

cocci and *B. coli*. A large piece of mucosa sloughed off and was passed. Haemoglobin, red blood count and white blood count were diminished (red blood cells, 3,530,000; haemoglobin 70 per cent; white blood cells, 7,550). A marked tympanitis was noticeable. On December 7, 350 cc. of blood were given the patient by direct transfusion. Continuous glucose drip was again instituted. The patient grew weaker, and now with continual bloody stools. He died on December 9.

At autopsy, a large amount of foul smelling gas and about 3 liters of fluid were released, lying free in the abdominal cavity. The transverse colon was found to have ruptured over its entire length and the anterior surface or wall of the transverse colon formed one side of the lumen; while the posterior side was formed by the loops of the small intestine. Dense fibrous adhesions lateral to the cecum attached the latter organ to the wall of the abdomen. Above the terminal portion of the cecum was an ulcer, or perforated area, 3 cm. in diameter, in the wall of the ascending colon. Its edges were rough and irregular. An acute inflammatory peritonitis extended all over the abdominal cavity. The liver was markedly enlarged. Incision through the whole length of the colon showed it to be intensely ulcerated, the whole mucosa showing this acute inflammatory reaction with necrosis and inflammation.

Culture in blood broth of material obtained from lesions at autopsy showed streptococci and gram negative bacilli, which were identified as the Flexner strain of *B. dysenteriae* and was agglutinated with known Flexner serum in dilutions up to 1:320. No agglutination by known Shiga and Duval serum.

DISCUSSION

Perhaps the most interesting one of the cases of my series of perforation of the colon is the mixed amebic and bacillary infections. It is hard to determine whether the ameba or the specific bacillus of dysentery played the greater role. The microscopic sections would indicate, however, that the ameba, which appeared in large numbers, caused a chronic colitis and

that the superimposed acute illness was due to the dysentery bacillus.

REFERENCES

1. Craig, C. F.: Complications of Amoebic and Specific Dysentery, as Observed at Autopsy. *Am. J. Med. Sci.*, 128:145-56, 1904.
2. Duval, C. W.: Personal communication.
3. Duval, Pierre and Kahn, Pierre: Un cas de Perforation du Colon au Cours de la Dysenterie Bacillaire Aigue. *Arch. d. mal. d. l'appar. dig.*, 2:142-49, 1908.
4. Felsen: Personal communication.

DISCUSSION

DR. JOSEPH FELSEN (New York): I shall confine my remarks to two important points of Dr. Silverman's paper. The first is the insidious nature of bacillary dysentery. Next to syphilis, bacillary dysentery is perhaps the greatest disease mimic of all time. This is illustrated by the atypical forms of acute bacillary dysentery such as the pneumonic type which simulates lobar pneumonia. I feel that probably the most logical concept of this disease is one that regards it as a focal intestinal manifestation of a systemic infection with toxin absorption. This corresponds to what Dr. Gaither meant, I presume, when he said that the bowel should be considered in relation to the other organs of the body.

The second point is the occurrence of perforation in bacillary dysentery. It is my humble opinion that intramural infection is a common accompaniment of both the acute and chronic forms of the disease. In the chronic form, multiple intramural abscesses may occur, giving rise to a septic type of temperature and a rather typical clinical picture of profound toxemia. These were evident in one or two of Dr. Silverman's cases. Intramural infection in bacillary dysentery follows the general distribution of the submucosal and muscular lymphatics of the bowel wall much the same as in tuberculosis or carcinoma. Perforation of an intramural abscess, however, is rare since a well defined zone of productive inflammation or fibrosis is formed on the serosal surface. This serves to wall off the area involved and, although signs of local peritoneal irritation may occur, frank perforation is the exception rather than the rule.

The Value of Peritoneoscopy in Gastro-Enterology*

A Review of 100 Cases

By

EDWARD B. BENEDICT, M.D.

BOSTON, MASSACHUSETTS

EXAMINATION of the abdomen and pelvis by endoscopy was first demonstrated by Kelling (1) in 1901. He tried the procedure in dogs, and many years later practised it in human beings. In the meantime Jacobaeus (2), about 1910, published several papers on thoracoscopy and laparoscopy, concluding that the latter method was useful in cirrhosis, syphilis, metastatic tumors and tuberculous peritonitis. The recent revival of interest in the subject has been due largely to the work of Ruddock (3) who in 1937 reported 500 cases examined by peritoneoscopy. Other recent contributors to the subject include Anderson (4), Benedict (5), Findlay (6), Hope (7), Horan (8) and Thieme (9). Meigs (10, 11) believes the procedure is valuable in gynecology and Allen (12) has stressed its importance in abdominal surgery.

For a detailed description of the peritoneoscope, technic of introduction, indications and contraindications the reader is referred to earlier articles (3, 5), but it should be mentioned here that the procedure is easily carried out under local anesthesia through a 1 cm. incision, and in properly selected cases is attended with very little risk. The advantages of peritoneoscopy over exploratory laparotomy are: (a) less risk and discomfort to the patient, (b) only one day's hospitalization, (c) local anesthesia and (d) stab incision. A biopsy may be obtained. Peritoneoscopy is contraindicated in serious cardiac or pulmonary disease and in intraabdominal or pelvic inflammation. Multiple adhesions constitute a relative contraindication. The indications for peritoneoscopy include obscure abdominal or pelvic disease to establish a positive diagnosis and to plan treatment. The procedure has proven of value in neoplasm, cirrhosis, tuberculous peritonitis,

*From the Massachusetts General Hospital.
Read at the Annual 1939 Session of the American Gastro-Enterological Association at Atlantic City.

ascites, pelvic tumors, ectopic pregnancy, and ovarian dysfunction.

In our series of 100 peritoneoscopies, 61 cases have been directly related to the gastro-intestinal tract, including the liver, gall bladder and pancreas. In some of the remaining cases of ascites, tuberculous peritonitis, etc., gastro-intestinal symptoms have been prominent. To the gastro-enterologist peritoneoscopy is useful in:

I. MALIGNANT DISEASE		35
1. Stomach		
a. Carcinoma	28	
b. Sarcoma	1	
c. Lymphoma	1	
2. Cecum, colon and rectum		
a. Carcinoma	5	
II. LIVER DISEASE		20
a. Cirrhosis	9	
b. Primary carcinoma	3	
c. Miscellaneous	8	
III. MISCELLANEOUS		45
a. Tuberculous peritonitis	6	
b. Gynecological	24	
c. Unclassified	15	

100

I. MALIGNANT DISEASE

Probably the most frequent and important use is in malignant disease to determine operability and to save unnecessary exploratory operations. The prognosis and treatment of cancer anywhere in the body may be materially altered by finding the liver or peritoneum full of metastases. We will consider primary malignant disease of the gastro-intestinal tract first. In neoplasm of the esophagus, for example, if the liver shows carcinomatous infiltration, any hope of resection will be abandoned, gastrostomy may be avoided and the esophageal lumen maintained by passing bougies over a previously swallowed string as a guide (13).

1. STOMACH—CARCINOMA, SARCOMA, LYMPHOMA

Much more common of course is carcinoma of the stomach, and it is in this disease that we have used the peritoneoscope more than in any other condition. Since exploratory laparotomy for carcinoma of the stomach carries with it a very high mortality, the information obtained by peritoneoscopy regarding the presence or absence of metastases in the liver and peritoneum is of great importance in advising for or against operation. A relatively small non-obstructing carcinoma of the stomach, clinically presumed to be operable, may have already metastasized to the liver, making operation for cure impossible, and palliative resection unjustifiable. On the other hand, a large palpable gastric neoplasm clinically supposed to be inoperable, may be shown by peritoneoscopy to have left the liver and anterior peritoneal cavity uninvolved. Carcinoma of the stomach has been the preliminary diagnosis in 28 cases. In 12 of these the lesion was considered operable at the time of peritoneoscopy and this was later confirmed by resection. Three cases considered operable by peritoneoscopy were not resected for various reasons. [1 patient had probable involvement of the lower esophagus by X-ray and questionable perirectal glands; 1 patient died at the time of a preliminary jejunostomy, and the third patient was

not operated upon because of a complicating coronary thrombosis]. Eight cases, however, showing no involvement of the liver or anterior peritoneum by peritoneoscopy, were found to be inoperable due to posterior fixation, invasion of the pancreas, lesser peritoneal cavity, or other adjacent structures. With increasing experience in the technic of peritoneoscopy it has been possible to note adhesions between the stomach and the liver with or without the probability of direct extension of the growth. Serosal involvement along the greater curvature has also been noted and in one case a positive biopsy was obtained from a lymph gland along the greater curvature. Positive biopsies from carcinomatous implants in the liver have proven very satisfactory. But so far at least the question of posterior fixation can only be determined by open operation. The remaining 5 cases in this group were considered inoperable by peritoneoscopy. In 3 of these a positive biopsy was obtained—twice from the liver and once from a lymph gland along the greater curvature. In the latter case a chylous ascites was also present and although the patient was almost certainly inoperable, at the family's insistence he was explored, found to be inoperable, and the peritoneoscopic findings confirmed. In the other 2 cases tiny implants were seen in the liver and peritoneum but no biopsies were obtained and the patients were not explored. In summary then of the 28 cases in this group, the information obtained at peritoneoscopy was proved to be correct in 17 cases, was almost certainly correct in 3 cases, and in the remaining 8 cases the information given was essentially correct but was insufficient to forestall exploratory laparotomy owing to extension of the disease posteriorly, or otherwise beyond the reach of the peritoneoscope.

As an example of a large gastric neoplasm found to be operable, I will cite the following case:

Case 1. J. E. (M. G. H. U. No. 172079,) a 53 year old male, American laborer, entered the hospital on February 11, 1939, complaining of epigastric pain of 14 months' duration. The pain was unassociated with and unrelieved by eating. There had been a loss of weight of 23 lbs. in 8 months. There was moderate distention and belching but no nausea or vomiting. X-ray examination of the stomach showed a large filling defect involving the proximal 2/3 of the stomach. This portion of the stomach was firm and stiff and apparently contiguous with an epigastric mass which was easily palpated. The clinical impression was that of extensive gastric malignancy. Because of fever and upper respiratory infection, peritoneoscopy was postponed until 10 days after admission at which time it was reported as follows:

"Under local anesthesia an incision 1½ cm. long was made in the midline just below the umbilicus, the peritoneal cavity inflated with air, and the Ruddock peritoneoscope introduced. The liver showed no evidence of metastatic disease anywhere throughout either right or left lobe. The edge appeared sharp and normal. Linear striations were rather marked, and near the edge the anterior surface was slightly greyish. The peritoneoscope was introduced between the liver and the stomach, and showed no evidence of adhesions between the stomach and the liver as far as could be determined. No evidence of serosal involvement of the stomach was demonstrable. There was no free fluid. There was no evidence of metastatic disease in the omentum or peritoneal cavity. The intestines were well collapsed, presumably aided by the enema and pitressin. Conclusions: Negative peritoneoscopy. Advise surgical exploration."

Three days later the patient was operated upon and no metastases found anywhere in the liver, peritoneum or pelvis. Subtotal gastrectomy was performed. Unfortunately, bronchopneumonia and cerebral thrombosis developed postoperatively and the patient died. The pathological report from the resected specimen was polypoid adenocarcinoma—lymph nodes negative.

COMMENT

In this case we had a history of long duration, no obstruction, and a palpable mass with a clinical impression of "extensive gastric malignancy." Such a patient might well have been considered clinically inoperable, yet peritoneoscopy showed no metastases, and the growth was resected without difficulty.

In the following case peritoneoscopy was useful in establishing a positive diagnosis of inoperable gastric carcinoma.

Case 2. F. S. T. (Baker Memorial Hospital U. No. 127931), Male, 57, two years before entry noticed loss of appetite, indigestion and abdominal pain. Physical examination on admission revealed a palpable mass in the epigastrium and liver edge 4 cm. below costal margin, probably nodular. X-ray examination on two occasions, (5/12/38 and 5/14/38) was unsatisfactory due to retained secretion and food—"the nature of the obstructing lesion in the region of the pylorus cannot be definitely demonstrated but seems highly suggestive of ulcer." Gastroscopy performed on May 16, 1938, showed on the lesser curvature near the pylorus an ulceration about 5 x 3 cm. with ragged nodular proliferating margins and a dirty gray base. The gastroscopic diagnosis was carcinoma. At times the patient was slightly obstructed and operation was considered. The surgical consultant, however, advised against operation. Before refusing to give this patient the possible benefit of a resection or palliative operation, it was thought advisable to make certain by peritoneoscopy regarding the question of liver or peritoneal metastases. Accordingly, peritoneoscopy was performed on May 23, 1938, and showed the liver throughout to be "studded with yellowish nodules varying in size from 3 or 4 mm. to 2 or 3 cm. in diameter, and having the characteristic appearance of carcinoma. The anterior serosal wall of the stomach appeared normal, there being no evidence of neoplasm. There was no evidence of metastatic disease in the peritoneum of the upper abdomen and none could be seen in the omentum so far as was examined. An anterior gastro-enterostomy would appear to be possible. A biopsy was taken from one of the larger lesions on the anterior surface of the liver. There was very little bleeding." Before the biopsy report was obtained, X-ray treatment was given on the basis that the lesion might be lymphoma. There was a rather remarkable clinical improvement for a short time. The biopsy, however, was reported metastatic carcinoma.

COMMENT

Although the clinical impression in this case was that of inoperable carcinoma of the stomach, peritoneoscopy with biopsy established a positive diagnosis of metastatic carcinoma of the liver. This was particularly important in this case in view of the good response to X-ray therapy which raised the question of lymphoma as a diagnosis. The importance of gastroscopy (14, 15) in this case should also be emphasized.

In the following case of sarcoma of the stomach, peritoneoscopy gave important information.

Case 3. H. G. F. (Baker Memorial Hospital U. No. 31604), Male, 46.

1/14/35. Partial gastrectomy for sarcoma of the stomach.

1/31/38. The patient reentered because of a large mass apparently connected with the liver noted four months ago. X-rays taken then showed displacement of the stomach to the left by this mass. A prolonged course of X-ray therapy was followed by relief of symptoms and the mass at time of entry appeared to be questionably smaller, freely movable and probably not connected with the liver. Peritoneoscopy showed the liver and liver edge apparently free of malignant disease and probably separate from the tumor mass. There was no evidence of metastatic disease throughout the peritoneum. A week later palliative resection of the recurrent (spindle cell) sarcoma was performed.

COMMENT

Peritoneoscopy in this case demonstrated that a recurrent sarcomatous mass did not involve the liver and was probably resectable. Laparotomy confirmed these observations, and the recurrent mass was removed.

Gastric lymphoma was the probable diagnosis in the following case:

Case 4. W. K. (M. G. H. U. No. 86095), Male, 66, entered the hospital on October 30, 1937, complaining of anorexia, swelling of abdomen and progressive weakness of three months' duration. Physical examination—marked ascites. X-ray examination of the stomach showed a diffuse process involving the upper two-thirds, probably infiltrating type of tumor. A very marked inflammatory swelling of the mucosa could not be definitely excluded, but was felt to be much less likely.

Gastroscopy did not suggest carcinoma but favored an inflammatory process or lymphoma. Peritoneoscopy was reported as follows: "Under local anesthesia an incision about 2 cm. long was made in the midline just below the umbilicus. Abdomen inflated with air and Ruddock peritoneoscope introduced in the usual manner. The liver appeared entirely normal. Surface smooth, edge sharp, color brown. The gall bladder appeared a deep purplish-blue and very vascular. The upper part of the stomach could not be seen as the liver was overlying it. Along the lesser curvature there was marked engorgement of the vessels, but the serosa appeared normal. The anterior wall of the stomach appeared normal. The omental vessels throughout were markedly engorged. Loops of bowel appeared normal. Peritoneal surface of anterior abdominal wall appeared normal, diaphragm normal. There was no evidence of metastatic malignancy anywhere in the liver or peritoneum. There was a considerable amount of slightly cloudy, grayish fluid in the dependent portion, 530 cc. of which was removed. The incision was left open to facilitate drainage of the ascitic fluid. The findings can probably be all explained on the basis of lymphoma. A general abdominal carcinomatosis and cirrhosis of the liver have been ruled out." Definite improvement followed X-ray treatment. Repeated paracentesis was necessary, the last one before death (5/20/38) yielding six quarts of white cloudy fluid.

COMMENT

This case essentially was one of unexplained chylous ascites, in which peritoneoscopy excluded carcinomatosis and cirrhosis and made the diagnosis of lymphoma most probable.

b. CARCINOMA OF CECUM, COLON AND RECTUM

In carcinoma of the large bowel peritoneoscopy is less frequently indicated because colostomy for relief of obstruction is so often imperative, and at the time of colostomy the abdomen can be explored. We have, however, performed peritoneoscopy in one case of carcinoma of the cecum, one case of carcinoma of the

colon and three cases of carcinoma of the rectum. In the patient with carcinoma of the cecum the liver was found to contain metastatic carcinoma (positive biopsy obtained) and there was a small amount of free fluid in the abdomen. In view of these findings and the absence of obstruction laparotomy was not advised. On the theory that this patient would later become obstructed, laparotomy with ileotransverse colostomy was, however, performed and confirmed the peritoneoscopic findings. In the case of carcinoma of the colon an adenocarcinoma of the descending colon had been resected six months earlier, symptoms of subacute obstruction had appeared but the patient was able to tolerate a liquid diet. Peritoneoscopy showed carcinoma had invaded the liver and a positive biopsy was obtained. No other operation was performed. Two months later this patient died and autopsy confirmed the peritoneoscopic findings. A brief resumé of the three rectal cases follows:

Case 5. M. E. C. (M. G. H. U. No. 55769), Female, 69. Peritoneoscopy showed no involvement of the liver. A mass in the right lower quadrant was seen to be covered by fatty omentum and thought to be inflammatory. Colostomy was done later, however, and the mass was shown to be malignant.

Case 6. A. C. (M. G. H. U. No. 79155), Female, 40. Peritoneoscopy showed "liver surface to be granular throughout but no nodules suggestive of carcinoma were seen on the surface. On the right anterolateral border of the right lobe, however, there appeared to be a slight swelling which could represent metastatic disease inside the liver." As the patient was showing obstructive symptoms a colostomy was done, at which time palpation of the liver revealed metastases.

Case 7. W. L. (M. G. H. U. No. 18665), Male, 65. 2/10/37. Colostomy and posterior excision of the rectum for carcinoma.

9/3/38. Patient reentered with a story of 2½ weeks of painless jaundice. The presumptive diagnosis was metastatic carcinoma of liver. Peritoneoscopy was indicated to either confirm this diagnosis and show the extent of the disease or to demonstrate absence of metastatic disease. Peritoneoscopy was done on September 9, 1938, and showed no evidence of metastatic disease in the liver or anywhere in the peritoneum. The gall bladder could not be seen. Operation was undertaken on September 20, 1938, the gall bladder was found to be small and contained several stones. There was one large stone which protruded through the dilated cystic duct into the common duct. On removing this there was a free flow of bile. No evidence of metastatic malignancy was found. At a later operation, October 26, 1938, the common duct was explored and a common duct stone crushed. Following these operations the patient made an uneventful convalescence and was doing well three months later.

SUMMARY

In summary of these five cases of carcinoma of the large bowel, it may be said that peritoneoscopy was of no value in two cases (rectal cases 5 and 6). In the case of carcinoma of the cecum with metastases to the liver there was little to be gained by peritoneoscopy since ileotransverse colostomy was performed anyway. It is debatable, however, whether with dietary measures ileotransverse colostomy might not have been avoided under such terminal conditions. In the case of carcinoma of the descending colon peritoneoscopy established a positive diagnosis of metastatic disease in the liver. In the final case of carcinoma of the rectum peritoneoscopy gave definitely helpful

information by showing the liver and peritoneum to be free of metastatic disease.

II. LIVER DISEASE

a. Cirrhosis

Peritoneoscopy has been performed here in nine cases involving a differential diagnosis of cirrhosis of the liver, neoplasm, lymphoblastoma, tuberculous peritonitis and unexplained ascites. In seven of these the peritoneoscopic finding of a coarsely granular or hobnailed liver was considered sufficient evidence to make a positive diagnosis of cirrhosis. Ascitic fluid was present in two of these. Biopsy was unsuccessful in one, showing only fibrosis, probably from a very thick liver capsule. In the eighth case the differential diagnosis lay between cirrhosis of the liver and neoplasm; peritoneoscopy here revealed a hobnailed appearance and a positive biopsy showing cirrhosis was obtained. In the ninth case the same differential diagnosis arose between cirrhosis and neoplasm, but peritoneoscopy revealed a normal liver and although subsequent laparotomy with choledochostomy was reported as showing biliary cirrhosis, the pathological report of a biopsy from the liver showed only slight obstructive cirrhosis.

The following case reports suggest the value of peritoneoscopy in the differential diagnosis of cirrhosis of the liver and malignant disease.

Case 8. B. F. N. (Baker Memorial Hospital U. No. 87002), Male, 71, entered the hospital November 3, 1938, complaining of anorexia, constipation, gaseous indigestion and cramp-like pain of two months' duration. One week before admission he became distended, obstipated and nauseated at the sight of food. Physical examination showed a tremendously distended abdomen with shifting dullness in both flanks. Paracentesis yielded three quarts of milky fluid after which the liver edge could easily be felt 5 cm. below the costal margin. A mass was also palpable in the epigastrium which was thought to be either the left lobe of the liver or gastric tumor. Two months prior to admission, X-ray examination of the stomach showed a large ulcerating lesion on the lesser curvature with a filling defect in this region. Malignancy could not be excluded. Gastroscopic examination at that time was unsatisfactory, but, as far as could be determined, there was no evidence of carcinoma. Neither X-ray nor gastroscopic examinations were wholly satisfactory because of the patient's very large size.

Another complicating factor in this case was a mild diabetes mellitus with a blood sugar of 143 mgm. %. This was controlled by protamine insulin units 20 daily. Operation for possible malignancy of the stomach was out of the question. Peritoneoscopy performed on November 8, 1938, showed the liver to be small with nodular, granular markings, suggestive of cirrhosis. 14 oz. of chylous fluid was removed. There was no evidence of malignant disease. After general medical care, he was discharged home on November 26, with a diagnosis of cirrhosis of the liver, diabetes, and question of cancer of the stomach. Five days later his local physician reported that he died at home of hemorrhage.

COMMENT

In this patient peritoneoscopy definitely established a diagnosis of cirrhosis of the liver and showed no evidence of metastatic carcinoma.

In the following case the differential diagnosis also lay between cirrhosis of the liver and malignant disease.

Case 9. L. N. (Baker Memorial Hospital U. No. 173770), Male, 53, entered the hospital on January 23, 1939, com-

plaining of swelling of the abdomen and obesity. He had always been over-weight and his intake of food and alcohol had been excessive for many years. Three years before entry he was put on a reducing diet and his weight came down to 200 lbs. Three months before entry his abdomen was swollen. He noted edema of the legs and orthopnea, requiring three pillows. There had been no jaundice. The clinical impression was alcoholic cirrhosis of the liver. The question of cancer superimposed on cirrhosis was raised and peritoneoscopy was therefore performed on January 27. Two and one-half pints of slightly reddish-brown fluid were aspirated. The peritoneal cavity appeared normal throughout except for an excessive amount of fat in the omentum and mesentery and an abnormal liver. The liver was definitely hobnailed throughout. Two satisfactory biopsies were taken from the anterior surface of the left lobe and the wound coagulated with diathermy. The pathological report was cirrhosis of the liver.

COMMENT

Peritoneoscopy in this case was helpful in establishing a positive diagnosis of cirrhosis of the liver by biopsy. A superimposed carcinoma was excluded.

Case 10. B. P. S. (Baker Memorial Hospital U. No. 128598), Male, 69, entered the hospital on May 16, 1938, complaining of abdominal cramps and diarrhea of two months' duration. Anorexia had been noted for six months. There had been 13 lbs. weight loss and progressive weakness during the past two months. Past history—syphilis treated four years ago with further antiluetic therapy seven years ago. Arteriosclerotic heart disease with auricular fibrillation of twelve years' duration controlled by digitalis—bronchopneumonia four years ago. Physical examination showed an enlarged heart, irregular heart sounds of fair quality but distant and soft blowing systolic murmur over the precordium, heard loudest at the apex. Abdomen showed definite tenderness with a suggestion of a mass in the region of the cecum. The liver edge was palpable about 2 cm. below the costal margin and was questionably nodular. Laboratory findings: Hinton—positive; Wasserman—strongly positive; van den Bergh—too low to read. Gastro-intestinal X-ray: The esophagus, stomach and duodenum showed no definite evidence of intrinsic disease. The usual pressure defect of the spine across the stomach appeared to be considerably larger than usual, suggesting an epigastric mass in the region of the body of the pancreas or left lobe of the liver. X-ray diagnosis: Question of carcinoma of the body of the pancreas. Peritoneoscopy, May 20, 1938. The liver appeared markedly granular throughout with some areas presenting a round hillocky appearance. The edge of the liver was rounded—both the right and left lobes were seen on the anterior and superior surfaces up to the diaphragm. There was no evidence of metastatic tumor anywhere in the liver. The patient was discharged on May 24 with a diagnosis of cirrhosis of the liver. Malignancy was still suspected but could not be found. The subsequent course of this patient has indicated that we are apparently not dealing with malignant disease, for although he has not done well, he is still up and about and no malignancy has been demonstrable during the past year.

COMMENT

Peritoneoscopy in this case was helpful in making a diagnosis of cirrhosis of the liver and excluding so far as possible a diagnosis of carcinoma.

Regarding peritoneoscopy in cirrhosis of the liver it may therefore be said that although the diagnosis of cirrhosis is often made clinically with reasonable certainty there are cases where the diagnosis is doubtful or well-nigh impossible. It is in such cases that peritoneoscopy has been of definite value in establishing a positive diagnosis.

b. LIVER — PRIMARY CARCINOMA

Three cases in this series have fallen into this group because clinically the question of primary carcinoma of the liver was seriously considered. In the first case the clinical diagnosis lay between liver abscess and malignancy. Peritoneoscopy showed a large liver but no abscess or neoplasm was demonstrable. At subsequent laparotomy, after much dissection there was demonstrated a bulging of the under surface of the liver which was thought to be due to abscess. This area was marsupialized and at a secondary operation was shown to be carcinomatous, probably primary. No wonder this could not be demonstrated by peritoneoscopy! In the second case peritoneoscopy disproved a clinical diagnosis of primary carcinoma of the liver, showing only hypertrophy of an otherwise apparently normal liver. This was subsequently confirmed by exploratory laparotomy, which revealed a normal liver and a retroperitoneal cortical cell adenoma of the adrenal. In the third case a clinical diagnosis of primary carcinoma of the liver was made. At peritoneoscopy "the liver throughout was studded with yellow nodular masses varying in size from $\frac{1}{2}$ to 3 or 4 cm. in diameter, many of them coalescing and having the typical appearance of carcinoma. From the peritoneoscopic appearance, it is like most of the metastatic carcinoma which I have seen, but as no primary source has been found it may be primary carcinoma of the liver. A large satisfactory biopsy was taken from the anterior surface of the left lobe." The biopsy report was adenocarcinoma.

In these three cases therefore peritoneoscopy was of no help in the first (a difficult case to diagnose even at exploration), gave correct and helpful information in the second, and gave a positive diagnosis (with biopsy) in the third.

c. LIVER — MISCELLANEOUS

In this group eight cases are listed as follows:

Case 11. J. DeC. (M. G. H. U. No. 129901), Male, 44. Clinically a right upper quadrant mass was palpable, but no positive diagnosis was possible. At peritoneoscopy "the anterior surface of both lobes of the liver appeared entirely normal and the liver edge appeared normal, except from the right lobe there was projecting a bluish-gray cystic appearing mass about the size of a lemon, covered superficially with several blood vessels and very smooth and glistening. This mass was continuous with the edge of the liver. On the lower part of it was a pearly-gray slightly elevated nodule about 2 cm. in diameter, which could represent neoplasm, but which may be simply a fibrous thickening of the wall. The whole mass could be a very much distended gall bladder, though it is somewhat to the right of the usual location. It could also be cystic disease of the liver. It extends about 8 to 10 cm. below the costal margin. The stomach and intestinal tract and peritoneum appeared normal.

Conclusions: The mass is probably cystic, ? of distended gall bladder, ? of cyst of liver. Suggest Graham test and ? of exploration. This patient was later operated upon, and the mass proved to be a cystic gall bladder, which was removed.

Case 12. L. M. D. (Baker Memorial Hospital U. No. 88897), Female, 60. This patient had had one eye enucleated for melanotic sarcoma and entered the hospital with a large liver. The clinical diagnosis was metastatic melanotic sarcoma of the liver. This was confirmed by peritoneoscopy (positive biopsy).

Case 13. M. H. (M. H. G. U. No. 350948), Female, 60. A diagnosis of polycystic liver and kidneys had been made

by operation at a previous admission several years previously. The diagnosis of polycystic liver at this admission was confirmed by peritoneoscopy.

Case 14. C. J. (M. G. H. U. No. 159996), Male, 59. In this case the differential diagnosis was between malignant disease and catarrhal jaundice. Peritoneoscopy showed no evidence of malignant disease in the liver, gall bladder, or peritoneum.

Case 15. M. E. K. (Baker Memorial Hospital U. No. 181460), Female, 35. This patient had had her breast removed for carcinoma several years prior to admission. On entry she showed an enlarged liver with ascites. The presumptive clinical diagnosis was metastatic carcinoma of the liver, but cirrhosis was also considered possible. Peritoneoscopy revealed a liver which looked cirrhotic, but the biopsy was reported as carcinoma. She ran a rapidly downhill course and died within a month.

Case 16. N. McI. (M. G. H. U. No. 330594), Male, 60. In this deeply jaundiced patient a clinical diagnosis of carcinoma of the gall bladder was suggested. Peritoneoscopy showed the liver to be studded with elevated nodules, having the appearance of carcinoma. Autopsy confirmed this diagnosis and showed the primary source to have been bronchogenic carcinoma (clinically wholly unsuspected!). This case is of particular interest as it was the first one ever performed at the Massachusetts General Hospital (January 10, 1936) and was done with a thorascopy.

Case 17. L. S. (M. G. H. U. No. 353058), Male, 66. In this Italian-born patient the question of echinococcus cyst was raised, but peritoneoscopy revealed a normal liver.

Case 18. I. K. (Baker Memorial Hospital U. No. 43671), Male, 62. This patient's sole complaint was anorexia of one month's duration, and slight soreness in the left upper quadrant. Physical examination showed a large smooth upper abdominal mass, larger on the left. X-ray study: Gastro-intestinal series negative, barium enema negative. Chest plate revealed a circumscribed circular mass 5 cm. in diameter at the apex of the left lower lobe consistent with a solitary metastasis from a hypernephroma or with primary bronchogenic carcinoma. In view of the complete absence of pulmonary symptoms and an X-ray which suggested enlargement of the left kidney, cystoscopy and pyelogram were done which revealed no evidence of renal pathology. At peritoneoscopy the liver was found studded with umbilicated nodules, biopsy of one of which was reported adenocarcinoma.

In this group peritoneoscopy gave correct information in all eight cases, sometimes confirming a probable diagnosis, sometimes helping toward a correct diagnosis by exclusion, and at other times (as in Case 11) leading directly to the final diagnosis.

III. MISCELLANEOUS

It is difficult to group peritoneoscopy cases according to any set classification. Since this report is concerned primarily with gastro-intestinal disease, an attempt has been made to conform to a classification related to gastro-enterology. There are, however, many patients presenting gastro-intestinal symptoms who have no primary disease of the gastro-intestinal tract. For this reason it is important for the gastro-enterologist to recognize the value of peritoneoscopy in such cases as tuberculous peritonitis and pelvic tumors.

a. TUBERCULOUS PERITONITIS

The six cases in this group are of particular interest to the gastro-enterologist for all of them presented some gastro-intestinal symptoms including abdominal pain, anorexia, nausea, vomiting, sour eructations,

diarrhea and loss of weight. In two cases where the clinical impression was tuberculous peritonitis peritoneoscopy showed no evidence of it. Further study in one of these revealed a probable regional ileitis by X-ray, but in the other case the clinicians clung to a diagnosis of mesenteric gland tuberculosis, which could not be excluded by peritoneoscopy. A brief summary of the other four cases follows:

Case 19. D. D. (M. G. H. U. No. 352111), Female, 30.

History: Four months of slight progressive increase in size of abdomen. Recent abdominal pain, diarrhea, nausea and vomiting.

Physical examination showed a distended abdomen with shifting dullness.

Clinical impression was tuberculous peritonitis, but the question of cirrhosis of the liver was raised.

Peritoneoscopy showed the anterior abdominal wall, large and small bowel, round ligament of the liver, broad ligament of the uterus everywhere studded with fine tubercles. One gallon, 22 oz. of straw-colored fluid was removed and replaced with air.

Final diagnosis: Tuberculous peritonitis. Pulmonary tuberculosis.

Case 20. G. H. (M. G. H. U. No. 88618), Male, 23.

History: Three months swelling of abdomen, loss of weight, sour eructations, lassitude and night sweats.

Physical examination showed a full abdomen looking ascitic but without positive physical evidence; slight splenomegaly.

Clinical impression: ? tuberculous peritonitis, ? lymphoma.

Peritoneoscopy: Abdomen completely filled with filmy adhesions some of which showed multiple pinpoint whitish-yellow tubercles on them.

Final diagnosis: Tuberculous peritonitis. Inactive pulmonary tuberculosis.

Case 21. R. S. T. (M. G. H. U. No. 173952), Male, 41.

History: Two years of pain in the left flank, weakness, loss of weight and diarrhea.

Physical examination: Essentially negative.

Clinical impression: ? carcinoma of sigmoid, lymphoma, diverticulitis, tuberculosis, lymphogranuloma inguinale.

Peritoneoscopy showed multiple punctate lesions 1-2 mm. in diameter on the surface of various loops of small bowel. These were consistent with tuberculous peritonitis.

Final diagnosis: Tuberculous peritonitis; pulmonary tuberculosis; ? tuberculosis of cecum.

Case 22. B. P. (M. G. H. U. No. 166987), Female, 18.

History: Three months generalized abdominal pain with chills, fever, vomiting, diarrhea, and swelling of abdomen.

Physical examination showed shifting dullness and a fluid wave.

Clinical impression: Tuberculous peritonitis.

Peritoneoscopy: Numerous fine translucent elevations typical of tuberculous peritonitis. Biopsy showed tuberculosis.

In summary of these six cases peritoneoscopy excluded a diagnosis of generalized tuberculous peritonitis in two, and confirmed or established with certainty a diagnosis of tuberculous peritonitis in four, with positive biopsy in one. In one case air was purposely left in the peritoneal cavity, hoping it would be beneficial in treatment.

b. GYNECOLOGICAL

Many cases that eventually turn out to be gynecological may present gastro-intestinal symptoms. In a discussion of this sort, therefore, such a possibility must not be overlooked and the value of peritoneoscopy in differential diagnosis should be mentioned. We have

done peritoneoscopy in twenty-one cases involving a diagnosis of pelvic tumor or ovarian dysfunction. A general review of these is beyond the scope of this paper, but the following case will serve as an example:

Case 23. M. E. B. (M. G. H. U. No. 355031), Female, 68.

History: Four months increase in size of abdomen with vomiting, constipation and loss of weight. Two months ago noted a hard painless lump in right abdomen.

Physical examination showed a distended abdomen with fluid wave and a large firm fixed mass which appeared to fill the whole lower abdomen. By rectum nodules were felt in the pouch of Douglas.

Clinical impression: Carcinomatosis arising from the ovaries.

Paracentesis—2 quarts of greenish-yellow fluid. No tumor cells seen on pathological examination.

Peritoneoscopy: The entire lower abdomen was occupied by a large, smooth, pearly-gray mass from which a biopsy was obtained. The anterior peritoneum appeared to contain metastatic nodules.

Pathological report: Metastatic carcinoma.

Treatment: X-ray therapy.

Final diagnosis: Ovarian carcinomatosis.

DISCUSSION

Peritoneoscopy has been done on 100 patients. One fatality, previously reported (5), occurring in the 11th case done, was due to an error in judgment in subjecting a patient in the terminal stages of multiple lung abscess, coronary disease and possible echinococcus cyst of the liver, to the stress and strain of sedative drugs and peritoneoscopy. Subcutaneous emphysema was produced in a few of the earlier cases, but otherwise there have been no complications. The procedure is therefore safe in properly selected cases. In order to acquire judgment in its use and skill in manipulation of the instrument peritoneoscopy should be concentrated in the hands of a few physicians or surgeons. One would think from a surgeon's knowledge of abdominal and pelvic pathology, and operative technic, that the procedure should be done by one trained in surgery. Ruddock, however, is a physician. He has been responsible for the recent revival of interest in this method and has had notable success with it. The procedure requires much patience and forbearance, and there are occasions when the operator will be exasperated at being so near an organ and yet unable to see it as well as he would like to, or to grasp it in his hand. Some surgeons, therefore, would probably be temperamentally unsuited to using the peritoneoscope. In general, however, some training in abdominal and pelvic surgery is most desirable.

From a review of the cases presented above one cannot escape the conclusion that peritoneoscopy is a valuable procedure. It will replace exploratory laparotomy in certain cases, but its limitations must be recognized. It is difficult and often impossible to see the posterior peritoneum or deep in the pelvis. On the other hand, the liver and anterior peritoneum are beautifully visualized. The pelvic organs are often very well seen, but the ovaries may lie posteriorly and be difficult or impossible to examine. The results have been most striking in malignant disease. Carcinoma of the stomach, without obstruction and of questionable operability, offers a definite indication for peritoneoscopy. In this regard Thieme (9) believes "it should be used routinely in carcinoma of the stomach to avert operation in the inoperable cases." In carci-

noma of the colon and rectum peritoneoscopy is less frequently indicated because colostomy may be urgent. When, however, there is no obstruction peritoneoscopy is indicated to determine liver or peritoneal metastases and to delay or avert colostomy if the disease is incurable. In diseases of the liver peritoneoscopy has been useful in confirming or establishing a diagnosis of cirrhosis, in differentiating cirrhosis from primary or secondary malignancy, in the study of unexplained jaundice, ascites, polycystic liver and echinococcus cyst. Of interest also to the gastro-enterologist is its use in tuberculous peritonitis where the peritoneoscopic findings are highly accurate. Its usefulness in pelvic pathology is also unquestionable, and here again such cases may present many gastro-intestinal symptoms, baffling sometimes even to the well trained internist. Though its limitations must always be borne in mind, peritoneoscopy will not infrequently lead to a positive diagnosis.

CONCLUSIONS

Peritoneoscopy is a safe, simple, and highly reliable diagnostic method. Errors in diagnosis have been very rare.

Peritoneoscopy will confirm or refute various doubtful clinical diagnoses. Positive diagnosis by biopsy is often possible.

Peritoneoscopy will avert exploratory laparotomy in certain cases.

REFERENCES

1. Kelling, G.: Ueber Oesophagoskopie, Gastroskopie und KÖlioskopie. *München. med. Wchnschr.*, 49:21-24, 1902.
2. Jacobaeus, H. C.: Ueber die Möglichkeit die Zystoskopie bei Untersuchung seröser Höhlungen anzuwenden. *München. med. Wchnschr.*, 57:2090-2092, 1910. Kurze Uebersicht über meine Erfahrungen mit der Laparo-thorakoskopie. *Ibid.*, 58:2017-2019, 1911. Ueber Laparo-und Thorakoskopie. *Beitr. z. Klin. d. Tuberk.*, 25:183-354, 1912. Om laparo-och thorakoskopi. *Hygiea*, Stockholm, 74:1070-1091, 1912. Sur la laparoscopie et la thoracoscopie. *J. méd. franc.*, 7:290-298, 1913. The Use of Laparothoracoscopy from a Practical Point of View. *Tr. Internat. Cong. Med.*, Sect. 6, Pt. 2, pp. 565-599, 1914. Können durch die Laparoskopie Indikationen zu chirurgischen Eingriffen gewonnen werden? *Nord. Med. Ark.*, 14:1-16, 1914.
3. Ruddock, J. C.: Peritoneoscopy. *S. G. O.*, 65:623-639, 1937.
4. Anderson, E. T.: Peritoneoscopy. *Am. J. Surg.*, 35:136-139, 1937.
5. Benedict, Edward B.: Peritoneoscopy. *N. E. J. of Med.*, 218:713-719, April 28, 1938.
6. Findlay, H. Verrill: Peritoneoscopy by the Urologist. *The Urologic and Cutaneous Review*, 42, No. 3, 1938.
7. Hope, R. B.: The Differential Diagnosis of Ectopic Gestation by Peritoneoscopy. *S. G. O.*, 64:229-234, 1937.
8. Horan, Thomas N.: The Use of the Laparoscope. *J. of the Mich. State Med. Society*, Sept., 1937.
9. Thieme, E. T.: A Critical Survey of Peritoneoscopy. *Surgery*, 5:191, Feb., 1939.
10. Meigs, Joe V.: Report on Medical Progress. *N. E. J. of Med.*, 220:242-250, Feb. 9, 1939.
11. Idem: Cancer of the Ovary. *N. E. J. of Med.*, 220:545-553, March 30, 1939.
12. Allen, Arthur W.: Report on Medical Progress. *N. E. J. of Med.*, 220:290-296, Feb. 16, 1939.
13. Vinson, P. P.: The Treatment of Carcinoma of the Esophagus. *S. G. O.*, 62:840, May, 1936.

DISCUSSION

DR. JOHN L. KANTOR (New York City): This method, I think, has a future. It is a safe method, and in the few cases we have followed, patients can go about their business the next day, eat their meals the same night.

Differential diagnoses may be made, not so much in straight gastro-enterological cases, as in borderline cases. The diagnosis of cirrhosis in the preascitic stage is now one of the possibilities by this method.

Biopsies are being taken and give much information. Biopsy is usually taken from the liver or from metastatic implants on the parietal layer of the peritoneum. It is not so safe to take the specimen from the hollow viscera themselves. The biopsy is a little painful but not terribly distressing.

As far as the organization of this type of procedure is concerned, in my own hospitals we are trying to get a sort of team control and are grouping together all the endo-

scopic procedures—i.e. gastroscopy, peritoneoscopy, as well as proctoscopy—because we think they have a combined future.

DR. J. RUSSELL VERBRYCKE (Washington, D. C.): I congratulate Dr. Benedict on his mastery of this new procedure.

I think I had the first instrument released by Ruddock, and I am still trying to perfect myself in its technic. Every form of endoscopy, of course, has three steps: (1) the introduction of the instrument; (2) the visualization; and (3) the interpretation. The first is easy, the introduction, but certainly with peritoneoscopy in my hands, the visualization is not quite so easy; but, most of all, I have had difficulty with the interpretation. Things look so very different inside of the abdomen.

As I do more of this, I have mixed feelings, first a feeling of enthusiasm as to the wonderful possibilities of the method, and then one of intense humility with myself that I can't interpret better what I do see.

I have not yet reached the point where I am willing to put my work up with an absolute hundred per cent "yes" or "no."

I have brought just two slides I should like to show.

(Slide) These are some things I have been able to see; the upper left-hand corner, carcinoma of the liver, metastases, and one thing to be emphasized is that a good landmark to start from is shown here, the round ligament of the liver, which always shows very plainly. The second one was a very interesting case of definite cirrhosis throughout the liver, but there were those two larger nodules which several of us have interpreted as being most suspicious of carcinoma. We did not get a biopsy in this case because the electrocoagulation machine was not available at the time and it is dangerous without that.

The next demonstrates the way adhesions show as a sort of stalactite-stalagmite appearance and, of course, they are easy to determine and then the last picture shows what I take to be the easiest part of the abdominal cavity to see, the pelvis, when it is not complicated by too many adhesions.

(Slide) This is a variation of the one shown by Dr. Benedict. I have put in a couple more advantages than he and Dr. Ruddock have mentioned, and one disadvantage.

With an exploratory we have a limited view and no ordinary incision gives complete visualization of the abdomen, whereas we have a wide view of the entire abdomen through the peritoneoscope.

On the other hand with an exploratory we have the benefit of deep palpation which in peritoneoscopy the deep structures are not seen satisfactorily unless they push up through the mass of omentum and cores of bowel.

DR. RUDOLF SCHINDLER (Chicago): I also want to congratulate Dr. Benedict for giving us this excellent paper. I have two questions I want to ask.

I tried peritoneoscopy in 1922 and I gave it up for two reasons, the first not very important. My patients experienced quite some discomfort through the pneumoperitoneum, sometimes so disagreeable that I thought it was too much for a simple diagnostic procedure. I wonder how you avoid this type of discomfort.

The second question seems to me more important. I knew at that time, as a pathologist, that there often are diffuse adhesions of the peritoneal cavity and I knew from my experience with the cadaver, that I could not avoid with certainty puncturing the small intestines in such cases. Now I realize that it is not at all dangerous to get a puncture or a fistula of the intestine, but it is very disagreeable. I wonder how one can diagnose such diffuse adhesions before going in with the needle, and how to avoid such a fistula.

DR. EDWARD B. BENEDICT (Boston): In answer to Dr. Schindler, I must say that with thorough sedation we have had very little discomfort from the pneumoperitoneum. If there have been previous laparotomies, I am always careful to go through in another locality in the abdomen, and have had relatively little trouble from adhesions and no perforation of the bowel.

Now I should like to show the picture.

. . . Showing of motion picture "The Technique of Peritoneoscopy." . . .

A Discussion of the Procedures Which Are Helpful in Diagnosing Lesions of the Esophagus

By

HAROLD E. WRIGHT, M.D.*

BALTIMORE, MARYLAND

OBVIOUSLY the progress of any science is dependent not only upon the ingenuity of its practitioners, but also inevitably upon developments in other fields. This has been, and still is the rule in the medical sciences. The fervid desire for truth and exactness prompted our early medical practitioners first to inspect and palpate the various organs of the patient, to percuss and finally to listen to certain vital processes.

Orificial examinations, however, were limited to palpation until there was sufficient development in the electrical world to permit of the development of endoscopy, and this, together with the discovery of X-rays has added more to our knowledge of the dis-

eases of such an inaccessible organ as the human esophagus, than have any other contributions.

Endoscopes developed for the purpose of esophagoscopy have, to the best of my knowledge, been rigid metal tubes of varying lengths. Some are telescopic and consist of two rigid barrels, one sliding through the other, and fitted with proximal lights. Others are single rigid tubes and derive their lighting facilities from a long light carrier fitted with the tiny "wheat seed" bulbs. One of the earlier types of single-tube instruments was provided with an obturator and designed to be passed through laryngeal speculum. The later forms of this instrument are made with the so-called slanting or "whistle tip" and are designed to be passed under direct vision without the aid of speculum or obturator. A suction tube is an integral part of the one-piece instruments while the telescopic types

*Gastro-Intestinal Department, Johns Hopkins Hospital, Baltimore, Md. Read at the Annual 1939 Session of the American Gastro-Enterological Association at Atlantic City.