Original Articles.

THE PRINCIPLES UNDERLYING THE TREATMENT OF ACUTE INTESTINAL OBSTRUCTION: A STUDY OF ONE HUNDRED AND TWENTY-ONE CASES OF ACUTE INTESTINAL OBSTRUCTION FROM THE MASSACHUSETTS GENERAL HOSPITAL CLINIC.*

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NEVER before in the history of medicine has the subject of intestinal obstruction attracted more widespread attention than at present. We are all interested in the problems involved in these cases. Individuals suffering with intestinal obstruction first come under the observation of the physician. The surgeon should have a clear appreciation of the relative values of the clinical facts collected by the internist. The internist needs to know the accomplishments and limitations of surgical art applied to this, the gravest of emergencies.

Cases of intestinal obstruction are naturally arranged in two groups, the *non-mechanical* and the *mechanical*. The *non-mechanical* group includes those instances of abdominal pain, distention and vomiting with constipation seen under the following conditions: (1) Associated with an abdominal contusion. It is more than likely that the intestine is actually injured by the contusion of the abdominal wall. (Munro.) The obstruction resulting is not merely a reflex from the abdominal parietes, but may be dependent upon the intestinal lesion, and (2) those obstructions associated with abdominal inflammatory processes; as, for example, appendicitis. How often does the attending physician make the diagnosis of obstruction of the bowels when really there exists a primary appendicitis with a physiological cessation of peristalsis protective to the individual. (3) The obstruction seen associated with pneumonia. I have operated upon three or four patients, all children, for supposed appendicitis in which no appendicitis was found. In each of these cases subsequent to operation a frank pneumonia became well defined and upon the right side of the chest. (4) The obstruction seen with acute nephritis. (5) The obstruction met with after clean laparotomy wounds, due primarily to trauma or unrecognizable sepsis. The observations of Durham and Buxton upon peritoneal infections, and upon the part played by the omentum in such infections, and the observations of Robson and Stengel, strongly emphasize the view that the cause of obstruction in these cases is a mild degree of infection which may show no gross lesion. These cases have been spoken of hitherto as instances of peritonism, peritoneal infection, reflex obstructions, functional ileus.

All that one can say is that these are not the result primarily of mechanical conditions, but

probably the result of infection. The infection probably acts directly or indirectly upon the neuromuscular intestinal mechanism. Such cases require, at least at the onset, rectal enemata, physostigma, if there is no gross sepsis, lavage of the stomach, the use of the rectal tube and possibly ileostomy or colostomy to temporarily relieve the physical condition.

The *mechanical group* includes the obstructions caused by a band and an adhesion, by a kink of the intestine, by an intussusception, a twist or volvulus, by a stone within the lumen of the gut, by a new growth and tumor pressing upon the outside of the bowel, by tumors growing in the wall of the bowel and by the various forms of hernia.

The individual is seized suddenly when apparently well with violent abdominal pain, vomiting and nausea, dejection from the rectum followed by constipation. A few hours later follow hiccough, slight meteorism and early signs of shock and collapse. He lies back in bed prostrate, with gaunt cheeks and sunken eyes. His pain has vanished but some haunting fear has taken its place. His hands wander with pathetic restlessness over the bedclothes and are cold and damp. Beads of sweat stand on his brow. His face is pinched, his expression vacant and staring, his voice is feeble. The pulse has sunken to an uncountable thread. There is regurgitation of blackish vomitus through mouth and nose. The breathing is labored and shallow and accompanied by faint sighs and perhaps by feeble inarticulate groans. The countenance is ashen and livid. Such a picture makes a reality of the metaphor, "the shadow of death." (Treves.) This is the only too familiar picture of an unrelieved acute mechanical intestinal obstruction.

How often the internist and the surgeon have, alone or together, gazed upon this picture in the dying and been powerless to save the sufferer. It is a startling fact that had the diagnosis been accurately made at the onset of the disease relief might have been afforded. Where does the responsibility rest? Either the physician was not summoned early, or, having been summoned, did not recognize the condition present, or the operator was inexperienced, or the case was one in which the lesion was a most virulent one.

In order to facilitate the early diagnosis and the most efficient treatment of acute intestinal obstruction, we require all the information that it is possible to gather from clinical experience, from experimental physiological and chemical data, from the post-mortem room and the operating table. It is to a very brief statement of the facts derived from these various sources that I wish for a moment to direct your attention. It is upon these facts that is based the present treatment of intestinal obstruction. These facts form the principles of treatment.

The anatomical or *mechanical* conditions associated with intestinal obstruction *formerly* naturally attracted *most* attention and concern. If the volvulus was detected and untwisted, if the strangulated band was divided, if the intussusception was reduced, at this point the surgeon's

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or physician's duty ended. He thought of little else.

We understand to-day that not only must the surgeon determine the seat and the character of the obstruction, but he must also recognize the vital changes in the bowel and the general physical and vital changes in the individual and be guided thereby.

What happens in an acute intestinal obstruction? What changes take place locally in the bowel? What causes the great shock? Why is death so early?

Two notable factors are present in every intestinal obstruction. First, there is an obstruction to the passage of the normal intestinal contents, and second, there is an obstruction to the circulation in the wall of the gut.

The symptoms are out of all proportion to the first factor, the intestinal stasis. We know that prolonged fecal impaction may exist without such symptoms. Consider, then, the changes in the wall of the gut. These changes in the completely obstructed gut are very rapid. The hypertrophy and ulcerations of chronic stenosis are absent. There is no time for them to occur. The gut above the obstructing band is distended and dilated. The contents of the gut accumulate.

In from four to eight hours the vascular changes result in a marked venous stasis. The wall of the bowel becomes thick with edema. The contents of the gut change to a liquid, fecal matter containing serum and blood cells together with bacteria. The experiments of McClure demonstrate that the number of bacteria thus developed above the obstruction may become enormous. The distention of the gut may be very great.

The vascular stasis may be so pronounced as to cause blood to appear not only in the lumen of the gut, but also within the peritoneal space. At operation, therefore, a bloody fluid will be found within the abdomen. F. T. Murphy has demonstrated the vascular changes occurring in strangulated *animal* gut. He found that "obstruction to the venous flow produces much more prompt and serious symptoms than obstruction to the arterial supply of the gut. If the arterial supply was cut off the symptoms were fairly well marked after eighteen to twenty-four hours. If, on the contrary, the arterial supply was not cut off but the venous return was obstructed, the animal began within an hour to vomit, lose muscular tone and usually died in from twenty-four to thirty-six hours. The walls of the obstructed loop were found to be edematous, dusky and softened with bloody fluid in the abdominal cavity. There was found to be a disintegration and ulceration of the mucosa. There is always a microscopic and there may be a macroscopic perforation of the gut. The venous stasis is very serious."

It has been demonstrated by Mall and others that the intestine normally lives an independent life in a way. It has its own special nerve stimuli in the plexus of Auerbach. In these cases of obstruction the gut is paralyzed. There is eventually a cessation of peristalsis. The results of the experiments of Mall and Booker lend weight

to the explanation that the paralysis of the gut is occasioned by the direct action of the toxins within the intestine upon the plexus of Auerbach. That is, the toxins within the gut reach the nerve cells directly.

Gas develops in the affected loop. This gas accumulates from above but may be developed from the putrefaction of nitrogenous material within the gut, or because of the damage to the intestinal wall there may be a diminution of the normal absorption of gas from the affected loop and consequently an accumulation may result. A distention of the strangulated loop may be one of the positive signs of intestinal obstruction. The local meteorism, or the sign of Wahl, as it is named, is always to be looked for in a suspected intestinal obstruction.

Bouchard thought that the cause of the symptoms present was the absorption of poisonous substances developed in the strangulated loop of intestine. He called this the auto-intoxication theory.

Kukula believes that not only toxic fluids but toxic gases may be absorbed from the intestinal loop. Albeck thinks that the accumulating intestinal poisons may be regarded as putrefactive poisons. Boeszky and Genersich consider the severer symptoms of intestinal obstruction as due to a general septicemia, largely a colon bacillus infection. Nesbitt and Clairmont and Ranzi think the auto-intoxication theory of Bouchard is the most plausible. McClure concludes that it is difficult to understand how a reflex through the intestinal nerves can explain the symptoms of intestinal obstruction as well as the intoxication theory.

Roger has recently advocated the auto-intoxication theory and suggests the idea of a syndrome of gastro-intestinal insufficiency. That is, it is possible that the secretions of the intestine above the obstruction are cut off and diminished, and just as there is a renal insufficiency and a thyroid insufficiency, so there may be a gastro-intestinal insufficiency. Reichel has demonstrated that obstruction to the lumen of the gut alone is insufficient to cause serious symptoms, but that there must be an infection at the kink.

Dudgeon and Sargent have demonstrated that the intestine is normally impermeable to bacteria. Pathological changes of very slight degree and special lesions of the epithelium make penetration of the intestinal wall possible. The experiments of Birsch Herfeld, Wurtz and Hudala emphasize these facts. Any damage to the anatomical integrity of the gut permits permeability.

Bacterial toxins may cause an infection independently of any gross peritoneal changes. Obstruction without gross evidences of peritonitis may really be cases of chemical poisoning and no bacteria may be found within the peritoneal cavity.

Maury concludes from experimental work recently done that death in duodeno-jejunal obstruction may be due to the absorption of certain toxic elements of the bile which are normally harmless because of dilution and suspension in the

secretions of the intestine rather than to bacterial infection. The greater the distance from the bile duct papilla to the obstructive point, the more dilute is the accumulated material and, therefore, the less toxic is it. The mortality, therefore, diminishes as the obstruction is lower in the gut.

Bond has demonstrated that the omentum takes care of a large number of bacteria at the initial infection, but that eventually, if the infection is severe, a peritonitis follows. It is of practical interest that possibly the peritoneal fluids thrown out may be bactericidal in their action, particularly if the bacteria are of little virulence. In other words, the peritoneum by this pouring out of fluid may be protecting the body against an invasion.

It is of interest in this connection that the peritoneum possesses the power of absorption of deleterious substances. Muscatello demonstrated that the upper peritoneum in the region of the diaphragm absorbs more than the lower region of the pelvis. Clark, basing postural drainage upon this fact, elevated the foot of the bed in order that the infectious material might be more rapidly absorbed. Fowler reversed this position and instead of permitting the individual to drain the infectious material into himself, raised the head of the bed and drained the peritoneal fluid into the pelvis and removed such material from the body by external drainage. Fowler thought that he thus avoided rapid absorption by the diaphragm.

Bond and Cannon have demonstrated reversed currents in the gut and normal reversed peristalsis. These facts Murphy, of Chicago, took advantage of and suggested the seeping of normal salt solution into the rectum in order that it might be rapidly absorbed from the wall of the gut and thus dilute the poison.

The cause of the pain of intestinal obstruction Lenander has recently demonstrated to be an irritation of the nerves of the mesentery and parietal peritoneum. Rough handling of the bowel through traction on the mesentery is, therefore, to be avoided in all intra-abdominal manipulations.

Feculent vomiting has been demonstrated to be dependent not only upon a contraction of the abdominal muscles and compression of the stomach directly, but to be caused by a reversed intestinal peristalsis demonstrated by Cannon.

The important and startling clinical fact in cases of intestinal obstruction is the profound intoxication, the toxemia, the genetal sepsis. The cause of this toxemia is an acute infection from the damaged gut.

These two fundamental conceptions must underlie and be the basis of every thought and every effort in the treatment of intestinal obstruction.

In the light of these later findings what should be the *treatment* of a *suspected* case of acute intestinal obstruction? The changes in the bowel are so rapid that, the diagnosis having been made, action should be immediate. Delay may mean death,

If there is doubt about the diagnosis, and the patient has abdominal pain without involuntary muscle spasm, is distended without a temperature, *no cathartics* should be given by mouth. If there is a beginning peritonitis it will be increased by the catharsis. If there is infection in any part of the abdomen the increased peristalsis occasioned by the cathartic will spread the infection to another part of the abdomen.

More harm is caused by the common practice of administering cathartics in the case of abdominal pain in which the diagnosis is uncertain than in almost any other way.

No *massage* should be given to the abdomen for fear of causing a perforation or of spreading the infection. The patient should be kept in bed and quiet. No *food* should be administered by mouth for fear of causing intestinal peristalsis and thus increasing the peritonitis. No *water* should be allowed to be swallowed. Very little water is absorbed directly from the stomach. The swallowing of water increases peristalsis. No *morphia* should be given until operation is decided upon or the diagnosis is made, for morphia will conceal symptoms. If there is vomiting the stomach should be washed out with warm water.

Ewald has recently called attention to an early symptom of intestinal obstruction. He says the stomach fills with intestinal contents very early in the obstruction, whether it be a mechanical or non-mechanical obstruction. One can obtain through a stomach tube material with a strong feculent odor at a time when many serious symptoms have not appeared. The stomach lavage may be repeated several times a day and a large amount of material obtained each time. I have not yet had opportunity to confirm these recent observations of Ewald.

An early diagnosis of intestinal obstruction is not always possible, but it is often possible if the significance of abdominal pain and vomiting without fever are duly considered.

Cases of intestinal obstruction are not common in any one man's experience. They are of rather infrequent occurrence.

Early diagnosis of acute intestinal obstruction permits early operative relief.

Early operation in these cases gives a low mortality, although, unfortunately, not always. As a magnificent illustration of what an early diagnosis may accomplish in the diminution of the mortality of acute intestinal obstruction, note the remarkable experience recorded by Clubbe in 1907 in cases of intussusception in infants. Clubbe has operated upon 124 cases of intussusception. He has had but 40 deaths, a mortality of 32%. Clubbe's last 24 cases, with 3 deaths, or a mortality of 12½%, is phenomenal. The mortality in mixed statistics of intussusception is as high as 52%. The reason for this splendid operative showing lies in the fact that the physicians about Sydney, Australia, where Clubbe practices, have come to recognize the meaning of the initial signs of intussusception, viz., the sudden screams of the child, the characteristic pallor and the vomiting. They have learned to properly interpret the ap-

parent recovery from this acute onset and the recurring cries from peristaltic pain as a picture of acute intussusception, and having learned to interpret this picture, operation has been performed immediately with the resulting low mortality.

In studying any suspected intestinal obstruction it is not necessary to determine the *form* of obstruction, whether by band or adhesion, by Meckel's diverticulum, etc. It is sufficient to have determined that there exists a serious intra-abdominal operable intestinal lesion. In the very nature of things an infectious inflammatory process has certain well-recognized earmarks which seem to distinguish it from a purely mechanical process.

However, and here lies the trouble, if the mechanical difficulty is permitted to run along for several days, then there is added to the picture the inflammatory framework. It is then almost impossible to distinguish the one process from the other. One may, by a clear history of the onset of the attack and its progress, make a definite diagnosis of intestinal obstruction. Herein lies the wisdom of carefully considering the patient's story and weighing the evidence. We should, all of us, continually carry in our mind's eye the possible types or varieties of intestinal obstruction, from the acute pyloric stenosis of early infancy to the chronic obstruction from carcinoma in old age. The two great classes: (1) the non-mechanical. The distended paralyzed intestine associated with an acute infection. (2) The mechanical. The kinks and twists of coils held snugly against one another. The bands from old inflammatory processes. The intussusception of childhood. The volvulus of adult life. We should be familiar with the pathological changes occurring in these various types of obstruction.

There is no disease the proper treatment of which depends more upon a true conception of the pathology than does intestinal obstruction.

The operation. — The operation for intestinal obstruction should be early.

The incision should be made in the median line below the umbilicus.

In early post-operative ileus the incision had best be made through the clean abdominal wall and not through inflamed tissues, so that the probable site of the obstruction may be reached directly. There is then less danger of infecting the clean peritoneum.

1. If the patient is very ill it may be wise to simply, by local anesthesia, open the presenting distended loop and tie in a curved glass tube. This may relieve the immediate distention and allow gases and liquids to pass by what otherwise might become a permanent kink or twist. In such a case no attempt should be made to find the seat of the obstruction at the primary operation. These are desperate cases.

2. Upon opening the abdomen in a case which will permit of more prolonged operation, the collapsed gut should be looked for and followed to the seat of the obstruction. It is difficult to handle distended intestine.

The band should be first divided. The intestine above the obstruction, which is filled with bacterial and toxic products, virulently infectious, should then be emptied of its contents.

The method suggested by Monks, of Boston, is a good one — the threading the intestine upon a glass or metal tube. Several feet of intestine may in this manner be pulled up on to the tube and the contents evacuated.

If this seems undesirable, then the intestine may be washed out by the method recently advocated by Monks, i.e., opening the distended coil of gut, passing in a glass tube connected with a fountain of hot sterile salt solution and washing down an indefinite distance, opening below, re-introducing the tube and washing again; thus by two or three washings a large part of the intestinal tract may be rid of the harmful and toxic contents, which is replaced by hot stimulating salt solution. The effect upon the individual of thus flushing the intestine is often marvelous, the pulse improves, for the source of infection is removed, and convalescence may be established.

3. If the situation is like the following there must be taken into account another factor. A boy, operated upon for acute appendicitis. Drainage is employed. Recovery. Four weeks subsequently acute intestinal obstruction occurs. Operation finds a loop of gut, a foot and a half long, constricted but evidently viable. There are no gross evidences of peritonitis. The bowel is freed, cleansed and replaced within the abdomen. All is aseptically done.

Four days later, because of a persistence of symptoms, the abdomen is reopened, septic peritonitis is found and subsequently death occurs. The factor to be regarded is the permeability of the intestinal wall.

An appreciation of the changes taking place in the wall of the gut would have precluded this accidental infection. The bowel might have been left in the wound or surrounded by gauze or even resected.

Here was an instance in which the gut was damaged enough to have demanded resection, but it was replaced and the infection occurred through the damaged gut wall.

4. If the gut is evidently dead and there is a thrombosis of the mesenteric vessels, resection of the dead gut must be made. More harm comes from resecting too little intestine in these cases than too much. It does not add to the shock of resection to resect a few inches more. Sound tissue is thus surely reached and the thrombosed mesenteric border is avoided. If the individual is too ill to make an immediate intestinal suture, after emptying the proximal gut thoroughly and flushing it out if wise, the two divided ends should be attached to glass tubes and drawn outside the abdominal incision or well into it after having caught together the mesenteric borders of the gut.

At an *early* date, four or five days later, when the patient has partly recovered from the initial shock, an anastomosis should be done. I have

done several early anastomoses after first draining the bowel and they have done well. The abdominal wound and the intestine should be so left that the conditions will be most simple for the subsequent operative work of anastomosis with the least shock.

The amount of bowel which may be resected without harm to the individual is of interest in this connection. Senn, in 1892, concluded from experiments that resection of over one third of the small intestine in dogs and cats led sooner or later to marasmus. Trzebicki concluded that not over one half could safely be resected. Monari concluded from his dog experiments that probably not over one half of the human intestine could be resected with safety. Storp concludes from a study of surgical cases recorded and from his operative experience that two thirds of the intestine may be resected in man without fatal or deleterious result.

The *method of anastomosis* after resection, whether at the primary operation or at a secondary operation, is deserving of consideration. Hitherto it has been customary for surgeons to unite the small gut by lateral anastomosis after acute intestinal obstruction. I personally see no reason why this surgical custom should be perpetuated in all cases.

The technic of intestinal suture has now been reduced to thread and needle suture, is so exact, rapid and satisfactory, now that almost all rings and buttons have been eliminated (once called *adjuvants*), that there is no reason left for a lateral anastomosis, which is clumsy and attended by certain well-recognized dangers. I believe that the lack of development in individual technic has been largely responsible for the persistence of the old custom.

Many cases in the series here reported and the records of many isolated instances confirm the truth of this opinion. If, therefore, there is no contra-indication, such as badly edematous gut or greatly distended gut, I believe an end-to-end anastomosis is safer and preferable to a lateral anastomosis of the small intestine.

With regard to the propriety of any one doing abdominal and intestinal surgery, this may be accepted as a truism. No individual should attempt to do this kind of surgery who has not experimented upon the living cat or dog or pig. No sane man will experiment upon a living human individual in intestinal or stomach surgery. Such human experimentation is criminal. Any individual who essays to do abdominal surgery should fit himself to meet the technical emergencies.

Mature judgment in abdominal surgery only comes with experience in human surgery. Technical perfection any tyro can master. The mature judgment *and* the technical perfection make the surgeon.

In certain cases of intestinal obstruction it has been found satisfactory to do a lateral anastomosis to short circuit the obstruction within the abdomen without any other operative procedure; for example, in obstruction from irremovable malignant disease.

The *true place for enterostomy* has yet to be determined in cases of *mechanical* intestinal obstruction. It has been done in many cases. Some have recovered; some have died. It is a question whether enterostomy drains a sufficient extent of bowel to be of real value. Monk's procedure of washing may be preferable in these desperate cases. It should be tried.

Simple enterostomy at the time of operation with immediate closure of the intestinal opening is of little real value. An enterostomy tube left *in situ* drains a comparatively few intestinal loops. The closure of fecal fistulæ resulting from enterostomy is a problem of much interest. Fistulæ of the colon often close spontaneously. Fistulæ of the small bowel rarely close without operative assistance.

Post-operative intestinal obstruction with its 60% mortality may be avoided if there is the minimum amount of handling of the gut, if absolute hemostasis is maintained, if asepsis is secured, if the parts operated upon are replaced so far as is practicable in their normal positions, i.e., the sigmoid carried to the pelvis, the omentum made to cover a drained area, the large bowel rather than small kept in contact with a drain. Never, if avoidable, should the small gut lie next a drain; adhesions of an obstructive character may form.

That temporary paralysis of the intestine occurs after undue handling, exposure to cold air, etc., has been demonstrated. That permanent adhesions may occur we all know. Drainage should be secured without the use of great masses of gauze. Tiny drains are often best, a rubber tube containing a strand of gauze. Gauze covered with rubber tissue is useful. Evisceration should be avoided.

A comfortable working incision should be employed. A small incision invites trauma in handling. The omentum should be replaced beneath the abdominal incision before closing so as to avoid intestinal adhesions.

The possibility of feculent vomiting or regurgitation should be guarded against during operation upon these desperately sick people by lavage of the stomach just previous to or immediately after etherization.

After operation these cases will demand very careful watching. Distention may be met by high, warm, rectal evacuating enemata, the use of calomel and lavage of the stomach. Morphia or codeine will often stop hiccough. Nutrient enemata may be employed if needed. Subpectoral salt solution will relieve thirst.

In conclusion our knowledge of intestinal obstruction is derived from various sources:

From the necropsy table of the anatomist, from the bedside observations of the internist, from animal experimental physiology, from experimental physiological chemistry, from experimental pathology, from the biopsy table of the surgeon.

We are studying to-day living pathology and it is teaching us more than was ever dreamed of. Every internist should plan to see where the sur-

geon finds the lesion and what that lesion proves to be.

The changes occurring in cases of acute intestinal obstruction are found to be dependent upon an interference with the fecal current and an interference with the intestinal vascular current causing damage to the intestinal wall with a resulting general systemic infection or toxemia.

Intestinal obstructions are surgical lesions. The diagnosis should be made early so that operation may be done before irreparable damage has occurred.

Operative procedures are directed to the relief of the local obstruction; to the diminishing shock by ridding the individual of poisonous intestinal contents, the source of infection; to the early re-establishing of the intestinal canal; to the counteracting of the infection received; to the closure of fecal fistulæ; to the closure of herniæ.

I take this occasion to record 121 cases of acute intestinal obstruction from the Massachusetts General Hospital Clinic for the ten years previous to 1908.

(1) Thirty-seven cases of *post-operative intestinal* obstruction were found among these 121 cases.

Eighteen of these occurred *early* after operation, that is, before the abdominal wound had completely healed, or within twenty-eight days after operation. Of these eighteen *early* cases almost all occurred within five or ten days of the original operation. All followed appendectomy with abscess. The causes of the obstruction were: thick, soft adhesions gluing together intestines, firm adhesions constricting the small gut, adhesions holding the mesentery of the small gut somewhat twisted, a band holding the intestine down, a loop of gut held twisted, a band of adherent omentum, a loop of small gut caught and held slightly twisted by an omental loop.

Of these 18 acute post-operative cases, 13 died and 5 recovered. In the 5 acute cases which recovered there was *no* marked systemic *infection* remaining, in contrast to the 13 which died. These cases, too, were operated on early, before any secondary infection was precipitated. In all five instances no grave sepsis was present.

Details of the five recoveries.

The *first* case, four days after operation, obstruction. Intestine drained at operation, ileum constricted by a band high up in the abdomen.

The *second* case, two days after operation, obstruction. The low ileum was constricted by a band.

The *third* case, two days after operation, obstruction. The collapsed bowel was found. Bands were found and divided.

The *fourth* case, nine days after operation, obstruction. Cecum resected with mass of adhesions.

The *fifth* case, two days after operation, obstruction. Soft adhesions. Ileum adherent to the mesentery of adjoining gut.

Nineteen cases of post-operative obstruction occurred *late*, that is, from one month to two and one-half years following operation.

Of these nineteen *late* post-operative obstruction cases, 13 recovered and 6 died.

The primary operation was for appendicitis with

abscess and drainage, or ovariectomy, hysterectomy, intussusception, operation upon the stomach, a previous intestinal obstruction, a perforated duodenal ulcer, an intestinal resection.

The cause of the obstruction was in each case a band or adhesion.

It is a significant fact that of the six deaths sepsis was found primarily present, or there was found a twist of the mesentery, that is, indication of interference with the circulation of the gut.

Of these 37 post-operative obstructions due to adhesions and bands, 18 recovered, 19 died, 51% mortality, 49% recoveries.

It is significant of the importance of gross sepsis as contributing to the mortality in these cases that the per cent of mortality in the *early* post-operative cases was 72%, while of the *late* cases it was but 32%. The ileum was the part of the bowel involved in almost all these post-operative cases.

(2) There were 33 cases of intestinal obstruction from bands and adhesions *not post-operative*. Of these there were 15 recoveries and 18 deaths, a mortality of 55%, recovery of 45%.

Almost all the bands and adhesions were situated in the region of the cecum. In most cases the ileum was involved primarily in the obstruction.

The duration of the symptoms of obstruction previous to operation was about as short in the fatal cases as in the cases recovering; the element of time before operation was not apparently a very important one in determining the result in this series. All were operated fairly early.

(3) There were 9 cases of obstruction from a *Meckel's* diverticulum. Two recovered and seven died.

(4) There were 9 cases of *volvulus* and 9 deaths. These were all very sick cases. They died early after operation. Two died on the operating table.

There were 3 cases of *volvulus* of the sigmoid, 3 of the cecum, 1 of the colon and 2 of the small gut.

The gut was untwisted, or brought out and sutured to the abdominal wound, or resected and drained, or simply drained.

(5) There were 27 cases of intussusception with a total mortality of 52% or 48% recoveries.

(6) There were 2 congenital malformations of the intestine, each died.

(7) There was one case each of stone in the gut, hernia in a peritoneal pouch, hernia into the foramen of Winslow, one mesenteric embolism; all died.

The total mortality in these 121 cases was 60%, a recovery of 40%.

From this list there have been excluded all strangulated herniæ; all obstructions due to tumors, intestinal and extra-intestinal.

Besides these there were 27 cases in which a diagnosis of intestinal obstruction was made which were either not operated upon or were operated upon and nothing was found.

The per cents of recoveries in cases operated upon for ileus¹ by different surgeons whose cases have been recorded are as follows, with year of publication:

Oblanski,	1894,	110 operations,	38 recoveries,	or 35%
Heidenhain,	1897,	30	14	" 45%
Kocher,	1899,	78	56	" 72%
v. Bergmann,	1900,	66	15	" 23%
v. Mikulicz,	1900,	70	34	" 49%
Prutz,	1900,	36	19	" 53%

¹ These figures have little significance. The individual cases forming each group should be known in order to make valuable such figures.

Zeidler,	1900,	17	operations,	8	recoveries,	or	47%
Hefner,	1902,	31	"	15	"	"	49%
Philipowicz,	1903,	67	"	25	"	"	37%
Ranzi,	1904,	37	"	15	"	"	42%
W. Braun,	1904,	29	"	17	"	"	59%
O. Simon,	1905,	51	"	21	"	"	41%
Gobell,	1906,	54	"	26	"	"	48%
Rubritius,	1906,	91	"	48	"	"	53%
Mass. G. H.,	1908,	121	"	48	"	"	40%

THE DESIRABILITY OF INSTRUCTION IN PSYCHOPATHOLOGY IN OUR MEDICAL SCHOOLS AND ITS INTRODUCTION AT TUFTS.

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NOT so many years ago the Harvard bacteriological laboratory consisted of a little oven up in a corner of the gallery of the physiological laboratory in the old medical school. There Dr. Ernst was allowed to cook his germs and experiment. Dr. Ernst, as I remember it, had urged the introduction of bacteriology in the school and the establishment of a laboratory, but such was the skepticism regarding the value of bacteriology that the best that the faculty could be prevailed upon to provide was this little out-of-the-way corner as a tentative measure. Just previous to this Koch had announced his discovery of the bacillus as the cause of tuberculosis, or, as we had been taught in the school (following the views of Niemeyer), of chronic catarrhal pneumonia.

Still many expert practitioners did not hesitate to express themselves as skeptical of the soundness of Koch's alleged discovery, and bacteriology was taught in none of our medical schools. Though considerable work had been done in Europe in bacteriology, as yet America had not joined the procession.

The position of psychopathology to-day is not so very different from what was at that time the position of bacteriology. During the past twenty years a large amount of experimental work in this field has been done in Europe and America, but as yet the great body of the medical profession has not informed itself, either through mastering the literature or by repetition of the experimental observations, of the results of this work. And yet discoveries of the first importance have been made. A large mass of data opening up the mechanism of the mind and of those psychophysiological processes which produce disturbances in the functions of the body have been collected. If we have not solved the whole of the problems involved in the pathology of hysteria, neurasthenia, obsessions, psycholeptic attacks, dissociated personality and allied psychoses, we have at least learned some of the fundamental psychological principles underlying them and are able in consequence to apply intelligent therapeutics based on a scientific knowledge of the conditions.

The study of functional diseases is winning the attention of medical practitioners and it is well

that this is coming about, seeing that these diseases in one form or another—from temporary disturbance of one or more physiological processes of the viscera to persistent and organized derangements of the nervous system—make up probably the largest percentage of all cases that apply to the general practitioner for relief. From the point of view of numbers it is the functional rather than the organic disease that is of the greatest importance in practice, and the same is true from the point of view of effective therapeutics, as it is in the field of this class of disease that we have most control over disease processes and are able to say that we *cure* the patient. That functional diseases often produce intense suffering is also true and they appeal for this reason to the best services of the physician. Of the functional diseases those commonly classed as the psychoneuroses are particularly common and probably occupy a more prominent place in the practice of the general practitioner than in that of the neurologist, who only holds the court of last resort.

It is somewhat remarkable, then, that the study of the pathology and treatment of functional diseases, and particularly of the psychoneuroses, to which alone I now have reference, should hold such an insignificant place in the curriculum of our schools. Surely a layman, if the facts were laid before him as I have stated them above,—and I think they will receive general acceptance,—would express surprise at the small amount of attention that is given to diseases of this type in modern education, considering their importance and frequency, the amount of suffering entailed and their curability. We medical men know the reason for this neglect, which is to be found in their obscurity, general indefiniteness as subjects of objective study and lack of that material character that appeals to the intellectual interest of the average human being. Until recently, too, we have not had a sufficiently sound basis of knowledge to allow us to form precise conceptions regarding their pathology or symptoms, or a technic that would enable us to make them subjects of systematic investigation. It is partly for this reason, too, I think, that there has grown up the present-day crude and unscientific systems of psychotherapeutics known as Christian Science, Mind Cure, Osteopathy and what not, which should, properly speaking, be looked upon as opprobria upon medical education rather than denounced as public evils.

The advance in our knowledge of the pathology and symptoms of the psychoneuroses has, as a result of recent investigations, reached a point that should enable these diseases to become the subject of systematic instruction. To a large extent at least they are open to experimental observations which, though not so exact as those carried out in physiological experimentation, are sufficiently so to give valuable results. By special methods of technic,—hypnosis, abstraction, hypnodization, psycho-analysis, psychogalvanic and association tests, etc.,—and by a careful analysis of the symptoms, a complex symptomatology can