effected with straining and "bearing down." If the fæces have formed in a solid and dry mass, there may be, and often is, no little difficulty in effecting its expulsion. The *sphincter ani* is widely distended; the mucous membrane splits with the force of the expulsive effort acting on the solid fæces; more or less blood, mucus, and liquid fæces escape; and, finally, by a prodigious effort, only comparable to the pangs of labor, the hardened fæces are expelled in a large cylindrical mass. So severe the pain, so violent the expulsive effort, and so much injury done to the parts, that the system at large participates in the effects; the pulse becomes feeble, the face grows pale, and a clammy sweat bedews the surface. In some instances, especially in old persons having weak abdominal muscles, the contractile efforts of the muscles concerned in defecation are unequal to the task of expulsion, and hence the fæces, despite all their efforts, can not be propelled beyond the rectum, and then mechanical means become necessary to remove the accumulation.

The fact should not be overlooked that very considerable accumulations of solid fæces may take place, although apparently daily evacuation of rather liquid stools may occur. This paradoxical condition is due to the fact that the solid matters collect in the sacculi of the large intestine, leaving a central canal through which semi-solid and liquid materials may pass. It follows that with extensive fecal accumulation there may be daily, even more frequent, discharges. The author has encountered this state of things, more especially in old men, in whom a gradual and long-continued accumulation of the fæces has so lessened the perceptive and reflex activity of the mucous membrane, that hardly any extent of accumulation sufficed to excite the peristaltic action. Extensive accretion of fæces in the rectum has, in a few instances, been mistaken and treated for scirrhus. In women at

all ages after adult life such fecal collections may form in the large intestine, especially in the cæcum and rectum. When, at last, the bowel contracts on its contents, very great pain is felt, the expulsive efforts are severe, and, finally, the accumulated mass is discharged.

More frequently, in cases of constipation, the retained fæces assume a globular shape (*scybala*), and are apt to be coated with mucus. When a movement of the bowels takes place, instead of a proper evacuation, there will be discharged a few of these round balls. The color of the fæces is, in simple cases of constipation, not altered; but when the torpor of the bowel is secondary to hepatic disease—to catarrhal jaundice, for example—the absence of bile-pigment makes a difference in the character of the stools.

In that form of constipation known as habitual, and in which the intestinal torpor is the substantive disorder, there are disturbances which properly belong to it. Fecal accumulation, by interfering with the return of blood from the inferior hæmorrhoidal veins, will cause them to swell, and, pushing before them the mucous membrane, will form hæmorrhoidal tumors or piles. By the same mechanism, congestion of the other pelvic viscera will be induced, and hence menorrhagia, catarrh of the uterus, dysmenorrhœa, etc., will result. In other instances fecal accumulations, by pressure on the nerves, may set up a degree of irritation sufficient to eventuate in a formidable sciatica, or, by pressure on the spermatic vein, to cause varicocele, or, on the ascending *vena cava*, to produce a varicose state of the veins in the inferior extremities.

The long-continued retention of hardened fæces has, finally, an effect on the mucous membrane; a catarrh is gradually set up, and, the irritation gathering strength with its persistence, a profuse diarrhœa ultimately results. It happens in this way that, in many cases of constipation of a persistent character, diarrhœa alternates with a suspension of action or constipation. For a time the bowels will be exceedingly torpid; then there will occur more or less pain, flatulence, tormina, etc., and a profuse diarrhœa; after which the ordinary torpor will come on, to be followed ultimately by an acute catarrh again. In some instances, but rather rarely, the irritation of hardened, retained fæces sets up a croupous inflammation, and thus to constipation will be added a membranous enteritis.

It is not always easy to separate the symptoms due to constipation from those of which constipation is a mere sign. Nevertheless, there are some clearly referable to this condition. When constipation has existed for some time, the nutrition is impaired. The intestinal digestion and absorption become languid, and hence the function of primary assimilation is inefficient. The result of this condition is shown in the thinness of the body and the diminished muscular activity. Under these circumstances, also, the products of intestinal digestion

enter the blood in an imperfectly elaborated form. Various secondary disturbances occur. There are, for example, certain disorders of the skin produced in this way; as, psoriasis, eczema, erythema, urticaria, lichen, etc. If the constipation and the causes producing it are removed, the cutaneous manifestations also disappear. Without the evidence afforded by a defined eruption, the functions of the skin are recognizably altered by the condition of constipation. The cutaneous secretions are deficient, the epidermis is dry and harsh, the circulation languid, so that the extremities are cold, and the hair and nails are brittle and wanting in a proper physiological activity.

There is an intimate association between the intestinal and cerebral functions. This fact was recognized by the ancients in the term *hypochondria*—under the ribs. They found that, with a certain depression of the feelings, with melancholy, there occurred disorders of intestinal digestion, flatulence, and constipation. They had also observed the good effects in certain mental disorders of the more active cathartics. As with the condition of constipation, and the consequently impaired primary assimilation and lessened excretion by the intestinal glands, various effete products accumulate in the blood, it follows that the cerebral organs must be affected by them. Hence follow headache, hebetude of mind, vertigo, etc. The eminent writer who prepared himself for his task by taking a brisk cathartic, practiced an eminently rational expedient. Stupor in some, an obstinate wakefulness in others, are also caused by constipation. As the general blood-pressure can be lowered by brisk purgation, it follows that the state of the intra-cranial circulation is affected by constipation.

Various circulatory disturbances are produced by constipation, and mention has been made of hæmorrhoids and hæmorrhages. When the general cavity of the abdomen has been filled out by retained fæces, the column of blood in the ascending vena cava is pressed upon, and hence the return of blood from the inferior extremities is impeded. It follows, from this mechanical obstruction, that œdema of the ankles takes place, and this result is the more apt to occur if the subject is obese, since the intra-abdominal pressure is the greater the more fat is contained in the omentum. Whenever the ankles swell, great anxiety is felt by the patient lest dropsy is about to develop.

Constipation also increases the secondary results of pulmonary obstruction. When, in consequence of mitral lesions or lung-diseases, the venous circulation labors, and the right cavities of the heart are overlaid, fecal retention adds materially to the obstruction.

It follows, from the foregoing considerations, that constipation must be regarded from two points of view—as the sole cause of the morbid state, and as an important element in the pathological complexus.

Treatment.—Constipation is readily overcome for the time being by the administration of purgatives, but this practice can not be ap-

proved. The habitual use of purgatives—of purgative medicines and of purgative mineral waters—only increases the disability which they were intended to remove, for the bowels, becoming accustomed to the stimulation, will not act without it after a time. Before deciding on the treatment, a careful survey should be made in every case, and the causal condition should be ascertained, and efforts made to remove it. Is secretion insufficient? If this be causative, remedies to promote the secretions are necessary. If the motions indicate the absence of bile, phosphate and sulphate of soda and sulphate of manganese will be found effective; the last, especially, if there be a gouty habit; and the first two combined or not with arseniate of soda, if there be a tendency to contraction of the liver (cirrhosis). If the state of constipation be habitual, associated with paresis of the muscular layer of the bowel, and also deficient secretion, the best results may be expected from physostigma (tincture), nux vomica (tincture), and belladonna (tincture), in combination, and the action of these remedies may be promoted by combination with aloes (tincture) when the lower bowel is torpid. To these remedies must be added galvanic and faradic stimulation, or the combined currents, which seem to be more efficient.

If the subject is plethoric, the secretions deficient, the muscular layer wanting in contractile energy, a combination of magnesia sulphate (Epsom salts) with diluted sulphuric acid and sulphate of strychnine (one sixtieth of a grain), in solution well diluted, may prove highly effective. The addition of sulphate of iron renders the just-mentioned formula very useful in anæmic subjects, suffering under the same condition of the digestive tube, or in those of relaxed habit.

When we have to deal merely with paresis of the muscular layer of the bowels, the remedies must consist of those having the power to increase the contractile energy of this part. Nux vomica, belladonna, and the warm purgatives, have this effect; and hence a combination of these may be very useful. To these must be added electricity. One electrode is placed in the rectum—an insulated electrode, with a metal button or bulb uncovered—and the other, in the form of a moistened sponge, passed over the abdomen, especially along the course of the large intestine. Daily applications of a faradic current, or of a slowly-interrupted galvanic current, made as just described, will often effect permanent relief. Other forms of stimulation of the bowel may be good in these cases of torpor dependent on paresis of the muscular layer. A nightly dose of podophyllin resin, with the extracts of belladonna, nux vomica, and ergot, may establish a regular habit; but the concurrent action of certain hygienic measures may be necessary. The author has known of excellent results from the regular use of confection of senna every night on retiring, the quantity being very slowly reduced as the habit of a daily movement is effected. This preparation may be increased in activity by the addition of a minute quantity of podophyl-

lin resin, or croton oil. Other substitutes are cascara sagrada taken on going to bed, minute doses of podophyllin resin at the same time and regularly, and both of these have strong reports in their favor.

Hygienic means are not less important than the medicinal in the treatment of constipation. Regularity of habit should be inculcated. The patient should be instructed to repair to the closet at a fixed hour, selected with reference to convenience and leisure especially. An effort should be made, whether the desire be present or not. At the same time the abdomen should be thoroughly kneaded and rubbed. A large draught of cold water should be swallowed before breakfast, unless some contraindication exist. This may be sufficient, if a little salt—a teaspoonful—be added to the water. In the torpor of the bowels belonging to old people, a morning-draught of an alkaline mineral water—Saratoga, for example—has an excellent effect. In the case of the plethoric suffering from constipation, the purgative waters—Saratoga, Pullna, Hunyadi, and others—taken in the early morning, have an unquestionable good effect. Above all other means for removing constipation are those hygienic appliances derived from the natural stimulus of the intestinal movements—food. If there be no contraindication, those foods which leave a considerable residuum—as Graham flour, rye and corn bread, oatmeal, cracked wheat, etc.—can be used with distinct advantage; fresh vegetables of the succulent class—as lettuce, spinach, celery, onions, etc.—and fruits—as apples, dried peaches, figs, dates, tamarinds, etc.

As a sedentary life induces constipation, it follows that exercise must be enjoined in such cases. Mere enforced exercise is not so beneficial as that kind of active movement necessitated by travel. The author has seen some cases of constipation cured by a trip to Europe. Horseback exercise is an excellent mode of progression when practicable; but walking may always be carried out efficiently, and must, therefore, be chiefly depended on. The best results are obtained by a proper combination of the various curative agencies.

OBSTRUCTION OF THE INTESTINES.

Definition.—By obstruction or occlusion of the intestines is meant an arrest of the passage of their contents, by obstacles within the bowel, or in its walls, or in the cavity of the peritoneum. When the obstruction occurs in the intestine after it has passed out of the cavity—as strangulated hernia, for example—it becomes a surgical malady. A great many names have been applied to this state: ileus, iliac passion, volvulus, miserere, etc.

Causes.—Obstruction or occlusion of the intestines may be produced by causes that are intrinsic, or extrinsic, but they are best considered in three great divisions: 1. Extrinsic, or entirely outside of the

bowel; 2. Conditions affecting the walls of the intestines; 3. Disorders within the canal.

1. The extrinsic causes are tumors without, compressing the intestine; certain orifices in the peritoneum, as the foramen of Winslow; bands of connective tissue, remains of former inflammation; twisting, or torsion, of the bowel.

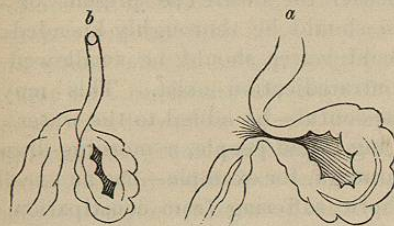


FIG. 3.—Mode in which twisting of the bowel occurs.
a, The first derangement. b, The twist.

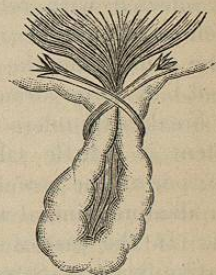


FIG. 4.—Constriction by a band of lymph.

The tumors coming into relation with the intestine, and obstructing by pressure, are of various kinds: floating kidney, displaced spleen, cysts of the peritoneum, tumors of the mesentery, of the ovary, etc., and cancer in various situations. As regards the entanglement of the bowel by passing into certain orifices, especially the foramen of Winslow, the accident is rare (three cases recorded), but a number of examples have now been noted of retro-peritoneal hernia, first accurately described by Treitz.* The duodeno-jejunal flexure is embraced in a fossa formed by a fold of peritoneum, "continuous on its inner side with the peritoneum covering the transverse duodenum, and forming the inferior layer of the transverse mesocolon." Diaphragmatic hernia is relatively more common; Leichtenstern collected two hundred and fifty-two cases. There are certain weak points in the diaphragm—at the œsophageal foramen, just behind the sternum, the space between the lumbar and costal parts of the muscle of the diaphragm—through which parts of the bowel and omentum have passed.

Constriction by old bands of adhesion, the result of former inflammations, is much more common than the herniary protrusions. The adhesion of the appendix vermiformis to the abdominal wall, or to neighboring parts of the intestine, forms a transverse band in which a knuckle of intestine may become engaged. Similar bands, or bridges, form between the organs in the pelvic cavity, and between the mesentery and intestine. Some of these bands, owing to changes made by the movements of organs, often quite considerable, attain to great lengths and form constricting loops of various kinds. Slits are found

* Dr. P. H. Pye-Smith, "Guy's Hospital Reports," third series, vol. xvi, p. 131, "On Retro-peritoneal Hernia."

in the mesentery, especially in the mesentery of the ileum, and low down, into which a fold of the intestine may drop and become incarcerated. The extremity of diverticula becoming attached by bands of lymph, also form openings into which the intestine may pass. There is, indeed, almost no limit to the forms and varieties of constricting bands for the occlusion of some part of the intestine.

Also, occlusion may be brought about by twisting (torsion) of the bowels. The sigmoid flexure is especially liable to this accident, owing to its shape and to congenital defects, and next the cæcum; rarely does this accident happen to any other part of the canal. I owe to Dr. Starck, of this city, the details of a case of this kind, in which two inches of the upper part of the ascending colon slipped over the part below. In the preliminary changes which occur in the sigmoid flexure preparatory to torsion, the mesenteric root shrinks and the two ends of the fold approximate, so that twisting can easily occur if the peripheral part of the fold is full of fæces and therefore heavy. The length and weight of the fold prevent untwisting, while rapid swelling and distention by gas, occurring in that part of the bowel above, keep the fold in position.*

While twisting of the sigmoid flexure is apt to take place in early life, torsion, or twisting, of the cæcum is a malady of advanced life rather—in more than half of the cases occurring from forty-five to sixty years. Owing to the changes produced by old hernias, to the absorption of fat in the mesentery, and to paresis of the muscular layer with resulting accumulation of fæces, a loop of the cæcum and ascending colon forms—with a contracted mesentery—the axis of the loop; the two ends of the loop approximate, and a twist may be readily induced by various forces, as sudden movements of the body, an abnormally long and full ileum, etc.

2. Changes occurring within the intestinal tunics, such as tumors, polypi, hydatid cysts, carcinoma, etc., cause occlusion by a gradual obliteration of the canal. More frequently is the obstruction due to cicatrices, formed by the closure of ulcers, notably those of dysentery, of typhoid fever, of syphilis, etc. The most important of this group of causes is intussusception. By this term is meant the slipping of one part of the intestine into the adjacent part, so that the peritoneal and mucous surfaces are opposed to each other. This accident always occurs from above downward. Frequently, after death, there are found invaginations, which formed during the last moments of life, but they have no importance. Often a number of them exist at various points.

As the part first invaginated remains at the point where it entered,

* Dr. Küttner, in St. Petersburg. Virchow's "Archiv," vol. xliii, p. 478, "Ueber innere Incarcerationen." A full account of the subject, with admirable plates showing the mechanism of twisting. Ibid., Band liv, S. 34. Also in the same, "A Case of Internal Strangulation," by Jacob Heiberg, with two illustrative diagrams.

it is obvious that the increase of the intussusception is by a continued slipping-up of the part below. The accident of invagination may take place at any point of the intestines, but the most common is that of the ileum into the cæcum, and this attains the greatest dimensions. In children the ileum may pass into the whole length of the colon, and be felt in the rectum and even pass through the anus. Other forms are of the ileum entirely, of the jejunum into the ileum, of the duodenum into the jejunum, of the colon, etc. Of all the forms of obstruction in the intestinal canal occurring in early life, that of invagination is most usual. Including all ages, half of the cases of intussusception occur before ten. As regards sex, males are more subject to the accident than females. There are two important elements in the mechanism—paresis, or distention, of a part of the intestine below; spasm, or contraction, of the part above. When the bowel is undergoing irritation and is distended with gas, if, in consequence of the same irritation, violent reflex contraction of the circular fibers is induced, it is not difficult to conceive of the suddenly narrowed portion dropping into the distended. Especially can we conceive this accident happening if the muscular layer of the enlarged portion of the bowel is in a paretic state, and the muscular layer in the narrowed part is in a tetanic or spasmodic state. A different explanation of the mechanism is made by others, especially by Leichtenstern, who affirms that there are two factors involved—a paretic condition of a part of the bowel; violent peristaltic action. He supposes that the invagination occurs entirely by an inversion of the paretic part of the bowel, and that this inversion is initiated by the excited peristaltic action. The differences of opinion are not very wide, after all, and are rather in the interpretation of terms than of the pathological factors. When intussusception occurs at the cæcum, doubtless the same causes are at work as those which induce protrusion of the bowel in dysentery—a violent tenesmus with paresis of the muscular layer—a condition of things which may readily arise in the ileum and the cæcum. When invagination has occurred, the mesentery being drawn in with the bowel and more or less stretched, the circulation is greatly impeded, especially the return of venous blood. Swelling ensues; the tunics of the invaginated portion of the bowel are infiltrated with bloody serum; an active catarrh of the mucous membrane is established; the peritoneum becomes intensely hyperæmic, and an abundant exudation is poured out, gluing together the contiguous portions of mucous membrane. In these cases there is not, necessarily, a complete occlusion—there may be still space for the passage of liquid fæces. The compression of the mesenteric vessels induces necrosis of the invaginated portion, which may slough off, and thus restore continuity.* It is

* Trousseau, "Clinique Médicale," tome iii, p. 196. He has had two cases of this kind.

necessary to this result that the invagination be equal on all sides, that union take place in a uniform manner around the bowel. If the invagination is unequal and the line of union irregular after the slough separates, in the course of contraction of the cicatrix which subsequently takes place, there may be produced very considerable deformity of the intestine, and its lumen seriously encroached upon. Again, when the slough separates, the adhesion may be insufficient, thus opening into the general cavity of the peritoneum.

3. Causes of obstruction within the canal of the intestines (intrinsic) are quite frequent—relatively more so than the extrinsic causes. First in importance is fecal accumulation, forming most frequently in the cæcum and ascending colon, and in the descending colon just above the sigmoid flexure. Not unfrequently such fecal accumulation has for a nucleus an intestinal or biliary calculus. The intestinal calculi are composed of ammoniaco-magnesian phosphate, and the carbonate and phosphate of lime, with more or less inspissated mucus (enteroliths). Other foreign bodies accidentally present in the canal may form a nucleus about which the salts above named crystallize or adhere. They are usually oval in shape, but may have a great variety of forms, and they differ in size, the average being about the size of a chestnut. Large concretions of chalk and magnesia have formed when these substances had been taken medicinally for some time. Stones of such great size have formed, that they are alone sufficient to cause obstruction. The usual results of their presence, if they occasion symptoms, are attacks of intestinal indigestion, colic, typhlitis, ulceration, and perforation of the cæcum and appendix. Biliary calculi much more frequently occasion obstruction; although of considerable size, they have been passed without any trouble. Sometimes, the symptoms of acute intestinal catarrh, pain, flatulence, nausea, diarrhœa, etc., are caused by them; again, the bowels are obstructed more or less completely by one, or a succession of attacks of impaction, relief from one attack being followed in a few weeks by another attack of the same character, have been produced by a gall-stone, lodging successively in different parts of the ilium. Now and then complete obstruction has been caused by a gall-stone. They occasionally set up an ulcerative process in the cæcum and appendix. An important factor in causing obstruction of the bowel is habitual constipation—that form, especially, which consists in a paretic condition of the muscular layer, and a state of diminished sensibility of the mucous membrane. Abnormal flexures of the colon often play an important part in causing an obstinate constipation. Accumulations occur to a very great extent behind the natural and factitious flexures, and in the cæcum in old subjects especially, in women leading very sedentary lives, and very careless. Large accumulations are not incompatible with daily, even more frequent evacuations. The central canal may still continue open and yet enormous