times be made in obstruction from gall-stones or compression from tumors.

The diagnosis of the seat of the obstruction is rather less difficult than is that of its nature.

It is to be based on :

(1) The determination of the capacity of the colon which, under anaesthesia, may be made to contain six quarts, a pressure of a column of water twenty feet in adults, twelve in children, being probably safe. It should be remembered that the rectum alone may contain one and one-half quarts. If four to six quarts can be introduced, the obstruction is almost certainly at or above the caecum. The earlier the procedure is resorted to, the less likely is gaseous distention to prevent its full application, or injury to follow its employment; on the other hand, the more likely is it to be of therapeutic service, as in intussusception.

(2) The situation of the tumor, if such be present, may throw light on the seat of the obstruction.

(3) But little reliance is to be placed on the symptoms. It may, perhaps, be stated: the higher the seat, other things being equal, the less the urine; the higher the seat, other things being equal, the less the tympany. Great excess of indican is not now considered of much value in locating the lesion in the large intestine. When tenderness first appears, its location may have some value as indicating the advent of peritonitis, which is apt to start at or about the lesion.

The presumable nature of the obstruction has some bearing on the seat. Intussusception involves the large intestine in 90 per cent. of the cases; strangulation the small intestine in equal proportion. Gall-stones and foreign bodies obstruct the small gut alone. All other forms are much more common in the large intestine; and all, save perhaps faecal impaction, are more apt to involve one or the other end of that portion of the canal.

Fitz's statistics show that four-fifths of all acute obstructions are found in the lower abdomen.

First in importance is the diagnosis of the condition that purgatives may be avoided and surgical interference, if necessary, may be resorted to before the patient's chances are imperiled by notable peritonitis or changes in the nutrition of the gut itself.

Next in importance, though not in ease, is the nature. Intussusception alone offers much chance of medical or expectant treatment.

A determination of the seat determines also the point of election for section. Except in the case of stricture of the rectum or sigmoid, this is a matter of comparatively subordinate importance.

THE SURGICAL ASPECTS OF ACUTE INTES- TINAL OBSTRUCTION.¹

BY JOHN HOMANS, M.D., BOSTON.

MOST of the cases of acute intestinal obstruction I have operated on have been caused by a malignant annular stricture of the bowel, or at least malignant disease; but there have been some exceptions.

The first case I operated on for intestinal obstruction was some eighteen years ago, and is the only one of the kind I have ever seen. It occurred after confinement, from inflammatory disease around the uterus which entirely prevented movements of the bowels. The

woman, young and healthy, was brought to the Carney Hospital. She had had no movement of the bowels for three weeks, was very much distended and in great pain. Dr. E. G. Cutler was the physician on duty, and asked me to see her. I did a left lumbar colotomy and she was entirely relieved. Operations went on through the artificial anus for some months and then gradually began to come through the rectum, and the last I knew of her almost all the discharges went through the natural passages.

The success of our efforts to relieve people of obstruction of the bowels would come largely from the accuracy of the diagnosis. These people with malignant annular stricture of the bowel very often are taken suddenly. I remember a patient of Dr. A. H. Nichols, a lady from the West staying at the Parker House. She said that her mother had died from cancer of the bowels. She was taken suddenly with complete obstruction, which had persisted for three weeks when I saw her. She was carried to a private hospital, and having located her pain and symptoms in the right iliac region, I, with the assistance of Dr. M. H. Richardson, ten or twelve years ago on a very hot day, opened the abdomen over the caecum, found no obstruction at that point, but after much overhauling of the distended intestines finally found in the splenic flexure of the colon an annular stricture. We replaced the bowels, sewed up the wound, made an artificial anus in the caecum, which relieved her, but she died in a day or two. Dr. Nichols procured the specimen which is now in the Warren Museum. I think the lumen of the bowel was reduced to a size somewhat smaller than the lead of an ordinary lead pencil, and yet she had had, as she said, no symptoms until her final seizure.

Another case was that of a stout Irish woman attacked while working at the wash-tub, in Roxbury. She had had no previous symptoms of obstruction. With the assistance of Dr. Fitz and her physician, Dr. S. A. Callanan, I opened the abdomen and found a mass of cancer behind the uterus which entirely involved the sigmoid flexure. I opened the bowel and sutured it to the skin. The stricture would not admit my finger.

Another case in which I did a left lumbar colotomy was one of almost complete obstruction with great abdominal distention. The intestines could be seen through the thin parietes moving with their vermicular motions and tightly distended. There were severe attacks of vomiting with much pain. The intestines were bound together by adhesive tubercular peritonitis and were also tied to the abdominal and pelvic walls, forming a sort of mound. The ileum was dilated to a circumference of four inches, and its walls much hypertrophied. The large intestine was contracted. Other organs contained tubercular deposits.

Another case was caused by cancer of the rectum in a lady fifty-five years old, with a cancerous family history. She became fat and strong after the operation, and went about wherever she pleased. Her physician found it necessary to keep a drainage-tube in the artificial opening, and about nine months after the colotomy the patient lost the tube in the bowel and would not allow search to be made for it. The tube ulcerated through the rectum above the cancer and caused fatal peritonitis.

Another was caused by cancer (annular) of the splenic flexure of the colon.

¹ Read before the Massachusetts Medical Society, June 7, 1892.

Another by cancer of the rectum in a lady sixty-five years old.

Another by cancer of the sigmoid flexure and neighboring parts.

Another case occurred in South Boston, and was a fatal one of volvulus in which no operation was done. The fatal twist took place in a woman twenty-eight years old, two years after a laparotomy for pyo-salpinx, and until the autopsy I supposed that the obstruction was in some way caused by the condition of the peritoneal organs left after the laparotomy, but it was simple volvulus of the ileum, and the only one I ever saw. The patient was attended by Dr. Fogg, of South Boston, who called me, and the autopsy was made by Dr. A. K. Stone.

These are some instances of malignant disease.

I have had two cases of traditional obstruction caused by bands or twists. One occurred in Woburn. I was sent for in a great hurry on a short day in winter. I dropped everything and went out to Woburn, and was kept an hour and a half waiting at the station, for some reason unknown to me. They kept me so long that daylight had almost gone when I reached the house. I opened the abdomen and did not find any band, and yet I felt as if there must be something of the kind, and if I had known as much about it at that time as I do now I presume I should have found it. It was a Meckel's diverticulum. I made an opening in the bowel, but so high up that the patient starved to death after a few weeks. That it was a band of a Meckel's diverticulum was shown at the autopsy.²

Another case of obstruction, rather sudden, was in a lady a year after ovariectomy, and was caused, I presumed, before I operated, by some adhesion or band between the wound and omentum or bowel. She was a woman of a great deal of character and good sense. I told her I should open the abdomen, and if I could not find the cause of the obstruction I should have to make an artificial anus, and she said, "Do whatever you think best." On opening along the line of the scar I found no adhesions, but in the lower part of the sigmoid flexure there was a malignant annular stricture. I made an artificial anus. She lived about a year and died of cancer of the liver. The last year of her life she said was a very happy one, though she could not go into society on account of the escape of gas. As far as movements of the bowels were concerned she got along very well, and was very glad she had had colotomy done.

Another case of obstruction, much more fortunate, where I opened the abdomen and found a stricture of the small intestine to the left of the umbilicus and made an intestinal anastomosis by means of Senn's plates, about a year and a half ago, in a little girl, was very satisfactory. Here there was no cancer. She is now alive and hearty. The stricture, which was complete, was caused by invagination and sloughing of the small intestine three months before I saw her. These openings, which are made by Senn's plates or Abbe's rings or any of the artificial rings, are said to contract. I do not know why they should not contract. At any rate in this girl the opening apparently has not contracted, and as the intestinal contents are fluid in the small intestine, contraction of the opening is not so serious as it would be in the large intestine where the

contents are more solid. She is now a stout, pretty girl, but was emaciated to a mere skeleton at the time of the operation, eighteen months ago.

Another man, with obstruction of the bowels caused by cancer of the sigmoid flexure of the rectum, I operated on a year ago last March. I found I could not make a resection of the sigmoid flexure, and made an artificial anus in the inguinal region. He has gained fifty-two pounds in weight, and was until recently very comfortable. Within the last six weeks the artificial anus had ceased to discharge. I could not see exactly why, because I could inject into it gallons of water, showing that there was no obstruction, and yet for some reason the feces did not come out of it. About seven weeks ago I made another laparotomy to the left of the former one, and pulled out the large intestine, which presented, until I got a straight pull on the descending colon where it begins to be the sigmoid flexure. You will find in doing these operations that it is not necessary at all to sew the bowel to the skin. Pull out the bowel, slide a little glass rod, or any rod, across to straddle the wound, and let it alone. The intestine heals at once to the parietes, and in a day or so you can open it. This method makes the so-called spur by holding up the two sides of the bowel. This man has now two artificial anuses, and has recovered and goes about comfortably. I felt if I closed the lower artificial anus, which could have been done quite readily, that he would have about a yard, more or less, of intestine which could not discharge anywhere. The alternative would have been to cut off the intestine below the glass rod and sew it up. However, the operation I did has relieved him. When I came to examine him at the last operation, a year or more after the first one, I put my finger into the distal end of the wound and felt the cancer which had grown up from the sigmoid flexure and is slowly approaching the surface, and I felt many enlarged lumbar glands; but still he is very comfortable. You will see the majority of the cases I have been able to remember have been of malignant disease. I recall three others of malignant disease where I have been called and have operated.

Another case of obstruction which was quite interesting was six months after an ovariectomy. As you can readily conceive, the bowels under the wound had adhered to the under side of the scar in the abdominal parietes at various points, so as to make little holes between the adherent bowel and the scar, and through one of these holes a loop of intestine had penetrated, and at the end of five or six days I was called. I opened the abdomen and found the loop gangrenous. If I had been called early enough, and had operated, I think I could have relieved the patient.

Sometimes cases of obstruction are due to adhesion of the bowel to an abdominal tumor. I have seen this in a fibroid tumor which had become entirely separated from the uterus and was nourished by adhesions to the omentum and mesentery and bowel. In that case there were places where the bowel was not attached right along to the tumor and left little apertures through which the intestine had become engaged and had become constricted, and death had resulted from peritonitis, so that you should remember if you have a movable tumor of the abdomen accompanied by symptoms of obstruction it may be that the bowel has become adherent to it, and strangulation has taken place through apertures at points of adhesions of the bowel.

I recall sixteen cases where I have been called upon

² The case is referred to in Dr. Fitz's excellent article on Persistent Omphalo-Mesenteric Remains, in the American Journal of the Medical Sciences, July, 1884.

to operate for intestinal obstruction, and nine of them were caused by cancer.

In another case, to which I was called by Dr. F. W. Draper, I strongly suspected acute pancreatitis, about which Professor Fitz had just written a most valuable monograph, and we sent for him at my suggestion; but neither of us had the courage of our convictions, and I obeyed the vote of the consultants, of whom I think there were seven, and opened the abdomen for supposed obstruction. As soon as we saw the fat necrosis in the omentum we saw our error, and I at once closed the wound.

CASES OF ABDOMINAL OPERATIONS ON ACCOUNT OF INTESTINAL OBSTRUCTION.

Disease.	Operation.	Cures.	Deaths.	Cases.
Cancer	Left lumbar colotomy . .	2	1	3
Cancer	Opening made in cæcum . .	1	1	1
Cancer	Artificial anus in splenic region	1	1	1
Cancer	Artificial anus in sigmoid flexure, inguinal or pubic	2	1	3
Cancer	Intestinal anastomosis . .	1	1	1
Pelvic inflammation after confinement causing complete obstruction	Left lumbar colotomy . .	1	1	1
Adhesive tubercular peritonitis	Left lumbar colotomy . .	1	1	1
Strangulation by hernia, through intra-abdominal adhesions		1	1	1
Persistent omphalo-mesenteric remains	Artificial anus	1	1	1
Complete obstruction following intussusception and sloughing	Anastomosis by means of Senn's plates	1	1	1
Intestinal band	Relieved by operation, but not cured	1	1	1
Intussusception in an infant	Relieved by operation . .	1	1	1
		6	10	16

Cases of cancer, 9; all others, 7. Laparotomy done on account of false diagnosis, 1. Cases of hernia are left out.

CASES OF OBSTRUCTION IN WHICH EARLY OPERATION WOULD HAVE BEEN PROPER.

Disease.	Fatal.	Autopsy.
Volvulus	1	1
Obstruction by strangulation through bands of adhesion to a wandering fibroid uterine tumor	1	1
Round fibroid filling pelvic brim like a cup (thirty-four years ago)	1	1

CASE OF OBSTRUCTION; OPERATION IMPROPER; RELIEVED WITHOUT OPERATION. CAUSED BY INTESTINAL ENTEROLITH.

Passed spontaneously by rectum 1

Total number of my recorded cases, 20.

There are a number of other cases not operated on which I have seen in consultation, mostly cancer.

As I said at the beginning, the question of diagnosis and the settling of it is the most important and all-important thing to settle, and here comes in experience. An experienced physician and a learned diagnostician, with common-sense in addition to his learning, is what is wanted. Why did I not operate on the case which turned out to be one from obstruction by an enterolith and why did I operate on the case of cancer? Because experience from sad and happy cases guided me aright. It is with these cases as with cases of appendicitis; the man who has seen many can often tell when to operate and when not to, and yet he could not thoroughly and clearly explain to a student why he refrained from operating in one case and yet operated in another which probably seemed to the student almost similar. In many cases an exploratory laparotomy alone will settle the question. But an exploratory

laparotomy in a person with distended intestines, and perhaps a slight amount of peritonitis, is very apt to be fatal if there is much handling of the bowels and difficulty of returning them, and they have to be stuffed back. Patients affected with abdominal cancer are peculiarly liable to be killed by an extensive laparotomy, though they bear the slighter colotomies very well.

I have seen patients go on for years with gradually increasing obstruction of the bowels, relieved at each attack by hyodermic injections of morphia, until finally complete obstruction has resulted, and at the autopsy I have found the intestinal wall above the obstruction as thick as the wall of the right ventricle of the heart. I have seen complete obstruction caused by a gradual compression of the rectum between a fibroid and the pelvic wall, in which the wall of the intestine above the point of compression was as thick as the wall of the left ventricle of the heart; and I have seen intestinal obstruction simulated by acute pancreatitis, by the irritation of an ovarian tumor, or an uterine tumor with a twisted pedicle. And it is only experience combined with common-sense and anatomical and pathological knowledge that will enable a physician or a surgeon to pick out the different cases and say, "This is a case of so-and-so, and needs immediate operation; this is probably a case of temporary obstruction which will relieve itself; this case is not one of obstruction, but is one of simulated obstruction"; in short to make the diagnosis, or if unable to make the diagnosis to say whether an exploratory operation should be done.

I have seen the abdomen opened for obstruction where there was not any; simply peritonitis; and I have myself opened it in a case of acute pancreatitis because the consultants advised it. It seems to me extremely difficult in these cases to make an accurate diagnosis of the cause of the obstruction, and in the majority of the cases in which I have opened the abdomen the obstruction, as I have said before, has been caused by malignant disease, and the places where the malignant strictures are more likely to occur, I should say, are the splenic flexure of the colon and the sigmoid flexure of the rectum. I have also seen it in the cæcum, but I think the former two places I have mentioned above the most common. If one is fortunate enough to find one of the traditional bands that can be divided and so set free the obstruction, he is very lucky.

It is interesting, I think, to see what takes place on the peritoneum of the exposed bowel. Supposing you do an inguinal colotomy, or any other colotomy for obstruction, and pull out the bowel and put your glass rod under and leave it. In the course of forty-eight hours that bowel is covered so thickly with what we call lymph that you would not recognize it for bowel. You would think it was mucous membrane when you take the dressing off and look at it. The deposit on it is a line or more in thickness. The intestine adheres to the side of the wound as well as or better than if you had sewed it.

It is impossible unless a man is omniscient to know just what is the matter, but we can try to attain unto it. I went to Cambridge a year or more ago to see a case with Dr. Morrill Wyman. The patient was a gentleman sixty-four years old and had had complete obstruction of the bowels for some days. I could not make a diagnosis as to what was the matter with him exactly, and as it turned out no one could have done so, and yet my instinct was not to operate. I told Dr.

Wyman that, not feeling sure of what I was going to accomplish, I should like to postpone the operation and have the patient carefully watched. This was a most exceptional case, and I do not know whether Dr. Wyman has ever published it. At any rate it is most unique, I should say. This gentleman went along, gradually becoming more comfortable, and, at the end of three or four weeks, passed a large stone through his rectum, similar to the stones which occur in cattle. The nucleus in horses and cows is generally a piece of iron or a nail, or something of that kind. I do not know what the nucleus of this was. The size of it was that of a large-sized plum, I believe, — a hard calcareous substance which completely obstructed the bowels. The patient has been well ever since. If I had operated and opened the bowel he would probably have died. I did not *know* absolutely whether to operate or not, but I knew enough to decide not to interfere. In this case I do not think anybody could have made the diagnosis. Our treatment turns largely on the question of diagnosis, and the diagnosis is made by human skill and not by divine skill, and we cannot be certain enough to know *always* what to do. I approve very strongly, in the majority of cases, of an exploratory operation, but one must be guided somewhat by the condition of the patient. Patients will often go three, four or five weeks with complete obstruction without distention. You see them with flat abdomens, and you see the intestines writhing in their vermicular motion, and the patients get along very comfortably for quite a long period. I think in these cases there is generally found some malignant stricture somewhere, to which the bowels have become gradually accustomed.

A CASE OF NEPHROLITHOTOMY; REMOVAL OF CALCULUS WEIGHING FIVE OUNCES; RECOVERY.¹

BY GEORGE W. GAY, M.D.,
Surgeon to the Boston City Hospital.

For eleven years Mr. R., aged forty-three, had been a great sufferer from frequent attacks of renal colic. For several years prior to the advent of the colic, he had been troubled with pains in various parts of the body, as the back, hips and legs. Chills, fever and malaise ushered in the attacks of pain, and they occurred every one or two months for six years, there seldom being an interval of three months. During the past five years the attacks have been less frequent, and less severe, only one paroxysm having occurred within twelve months. He has been disabled from following his business as a marble worker more than half of the time during all these years, as he would no sooner get fairly over one attack, than another would begin. The pain was always followed by profuse discharges of purulent and bloody urine, it sometimes reaching the large quantity of four or five quarts in the twenty-four hours. At these times he would frequently get up in the night, and pass a quart at once. No gravel was ever seen.

Six months prior to the operation a tumor made its appearance in the right side. It increased rapidly, until it extended from the median line to the ribs above, into the right inguinal region below. It was elastic, uneven or lobulated, fluctuating, not tender, descended upon full inspiration, and it had all the characteristics

of a dilated kidney. No hard substance was to be felt. There was a distinct groove between the tumor and the liver. The attacks of pain in former years had been attended with some jaundice, but none was present, when seen by the writer, nor was pallor or emaciation markedly noticeable. Jolts and jars hurt him, so that he could not ride far in a carriage without much suffering. His general health was failing: his strength was fast giving way, and he had given up work recently, as he was no longer able to attend to it.

The urine was free; cloudy; specific gravity 1,020; sediment was large, ropy and very tenacious. Micturition not very frequent except at times, as after exercise. The urine had not been clear for many years.

The operation was performed at the City Hospital on December 8, 1891. The patient was etherized, and placed upon his left side. An incision five inches long was made midway between the ribs and the crest of the ilium, commencing about three inches from the spine and extending toward the median line. The peritoneal cavity was accidentally opened at the most prominent part of the tumor, but was closed after a careful digital examination of the cavity had been made; and no ill results followed.

The kidney was exposed, and found to be a large, thin-walled cyst. The stone was readily detected by the finger. On opening the kidney, between one and two pints of a turbid fluid escaped. It was free from any disagreeable odor. The calculus was fixed in one or more of the calyces of the renal cavity, but was dislodged by moderate effort and removed. The cyst, for such the kidney had become by distention and absorption, was thin walled and prone to collapse. No renal structure was visible to the eye, or apparent to the touch. It was secured to the posterior angle of the wound with silk. The remainder of the incision was closed by a deep and superficial series of continued sutures. Union in this portion of the wound took place by first intention. There was very little suppuration throughout the case. Neither was there much discharge from the cyst after four or five days. The fact that the discharge never had a urinous odor would tend to show that the renal tissue proper had been mostly destroyed.

Comparatively little shock followed the operation, although there was a good deal of pain. He was turned upon his side every day while the wound was being dressed, and after the second day he could help himself very cleverly during the process. The severe pain soon passed away; but the soreness lasted for some time. Eleven days after the operation the patient was seized with acute pain in the left hypochondrium, and from no ascertainable cause. Of course a calculus in the left kidney was thought of, but the pain passed off in a few days and has never been as severe since.

For twenty-four hours after the operation the catheter was used. The urine was neutral, cloudy; specific gravity 1,018; albumen $\frac{1}{2}$ per cent.; sediment abundant, slightly ropy, and contained an occasional granular cast, bladder and renal cells. Two days later micturition was voluntary, and the amount of urine passed in twenty-four hours was forty ounces. It may be said here, that as time went on, the amount of urine passed in a day and a night often reached seventy to eighty ounces. This seems the more remarkable, when it is remembered, that with a large opening into, and free drainage from, the right kidney, yet very little fluid escaped from it, probably not over two ounces in

¹ Read before the Suffolk District Medical Society, April 30, 1892.