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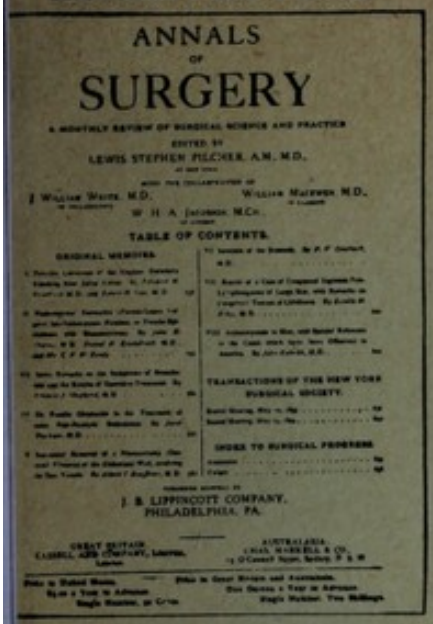
ANNALS
OF
SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY
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Intestinal Obstruction due to Gall-Stones.

Report of Three Cases, with Summary of Five more Cases from the Records of the London Hospital, 1893-1901.

BY H. L. BARNARD, M.S. (LOND.), F.R.C.S.,

OF LONDON,

Assistant Surgeon to the London Hospital.

INTESTINAL OBSTRUCTION DUE TO GALL-STONES.

REPORT OF THREE CASES, WITH SUMMARY OF FIVE MORE CASES FROM THE RECORDS OF THE LONDON HOSPITAL, 1893-1901.

By H. L. BARNARD, M.S. (Lond.), F.R.C.S.,

OF LONDON,

ASSISTANT SURGEON TO THE LONDON HOSPITAL.

Case I.—R. F., a married woman, aged thirty-seven years, was sent up to the London Hospital on January 13, 1901, by Dr. MacDonnell, of Stoke Newington, with a diagnosis of intestinal obstruction and the following history. Until nine months ago she had enjoyed very good health. She had never suffered from biliary colic or jaundice, nor had she any previous attack of intestinal obstruction. For nine months before admission to the hospital, she had, however, suffered from an aching pain in the right side of the abdomen, which prevented her from lying on that side. This pain was at times so severe as to make her feel sick. On Wednesday, January 9, 1901, she was suddenly seized with a "griping" pain in the right side of the abdomen below the ribs. On Thursday, January 10, 1901, she took a purge, and her bowels were opened several times on Friday, but the pain was not relieved. From this time she had absolute constipation,—neither fæces nor flatus were passed,—but she suffered from tenesmus. Vomiting commenced on Saturday, January 12, 1901. It was incessant, profuse, and from the very commencement brown in color, and smelled of fæces. The patient and her husband volunteered the statement that "she was passing her motions from her mouth." She was in great pain and in a condition of severe prostration.

On admission to the hospital the abdomen was found to be flaccid and neither distended nor tender on palpation. The pulse was 100 per minute and of fair volume and tension. The tongue

was dry and covered with white fur. The patient complained of great thirst, and about an hour after admission vomited dark, feculent-smelling matter. Per vaginam a mass, which was taken to be fæcal, was felt in the situation of Douglas's pouch. On examining the rectum it was found to contain some fæces, and the same hard mass could be felt above and in front.

Treatment.—Three enemata, containing turpentine, one ounce, in soap and water a pint, were given at intervals of about a couple of hours. The first brought away a little fæcal matter. The other two were without any result either of fæces or flatus, and the hard mass could still be felt from the rectum. The vomiting was now more urgent and the patient's general condition had not improved.

Operation.—The abdomen was opened by the usual median laparotomy incision below the umbilicus. A coil of congested and distended small gut projected. The inner aspect of the hernial rings and the umbilicus were then explored with the hand and found to be normal. The cæcum and appendix were examined. The former was found empty and contracted. The empty coil of ileum entering it was drawn out of the wound and rapidly followed up. At a distance of about five feet from the ileocæcal valve the gut was found to contain an ovoid, hard mass, which was recognized as a gall-stone. The gut was empty and contracted to a very small lumen below the stone, whilst above it was greatly distended and congested. The sudden narrowing of the gut formed a kind of septum, on which the stone rested and blocked the narrow orifice left. The coil of gut containing the stone was delivered out of the wound and packed round with sponges. It was then emptied of fæcal matter and clamped above and below. A short incision was made in the length of the gut and the stone squeezed out. The incision was then closed by a continuous suture of No. 1 silk, through the peritoneum muscle and mucous membrane, as the mucous membrane was too thin to be sewn separately. The wound was invaginated by interrupted Lembert sutures. The gut was well washed out with hot saline solution and returned to the abdomen. The abdominal wound was closed with through and through silkworm-gut sutures without a drain.

Progress.—The bowels were opened on the second day by enema. The abdominal wound healed by first intention, and the

a *b*

FIG. 1.—Gall-stone removed in Case I from the ileum, about five feet above the ileocæcal valve, actual size. (*a*) Section showing the white centre and end and the dark laminated crust upon the body of the calculus; also, recrystallization in the middle. (*b*) Shows the rough and dark-colored exterior of the calculus.

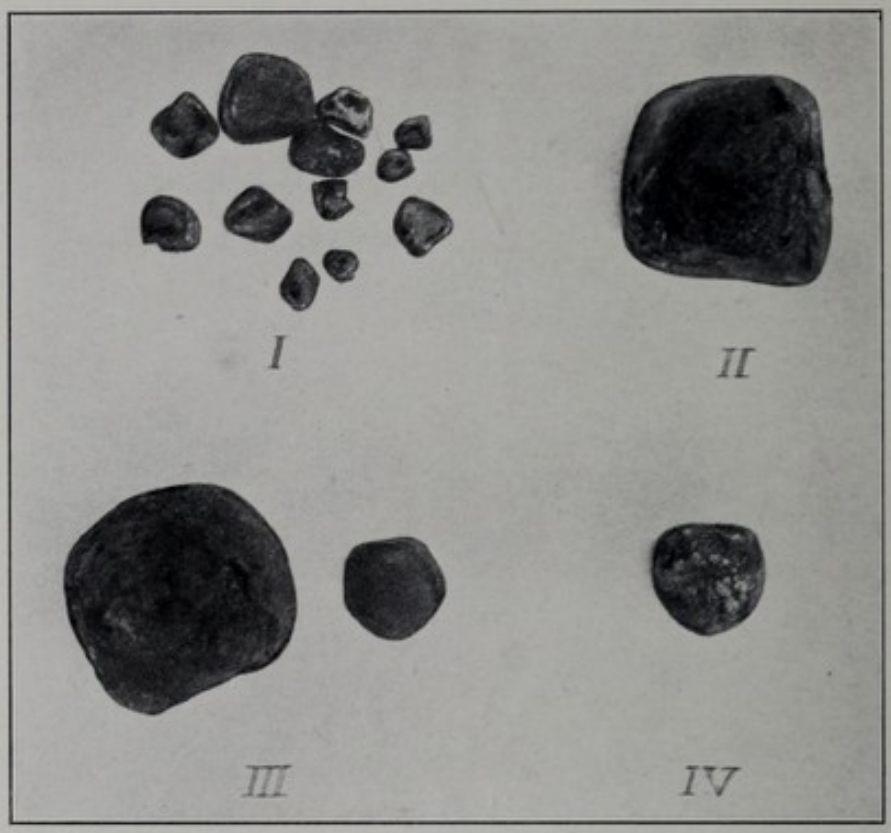

Fig. 5.—Actual size of calculi. Numbered according to loculi.

Fig. 6.—Case III. Calculus removed from jejunum. One and three-quarters inches by one and one-quarter inches; weight, 234 grains.

patient made an uninterrupted recovery, which was, however, a little delayed by cystitis and some retention of urine.

The *calculus*, the accompanying figure of which shows very nearly the actual size, was egg-shaped, and measured two and one-half inches in length, one and one-eighth inches in diameter, and three and one-half inches in circumference. It weighed 294 grains when dry. The structure was lamellated, but the central part, of nearly pure cholesterin, had recrystallized into a stellate arrangement. The narrow end presented a nipple-like projection of pure white cholesterin, which passed at a neck into the general body of the calculus, which was covered with a layer of dark-brown friable material. It will be seen in the diagram that the layers passed without interruption from the brown friable part to the pure white portion. It seems, therefore, probable that this nipple projected for a long time into the duodenum, and that the constant washing with acid chyme dissolved out the pigment from the exposed portion. Dr. Hunter, assistant bacteriologist to the London Hospital, kindly examined a scraping taken from the centre of the stone, and found it to contain bacillus coli communis. No typhoid bacilli were found; but in connection with the early age at which this woman developed a large gall-stone, it is interesting to note that the obscure hepatic signs of the stone followed an attack of typhoid some years before. Attention had been drawn to this point first by Bernheim in 1889, and afterwards by Dufort, Chiari, Mason, and Osler.

Case II.—In June, 1901, Mrs. M. M., aged sixty-three years, was admitted under the care of my colleague, Dr. F. J. Smith, for intestinal obstruction, and I was asked by him to see her with a view of operation.

History.—She gave a very clear history of previous biliary trouble. She had suffered for years from obscure pains in the right hypochondriac region, which she had always supposed originated from the liver, but she had never been jaundiced. While she was stopping at Hastings, in the summer of 1900, she had a very severe attack of pain in the region of the liver, accompanied by continuous retching, but not by actual vomiting. Her doctor told her the attack was due to the passage of the gall-stone. No search was apparently made for this in the motions.

The *present attack* was apparently produced by a purgative.

On Sunday night, June 10, 1901, the patient took a pill, and this acted very thoroughly on Monday. On Monday, June 11, 1901, at 11 P.M., and five days before she came to the hospital, she was seized with the most violent pains in her right hypochondrium, and with profuse and continuous bilious vomiting. She continued in this condition all night, but improved considerably in the morning (Tuesday, June 12, 1901). The sickness was much less. The colicky pains were, however, nearly as bad, but had now shifted to the umbilical region. An enema was administered, and produced a good result; her doctor was called in.

On Wednesday, June 13, 1901, the patient was still retching, and the vomited matter was now brown and offensive. Her medical man wished her to come up to the hospital, but she refused all surgical treatment.

Next day, Thursday, June 14, 1901, an enema produced a small result; she was much better; the vomiting almost ceased, and she obtained some sleep.

On Friday, June 15, 1901, she was much worse. The vomiting was now distinctly fæcal.

On Saturday morning, June 16, 1901, she consented to operation, and was brought up to the London hospital.

Condition on Admission.—Her general health was very bad. There was bronchitis, and her pulse was rapid and feeble. The abdominal examination was mostly negative in result. There was no distention and very little tenderness. No tumor could be felt either by palpating the abdomen or on examining the rectum and vagina, although Douglas's pouch was most carefully examined. The hernial rings were empty. A diagnosis of acute intestinal obstruction by gall-stone was made on the following grounds:

(1) The patient was a woman, and sixty-three years of age, suffering from acute intestinal obstruction.

(2) The definite history of previous hepatic pain and vomiting.

(3) The clear history that the pain in the present attack began in the hepatic region and shifted to the umbilical region later.

(4) The early profuse and bilious vomiting which remitted, and later returned and became fæcal.

(5) The late and incomplete constipation.

(6) The absence of distention, which pointed to an obstruction of the small intestine.

Operation.—Anæsthetic chloroform. During the whole operation she was regurgitating large quantities of fæcal vomitus. The usual laparotomy incision was made. As soon as the belly was opened, congested and dilated coils of small intestine presented, and some blood-stained fluid escaped from the peritoneal cavity. A hand swept round the pelvis proved the hernial rings were empty. The cæcum was then examined and found collapsed. The entering coil of collapsed ileum was brought out of the wound and followed up for about five feet, when a large calculus was found obstructing the lumen of the gut. The ileum above the stone was greatly dilated and congested; below it the gut was pale and contracted, so that the stone, as in the previous case, rested on a septum. The stone was removed, and the incision closed in an exactly similar way to that described in Case I. The contents of the intestine were heard gurgling past the obstruction before the belly was closed. A stomach-tube was passed, and several pints of feculent fluid were removed from the stomach, which was then washed out until the returning fluid was fairly clear. The patient's condition was, however, very bad after the operation. She was collapsed and had a continuous rattle in her throat.

Progress.—On the following morning she was cold, blue, and delirious, and her respiration was very rapid, 48 to 52 per minute. Her temperature had risen to 100° F. She had not been sick since the operation, and she had profuse diarrhœa with incontinence all night. She died in the afternoon, twenty-four hours after the operation.

The *stone*, of which a photograph is given here, was barrel-shaped and faceted at both ends. It was a dark coffee color and its outer layer was friable. The diameter was seven-eighths of an inch; circumference, three inches. The weight, when dry, was 103 grains. The faceting on either end appeared to indicate that this stone was one of three or more stones, of which one or more remained in the gall-bladder, whilst the passage of the other had caused the previous attack of pain and vomiting. The post-mortem examination, however, indicated that no large stone had previously passed, but that the upper facet was produced by several small stones found in the gall-bladder.

Post-Mortem.—The incision in the gut was soundly closed and surrounded by plastic peritonitis. There had been no leaking of intestinal contents. The predisposing causes of death were found in small, contracted, granular kidneys, the capsules of which would not strip, in a fat and flabby heart, and an atheromatous aorta. The endocardium and endarterium were deeply stained with blood pigments as in a septicæmia. The right lung was solid at its base and sank in water. The bronchial tubes

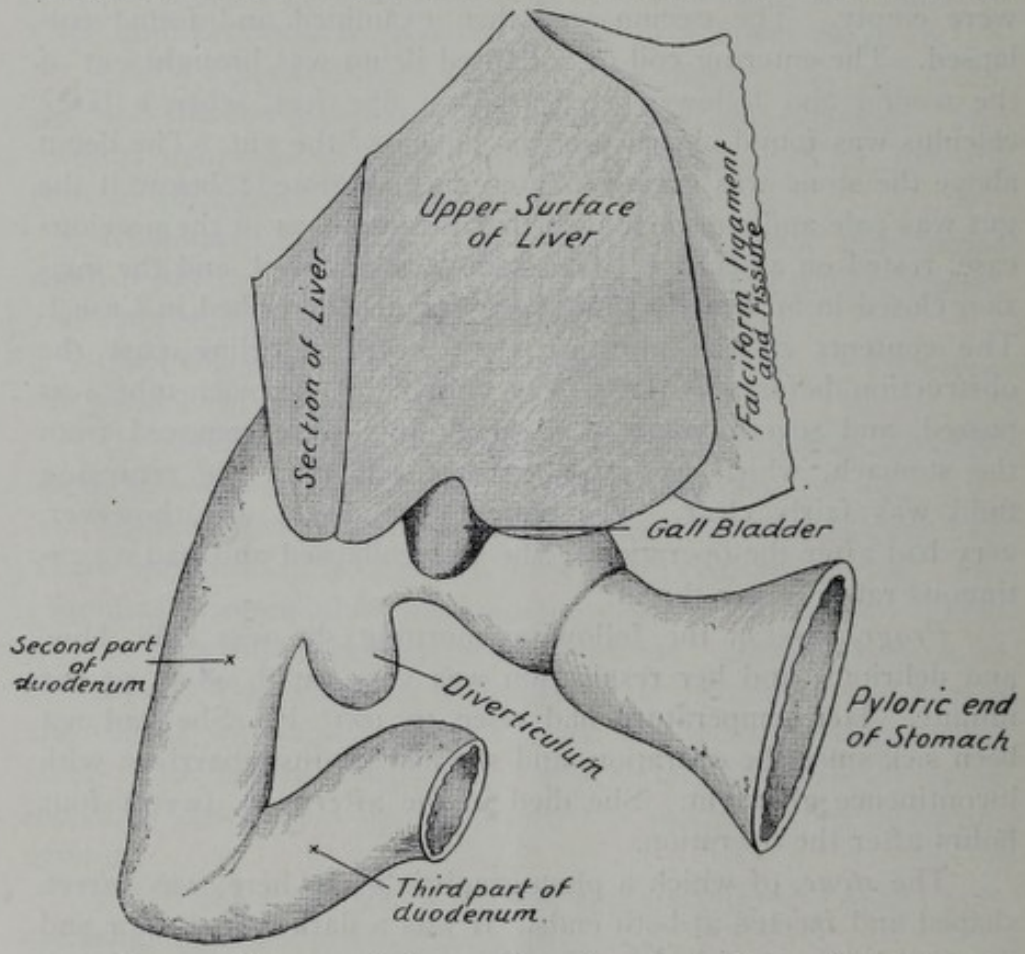

FIG. 2.—Diagram of the anterior view of the liver. Case II.

contained purulent matter. The left lung was in much the same but a somewhat earlier condition. The liver, gall-bladder, duodenum, pancreas, and stomach were removed *en masse* so as to be dissected and preserved.

The following structures were carefully dissected out:

(1) The duodenum. (2) The gall-bladder and the calculi it contained. (3) The hepatic, cystic, and common bile ducts,

and the pancreatic duct. (4) The portal vein, hepatic artery, and vena cava; these latter structures were normal, and need not be again mentioned.

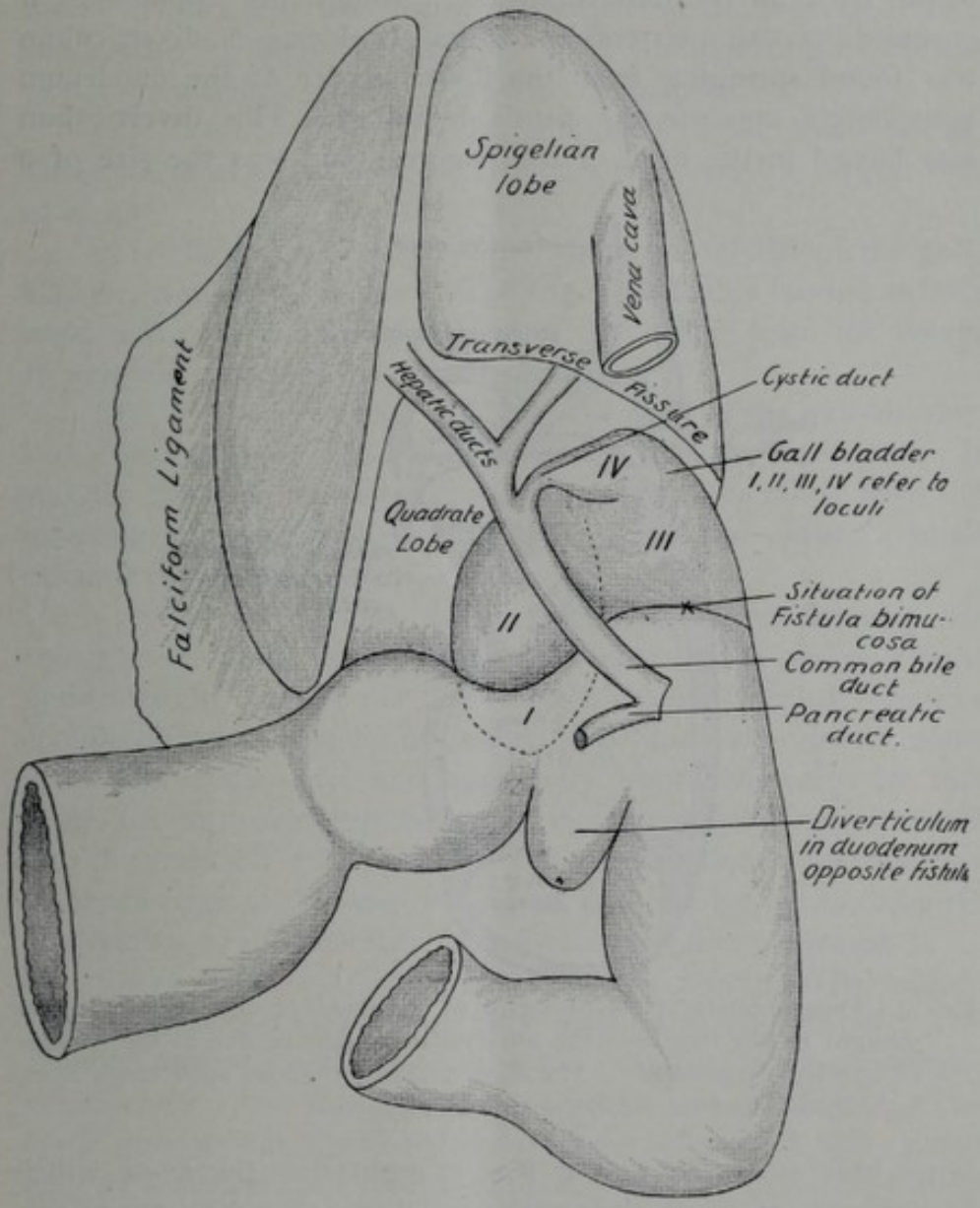

FIG. 3.—Diagram of posterior view of dissection. Case II. The portal vein and hepatic artery are not shown for the sake of clearness.

1. The *Duodenum* was hung up by adhesions to the neck of the gall-bladder. It passed from the pylorus one inch upward and to the right, and was adherent to the middle of the left border of the gall-bladder. It then passed in a loop or festoon behind

the gall-bladder, and was again adherent to the right side of the neck of that viscus. It was here that the fistula bimucosa existed. I was able to work the calculus, which had been taken from the ileum, back up the duodenum and through this fistula until it occupied its old quarters in the gall-bladder. A diverticulum was found springing from the lower border of the duodenum immediately opposite the fistula bimucosa. This diverticulum was buried in the head of the pancreas and was the size of a

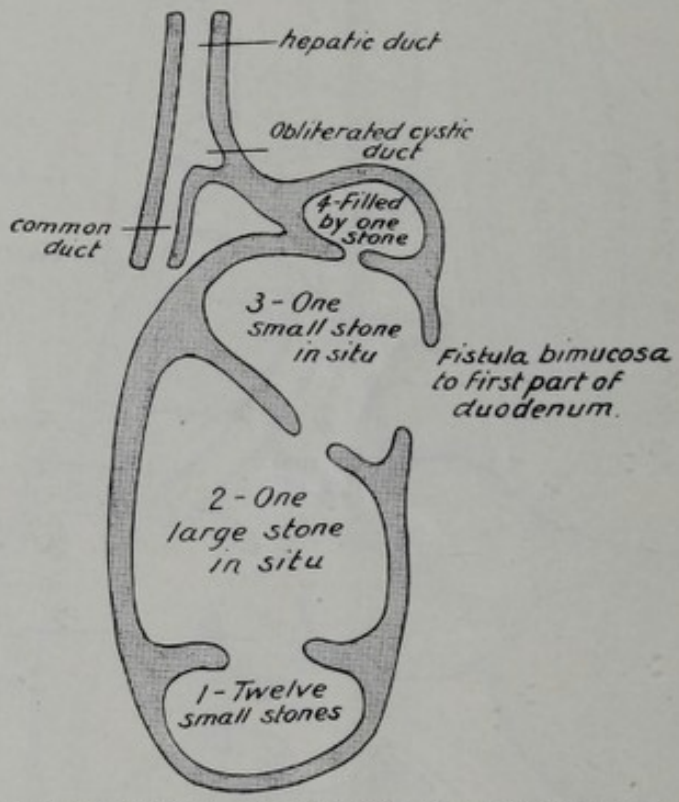

FIG. 4.—Diagrammatic view of loculi of gall-bladder and septa. It was thought at one time that the biliary colic might be due to the passage of another large stone. The facts showed that no such large stone had existed, and the ileocæcal valve was normal.

large hazel-nut. At first it was thought that the stone which had caused intestinal obstruction had lain for some time in this diverticulum after leaving the gall-bladder, but on actual trial the diverticulum was found to be far too small to hold the stone. It is possible that this diverticulum served as a by-pass to permit the flow of chyme past the obstruction caused by the gall-stone projecting through the wall of the duodenum immediately opposite to it. The entrance of the common bile ducts into the

duodenum was normal in position and structure. The third and fourth parts of the duodenum showed no pathological changes.

2. *The Gall-Bladder and Calculi.*—The gall-bladder was found divided into four loculi or compartments, separated from one another by dense fibrous septa, and communicating by orifices of not more than a quarter of an inch in diameter.

(1) The first at the fundus contained twelve small calculi, the smallest of which was the size of a tare, and the largest that of a pea.

(2) The second compartment, about the middle of the gall-bladder, contained a solitary large smooth calculus faceted at both ends, and only a little smaller than that taken from the ileum. It weighed ninety-seven grains when dry.

(3) The third loculus was near the neck of the gall-bladder, and it was this one which communicated with the duodenum. It was for the most part empty, so that the calculus taken from the intestine was reintroduced with ease, but in one corner a small calculus the size of a pea was found.

(4) The fourth and last compartment was at the very entrance to the cystic duct. It was not larger than a pea, and communicated by only a pin-hole with the third loculus. It was completely filled by a round tuberculated and pale-colored calculus. The cystic duct had apparently been obliterated by this stone, for no probe could be passed either from this compartment into the common duct or in the reverse direction. Perhaps this stone was impacted in the cystic duct, and had led by its complete obliteration to the necessity of a fistula into the duodenum.

3. *The Hepatic, Cystic, and Common Ducts.*—The hepatic and common bile ducts were very little, if at all, dilated. The common duct at its widest point would have just taken a medium-sized pencil. Its orifice into the duodenum was not dilated. The cystic duct, as has already been said, was obliterated, and existed only as a fibrous cord connecting the common bile duct with the neck of the gall-bladder. The common bile duct was clearly demonstrated to its entrance into the duodenum, and certainly the large stone removed from the ileum did not pass this way. The pancreatic duct was in no way abnormal.

CASE III.—I. P., a German woman, aged sixty-eight years, was admitted on the afternoon of September 11, 1901. She was in so collapsed a condition and spoke so little English that no

reliable history could be obtained. Apparently her illness began two months before, with severe abdominal pain and jaundice. Five days before admission she became acutely ill with profuse bilious vomiting and severe pain in the belly; but I could not discover where the pain had been. For two days she had passed no motion. The patient was an enormously fat woman. She was collapsed and nearly pulseless; when admitted, her pulse-rate was 103, but very feeble; her temperature was 95° F. An enema produced a small result. Her belly was soft and voluminous and not distended or tender; no tumor could be felt, and the hernial rings were all clear. The rectal examination was omitted. Under stimulants and a coffee and brandy enema she rallied a little in four hours, and it was then decided to operate, as a diagnosis of gall-stone intestinal obstruction had been made. The operation was carried out under eucaine local anæsthesia, and she experienced no pain except at the skin incision and when the mesentery was pulled upon. The usual laparotomy incision from umbilicus to pubes was employed, and three inches of fat were cut through before the muscular wall was reached. When the peritoneum was opened, most of the small gut was found collapsed and pale, but one coil in the upper part was congested and greatly distended. This coil was followed down, and almost immediately a large gall-stone in the gut was drawn into the wound, surrounded by sponges, cut on in the line of the gut and evacuated. The gall-stone rested on a septum formed by the junction of the distended and collapsed intestine, similar to that described in Cases I and II. In order to give her the best possible chance of recovery, it was determined to drain the gut at the point of suture, and accordingly a Paul's tube was tied in and fixed in the upper angle of the wound, and the remainder sutured with silkworm gut.

Progress.—Her condition was improved after the operation. She did not vomit, and her lungs remained clear. She evacuated fluid fæces freely from the tube, and, stimulated with strychnine and coffee and brandy enemas, she lived forty-eight hours.

Post-Mortem.—Only a partial autopsy was allowed. The liver and intestines were removed. The point of obstruction was found to be five feet from the duodenojejunal flexure and ten feet from the ileocæcal valve.

The *calculus* was large, rough, black, and barrel-shaped. It

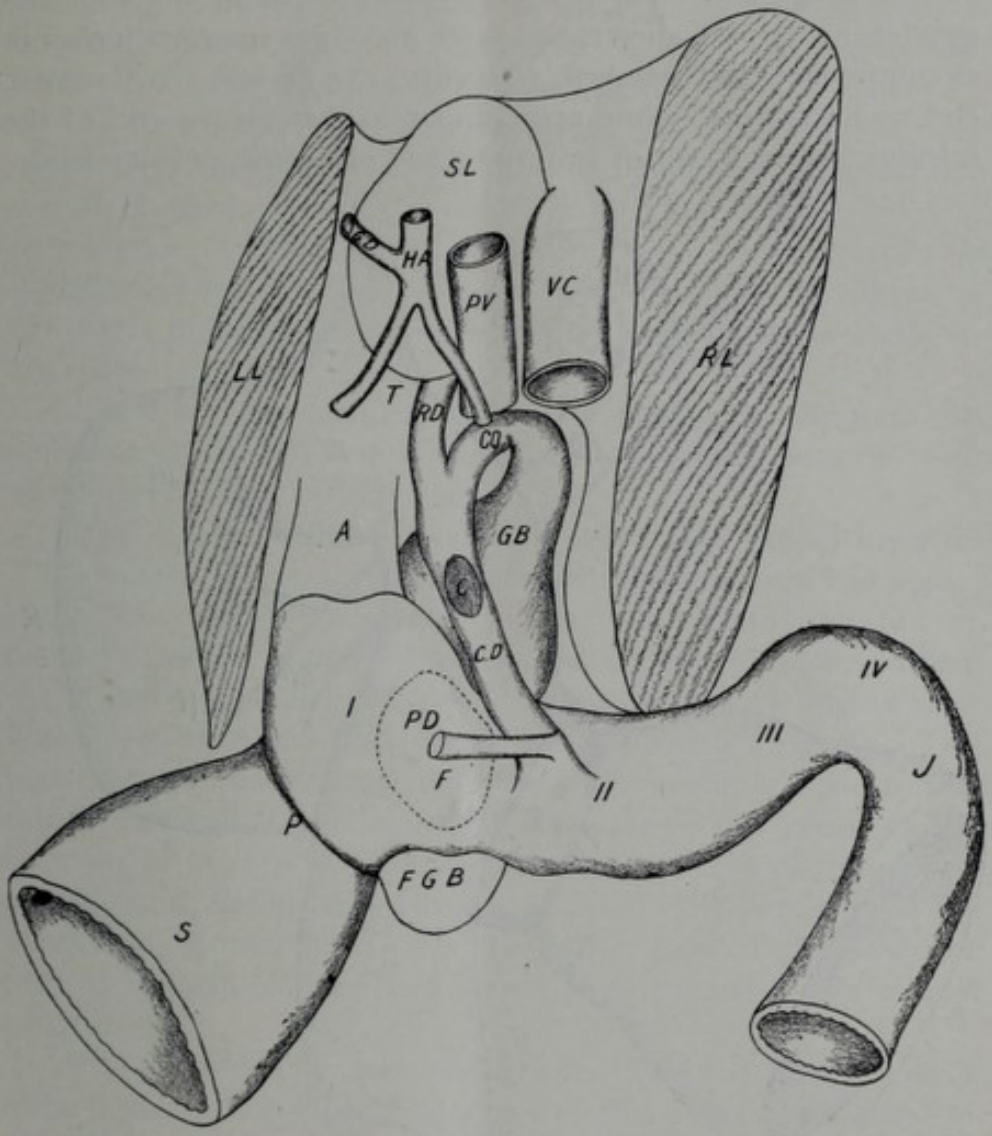

FIG. 7.—Liver, duodenum, gall-bladder, and bile ducts. Posterior view. Case III. *A*, adhesions binding first duodenum to liver; *S*, stomach; *P*, pylorus; *I, II, III, IV*, parts of duodenum; *J*, jejunum; *HD*, hepatic duct; *CD*, cystic duct, patent and dilated; *CD*, common duct, dilated to size of one-half diameter; *C*, calculus blocked in same, hence jaundice at commencement of attack, and perhaps dislodgement of calculus; *PD*, pancreatic duct; *T*, transverse fissure; *HA*, hepatic artery; *GD*, gastroduodenal artery turned up; *PV*, portal vein turned up; *VC*, vena cava; *GB*, gall-bladder adherent by anterior surface to, *I*, duodenum, where fistula occurred and stone passed, very thick and dense above; *F*, site of fistula; *FGB*, fistula bimucosa, right and posterior surface of gall-bladder; *SL*, spigelian lobe; *LL*, left lobe; *RL*, right lobe. The duodenum is not in the position in which it was found in this diagram.

measured one and three-quarters inches in length, one and one-quarter inches in diameter, and three and three-quarters inches in circumference, and weighed, when dry, 234 grains. At its lower end was a smooth, white area similar to that on the end of the calculus in Case I, which I presume had projected into the duode-

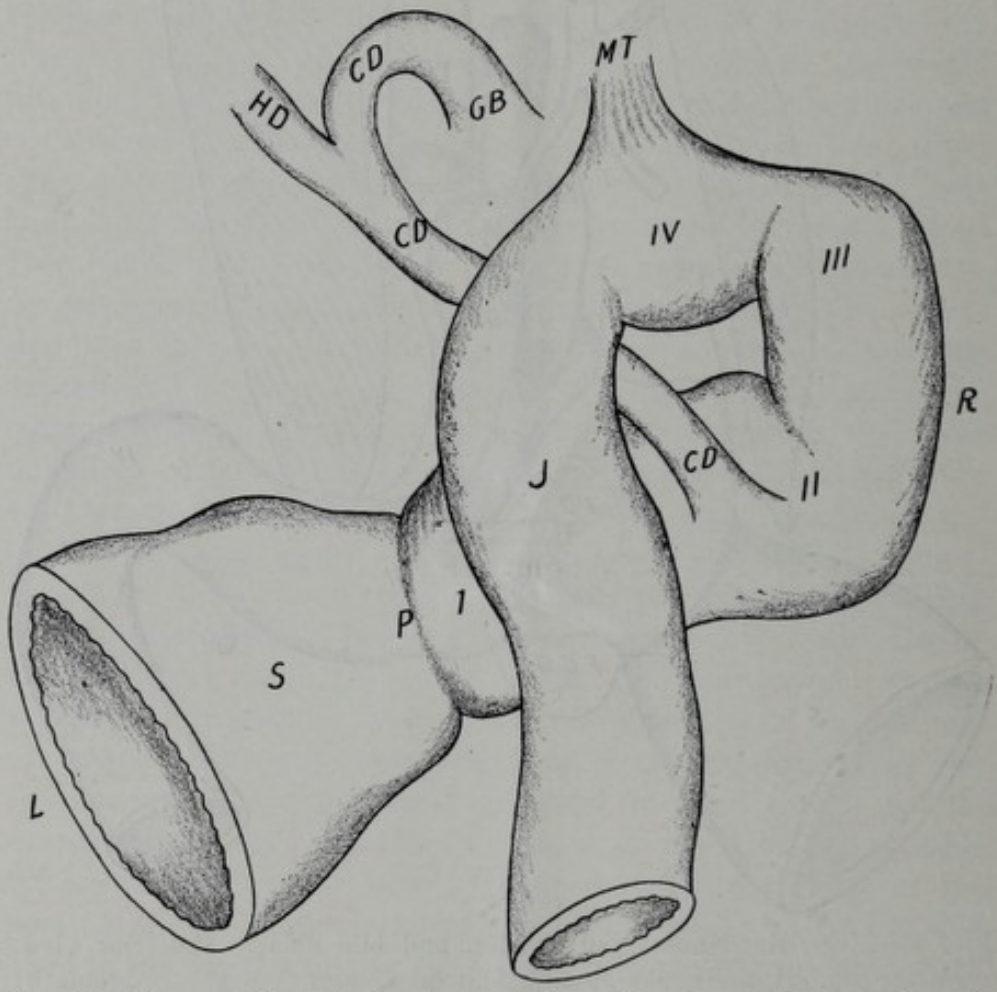

FIG. 8.—True position of duodenum. Posterior view. *S*, stomach; *P*, pylorus; *I, II, III, IV*, parts of duodenum. It is to be noted that the second and third parts both ascend to the junction with the jejunum held up by *MT*, the muscle of Treitz; *GB*, gall-bladder; *CD*, cystic duct; *HP*, hepatic duct; *CD*, common bile duct.

num for some time. On section it was found to be very friable, amorphous in structure, and not lamellated. The structure was coarse, and innumerable little crystals sparkled on its surface. I opened a gall-bladder recently soon after an attack of cholecystitis, and found it filled with gall-stone mud, in which were the

crumbling remains of a number of small faceted gall-stones. It appeared, indeed, that the acuteness of the inflammation had broken up a multitude of faceted gall-stones into this mud.

If the moisture were absorbed from this mass and it consolidated with the formation of minute crystals of cholesterin, it would produce just such a large friable amorphous calculus as in this case. I must admit, however, that I found no trace of partially eroded calculi on section; and of course this theory of the origin of large gall-stones would not apply to those which are lamellated.

The liver, gall-bladder, bile ducts, and duodenum were dissected as in Case II, and this specimen was shown with the other at the meeting of the Pathological Society.

The *Duodenum* was curiously twisted, and indeed inverted. The stomach, pylorus, and first part of the duodenum had apparently been forced downward, so that the second part ran up instead of down, and the duodenojejunal flexure and its suspensory ligament (muscle of Treitz) were on a much higher level than the pylorus and first part of the duodenum (Fig. 8). This was probably produced by tight lacing in youth, and the formation of the gall-stones may have been due to this cause, as has been urged by Mr. Arthur Kieth, who regards gall-stones as a part of what he has called corset disease. The first part of the duodenum formed practically the major part of the posterior wall of the gall-bladder, and here a large ragged fistula existed between them.

The *Gall-bladder* was not greatly enlarged, but its walls were thick, ulcerated, and adherent to the duodenum behind as described. It passed by a funnel-shaped neck into a dilated *cystic duct*, and this joined an equally dilated *hepatic duct*.

The *Common duct* when flattened out was one-half inch in diameter and somewhat thickened. About an inch below its origin a small elongated stone the size of a small bean was impacted. No doubt it was the passage of this stone which caused the onset of the symptoms two months before death with jaundice. When this jaundice subsided (for the patient was not more than tinged when admitted to the hospital), it was probably owing to the escape of bile by way of the gall-bladder around the calculus and through the fistula. It also seems probable that this stream of bile ultimately loosened the stone and led to its expul-

sion into the duodenum. The *pancreatic duct* was not dilated. The *pancreas* was firm and appeared somewhat fibrous, but it had been preserved in formalin.

In the last ten years there have been five other cases of acute intestinal obstruction due to gall-stones admitted to the London Hospital.

I wish to acknowledge my indebtedness to my House Surgeon, Mr. Hugh Lett, not only for his able assistance at the operation on Case I, and the care which he gave to the after treatment, but also for searching the records of the London Hospital for the following cases.

CASE IV.—H. G., aged seventy-three years, was admitted on January 3, 1894, with a diagnosis of acute intestinal obstruction, under the care of Mr. Openshaw. She was a very fat married woman. Four days before admission, she was seized with sudden paroxysmal pain in the region of the umbilicus, and this had persisted. Vomiting had been constant for three days. It was fæcal at the time she was admitted, and had been so, her daughter stated, for some time previously. Constipation had been complete for five days. The abdomen was a little distended. No other sign was made out.

Operation.—Laparotomy was performed, and a gall-stone was found in the ileum one foot from the ileocæcal valve. The wall of the intestine was very thin and nearly ulcerated through. The gall-stone was removed by an incision on it, and the wound closed by Lembert's sutures. The patient did not rally from the operation, and died four hours later. No post-mortem was performed.

CASE V.—G. S., aged forty-two years, was admitted to the hospital under the care of Mr. Eve, on March 19, 1894, suffering from intestinal obstruction. His previous history was of very great interest. In 1875, eighteen years before, he had a severe attack of pain in the epigastrium accompanied by tenderness and vomiting. During the next seven or eight years he was never entirely free from pain, *i.e.*, until 1884. He had severe attacks of pain about once every week during this period. He then consulted an eminent physician, who treated him for dyspepsia. Six months later the pain almost entirely disappeared, but was replaced by an obstinate constipation, making it necessary for him to take purgatives once or twice a week. Unless the bowels were open daily, the patient had a pain low down in his abdomen.

Mr. F. S. Eve is of opinion that during the whole of this period of ten years (1884-1894) the gall-stone was in the small intestine. On March 15, 1894, four days before admission, severe pain, with continuous vomiting and absolute constipation, suddenly appeared. Under an anæsthetic, a hard, bullet-like lump was felt in the right iliac fossa. Laparotomy was performed on March 20 by Mr. F. S. Eve, as no result had followed the use of enemata. A gall-stone was found impacted at the ileocæcal valve. This was displaced up the ileum in order that the incision might be through uninjured gut. The stone was then cut on and removed. The mucous membrane was first sutured, then the wound was invaginated by a continuous Lembert suture, and, finally, a piece of omentum was drawn over the incision and fixed by sutures. The gall-stone was one and one-half inches long, one inch in diameter, and three and one-quarter inches in circumference, and weighed 190 grains. It had no facet. It was of a dirty white color, and its surface, which is washed and worn, tuberculated and friable, is largely formed of phosphates. Indeed, it presents all over the appearance of the ends of the two calculi in my case which had projected into the intestine from the gall-bladder. This calculus is now in the Museum of the London Hospital.

Progress.—On the eleventh day after the operation, some thick, foul, yellowish-green pus discharged through the wound from a stitch abscess. The wound soon healed, however, and the patient left the hospital cured seven weeks after the operation.

This case was published in the *Clinical Society Transactions* for 1895, Vol. xxviii, page 91, with an analysis of twenty other cases.[1]

Case VI.—E. S., aged sixty-three years, was admitted to the hospital under the care of Mr. Jonathan Hutchinson, Jr., on November 6, 1895, with acute intestinal obstruction.

History.—She gave a clear history of attacks of jaundice and biliary colic. On November 2, 1895 (four days before admission), she had been seized with sudden and acute pain in the right hypochondriac region just below the ribs and with vomiting. The bowels were opened on the following day, but for the next three days the constipation was absolute and the vomiting continuous. On the day before admission the vomiting became fæcal. On admission the patient looked very ill, and she was

slightly jaundiced. Her pulse was rapid and small. The abdomen was tender and distended. Laparotomy was performed on the day of admission, and a gall-stone was found several feet above the ileocæcal valve. The gut above was greatly distended and congested, below it was contracted and empty. Enterotomy was performed and the stone evacuated through the wound; two small stones were found above it, and these fitted facets on the larger one. The stone which caused the obstruction was one and three-quarters inches long, one inch in diameter, and three and one-eighth inches in its greatest circumference. It weighed 191 grains. It was dark brown, and at its larger end presented four facets. The two smaller stones presented four facets each. It was clear that two or more other calculi were missing. The wound in the gut was closed in a similar manner to that described in the previous cases.

Progress.—The woman made an uninterrupted recovery, saving a sudden attack of collapse on the fourth day after the operation, for which no cause was found and from which she rallied. She was discharged quite well from the hospital a month later.

This case was recorded in the *Pathological Society Transactions,* 1896, Vol. xlvii, page 95.[2]

Case VII.—H. S., aged fifty-two years, was admitted to the London Hospital on October 24, 1898, under the care of Mr. McCarthy. He was in a state of profound collapse from acute intestinal obstruction. For ten days he had been vomiting, and latterly this had been fæcal. For four days he had suffered from absolute constipation. The patient was too collapsed for an operation to be performed. He died the day after admission.

Post-Mortem.—A large gall-stone was found impacted in the ileum, twenty-five inches from the cæcum. A fistula bimucosa was found connecting the gall-bladder and duodenum, which were united by peritoneal adhesions. Commencing peritonitis was present all over the small gut.

Case VIII.—S. N., aged fifty years, was admitted under the care of Mr. T. H. Openshaw, on November 27, 1899, suffering from acute intestinal obstruction.

Previous History.—She had never had an attack of jaundice. Twelve months before admission, she had a severe attack of abdominal pain, which came on suddenly and was spasmodic in

character. This was accompanied by vomiting. During the year she had six or seven similar attacks of spasmodic abdominal pain accompanied by vomiting, and each of about two days' duration. The present attack commenced ten days before admission with "spasms" and sickness. The constipation was absolute throughout, neither fæces nor flatus passed. On admission the vomiting was found to be fæcal. The abdomen was greatly distended.

Operation.—A gall-stone was removed from the ileum by an incision directly over the stone. The wound was closed by a double layer of sutures, the outer being Lembert's. The patient died forty-eight hours later.

Post-Mortem.—The wound in the gut was found to be soundly united and water-tight. A fistula bimucosa connected the gall-bladder with the first part of the duodenum, these parts being firmly united by peritoneal adhesions.

Remarks.

The frequency of intestinal obstruction due to gall-stones varies very greatly in different accounts. Osler,[3] quoting Fitz, makes it as common as one to thirteen cases of intestinal obstruction (twenty-three cases of gall-stones in 295 obstructions), Leichtenstern gives forty-one cases out of 1152 obstructions, or about one to twenty-eight.

The London Hospital records for the eight years in which the above eight cases of gall-stone obstruction occurred show that there were 360 cases of intestinal obstruction, including chronic obstruction. This proportion is one to forty-five cases of obstruction. The last figures are probably nearer the truth, as it appears that the tables of Fitz and Leichtenstern[4] were from reports of cases, and were not consecutive. Gall-stone obstruction occurs in women five times more frequently than in men. In the above eight cases only six were women and two were men.

The average age of twenty cases collected by Mr. F. C. Eve[5] was sixty-four, and according to Sir F. Treves it is fifty-seven. Case I is therefore remarkable in that the woman was but thirty-seven, and Case III in that it was a man and only forty-two. These large gall-stones, for the most part, pass into

the first part of the duodenum at a point where it lies against the neck of the gall-bladder by a process of ulceration after these parts have become united by adhesions. This fistula bimucosa was found in Cases II, III, V, and VI, the only post-mortems in the above series.

Less often the calculus ulcerates into the jejunum or transverse colon. Dr. Horace Jeaffreson, in the *British Medical Journal*, May 30, 1868,[6] narrates a case in his brother's practice in Suffolk where a large gall-stone was vomited, and at the autopsy some time later the gall-bladder was found adherent to the stomach. In several cases gall-stones have been discharged into the urinary bladder, and there is even an octavo work written by H. Faber, 1839,[6] on this curious complication. Abt, Gutterboch, and Hahn[6] have recorded examples of bilary calculi occurring in the urinary bladder, and Köstlin and Wucherer,[6] cases in which the communication was direct between the two bladders. Sir F. Treves says in the chapter devoted to gall-stones, in his book on "Intestinal Obstruction"[7] that no stone can cause obstruction in the intestines which has passed safely along the biliary passages. Osler, on the other hand, quoting Courvoisier (*Ibid.*), states that at the post-mortem examination of several of these cases the common bile duct was found dilated, so that it easily admitted the finger, and presumably no fistula existed, although he does not say so. The site of the obstruction is usually the lower part of the ileum and the ileocaecal valve. The small intestine becomes narrower from its upper to its lower end; and since small stones are more common than large ones, if they cause obstruction at all, it will be near the neck of this elongated funnel. Thus, if we arrange the cases given in Sir F. Treves's article and those in the above series according to their diameter and point of obstruction, we obtain the following table:

Diameter of Calculus.	Point of Obstruction.
2 1-4 inches.	Upper jejunum.
1 1-3 inches.	Jejunum.
1 1-4 inches, Case III.	Middle jejunum.
1 1-7 inches.	Lower jejunum.
1 1-8 inches, Case I.	Five feet up ileum.
1 inch, Case VI.	Several feet up ileum.
1 inch.	Ileum.
7-8 inch, Case II.	Five feet up ileum.
1 inch, Case V.	Ileocæcal valve.

In other words, the higher up a gall-stone causes obstruction the larger we may expect it to be. As a rule, any gall-stone less than one inch in diameter passes spontaneously.

The ileocæcal valve is one of the narrowest spots in the alimentary canal, and might be expected to obstruct for a time the passage of a calculus which it eventually permitted to pass. Thus, MacLagan[8] has recorded a case (*Clinical Society Transactions,* Vol. xxi, 1888, p. 87) in which a woman, after four severe attacks of intestinal obstruction, passed spontaneously four large gall-stones each one inch in diameter, and at the post-mortem only the fringes of the ileocæcal valve remained. Many causes appear to combine to produce the obstruction. The small intestine is adapted to propel fluid contents, and its interior is lined with valvulæ conniventes to delay the flow of chyme along it. It has not a smooth interior and a powerful muscular wall like the rectum and sigmoid adapted to propel scybalous masses comparable to large gall-stones. The rough surface of the gall-stone is moreover ill adapted to glide along the intestine, and should it remain there for any length of time, as it appears to have done in Case III, its bulk is further increased by rough intestinal accretions.

Spasm of the intestine at and below the stone excited by its rough surface, according to Duplay and Reclus,[9] is responsible for the main part of the obstruction. They state that at many autopsies on these cases the stone has been found lying quite loosely in the relaxed intestine. In Cases I, II, III, and VI the operator found the gut so contracted below and dilated above that the stone rested upon a septal-like pro-

jection in the gut, and could by no reasonable pressure be passed on along the gut. This spasm of the intestine would also account for the success which in former days attended the exhibition of morphia and belladonna in some cases, since these are drugs capable of relaxing this spasm.

Another point of interest about these cases is that there is no true strangulation of intestine. They are pure cases of obstruction to the contents of the small intestine without interference with its blood supply. It follows from these considerations that the gut is not paralyzed throughout, as it is in most other cases of acute intestinal obstruction, and a recognition of this fact will make the anomalous symptoms of gall-stone obstruction easy to understand. These symptoms may be summarized thus:

The onset is sudden. The pain and collapse are seldom severe until late in the attack. The constipation is illy marked, and in many cases the patients have passed flatus and even small motions after the onset of the acute symptoms.

In Cases I, II, and IV purgatives and enemas produced a motion even when the calculus was in the intestine. The abdomen is neither tender nor markedly distended as a rule. The prominent symptom is vomiting, which is severe, continuous, profuse, and early deeply stained with bile, so as to closely simulate fæcal vomiting.

In a case of Dr. Pye Smith's quoted by Treves,[10] where the stone was impacted in the upper jejunum, the patient vomited one and one-fourth gallons of bilious fluid in forty-eight hours, and died on the sixth day.

The vomiting, moreover, in Cases I and II could be divided into three stages. In the first it was sudden in onset and severe and profuse in character. In the second stage, when the stone had moved from a close proximity to the stomach, it remitted. In the last stage, when the stone became impacted lower down, it returned, and was like the fæcal stage of ordinary acute intestinal obstruction.

The calculus was probably felt in Douglas's pouch in Case I, and was certainly felt in the region of the ileocæcal

valve in Case V. This is a rare occurrence, for Treves[11] states that he could find no case in which the calculus was felt before operation. In the diagnosis of this condition it is usual to make a great point of previous biliary symptoms, but when we remember that the large stones capable of causing intestinal obstruction are usually single, and that they do not, as a rule, pass down the duct, we perceive at once that jaundice and true biliary colic will generally be absent, and that the symptoms will be limited to more or less obscure pain in the region of the liver. In Case VI, however, the obstruction was due to the largest of the three stones; moreover the presence of several facets indicated further calculi, and there was accordingly a clear history of attacks of biliary colic and jaundice. In my second case there was definite hepatic pain, but not jaundice or colic. In my third case the attack of jaundice which heralded the obstruction was caused by the gall-stone found in the common duct.

The mortality after operation for gall-stone obstruction is apparently very high. Waring[12] quotes the following figures: Lobstein, thirty-one cases of operation; mortality, 61.3 per cent. Courvoisier, 125 cases of operation; mortality, 44 per cent. Schuller, eighty-two cases of operation; mortality, 56 per cent. Jonathan Hutchinson, Sen., mortality, 50 per cent.

Mr. Eve[13] collected twenty cases of gall-stone obstruction when he reported his own case. Of these fifteen were submitted to operation, and six died, that is to say, 40 per cent. Of the series of eight cases reported above, seven were operated on, and of these four died, making a mortality of 57.12 per cent. Of the four that died, one aged sixty-three had been obstructed five days; one aged seventy-three had been obstructed five days; another aged fifty had been obstructed ten days, and the last, aged sixty-eight, five days.

Tillmann states that recent results are much more favorable, and he quotes Korte as having saved four out of five consecutive cases.

Treatment.—So seldom has it been possible to state before

operation that intestinal obstruction was due to a gall-stone, that it is useless to discuss a treatment which presupposes such knowledge. The problem, as in all other cases of acute intestinal obstruction, is to ascertain the existence of organic obstruction *at the earliest possible moment*. We may then open the abdomen, ascertain the exact cause, and proceed accordingly. The most certain test of the presence of organic obstruction appears to be the turpentine enema (one-half to two ounces of turpentine in sixteen ounces of soap and water); if this is returned on two consecutive occasions without flatus or fæces, the obstruction is almost certainly organic, but even this sign, as has been pointed out, is of uncertain value in gall-stone intestinal obstruction.

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[2] J. Hutchinson, Jr.: Pathological Society Transactions, 1896, Vol. xlvii, p. 95.

[3] Osler: System of Medicine.

[4] Leichtenstern.

[5] F. C. Eve: Clinical Society Transactions.

[6] For these references I am indebted to Mr. Jonathan Hutchinson, Jr., F.R.C.S., Jeaffreson, H. Faber, Abt, Guterboch, Hahn, Köstlin, Wucherer.

[7] F. Treves: Intestinal Obstruction.

[8] MacLagan: Clinical Society Transactions, 1888, Vol. xxi, p. 87.

[9] Duplay and Reclus.

[10] F. Treves: Intestinal Obstruction.

[11] Ibid.

[12] Waring: Diseases of the Liver and Gall-bladder.

[13] F. C. Eve: Clinical Society Transactions.