

ACUTE, SPONTANEOUS PERFORATION OF THE BILIARY SYSTEM INTO THE FREE PERITONEAL CAVITY.*

A REPORT OF SIX CASES FROM THE PRESBYTERIAN HOSPITAL OF NEW YORK AND 108 CASES FROM THE LITERATURE.

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HAVING personally had two cases of perforation of the gall-bladder into the free peritoneal cavity, my attention was called to the subject and I have gone over all the histories of operations on the biliary system in the Presbyterian Hospital for the past fifteen years. There were 365 such operations, with six cases in which the bile had extravasated through a perforation in the biliary system into the more or less free peritoneal cavity. Such perforations are rare, and not many of these cases occur in the experience of any one man. One is, however, likely to meet with such a case at any time, and one should not be taken off one's guard when confronted with such a condition.

It has seemed to me that something might be learned from going over the recorded cases in the literature. I have been able to collect 108 cases of perforation into the free peritoneal cavity and a table of them appears at the end of this article. The six cases which occurred in the Presbyterian Hospital are as follows. But two of these six died.

CASE I.—Chinaman, thirty-eight years of age. History 13622, Sept. 25, 1911. Ambulance. History difficult to get and through an interpreter. Slight attack similar to present illness several years ago. Attacks of digestive disturbances. Onset sudden three days ago, with epigastric pain, nausea, and vomiting. Next day pain localized in right lower quadrant, radiating up

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and down. No vomiting since yesterday but pain is getting steadily worse. Bowels constipated for three days.

Examination.—Well nourished but prostrated. Leucocytes, 10,000; polymorphonuclears, 85 per cent.; pulse, 114; temperature, 101°. Abdomen full, distended generally though not extreme. Does not move with respiration in lower half and only slightly above. Whole abdomen feels resistant and walls are tense, preventing palpation freely. General muscular rigidity but most marked in right lower quadrant. General tenderness but acute only in right lower quadrant. A little above McBurney's point, where slight pressure causes pain, there is sense of a mass about the size of a large orange, exquisitely tender. Tympany everywhere except a little dullness in each flank.

Clinical Diagnosis.—High gangrenous appendicitis with spreading peritonitis.

Operation at once, Dr. McWilliams, at midnight, Sept. 25, 1911. Gas and ether. High McBurney incision made. On opening peritoneum turbid, greenish-yellow, somewhat purulent, odorless fluid escaped, being free in cavity. Appendix not located. Cæcum involved in mass of recent adhesions. On passing finger upward separated weak adhesion, following which there was a gush of great quantity of bile mixed with flocculi. Right rectus incision over gall-bladder emitting large amount of bile. Omentum adherent to liver. Separated. Great difficulty in finding gall-bladder. It was found deep in posteriorly, very small and contracted, with a perforation admitting tip of finger in cystic duct directly over a large curved calculus. Gall-bladder incised and stone removed. On account of patient's condition, nothing further done. Tube sewn into bladder and two tubes into Morrison's pouch. Closure about tubes.

Patient in poor shape after operation. Infusion 1200 c.c. salt solution with adrenalin 20 minims. Died next morning, eight hours after the operation. No autopsy.

Result of Cultures.—Smears, many pus-cells but no bacteria. Cultures. Predominating cocci in groups and a few gram negative bacilli.

We have in this case both the mechanical and infectious factors present. How much the infection had to do with the perforation it is difficult to say, but the stone had certainly

ulcerated the duct which was tightly drawn over the large stone. Had this man been operated upon on the first day of his illness, there might have been a chance for his life, but the form of infection, streptococci, is against any form of peritonitis recovering. It was also unfortunate that a diagnosis of appendicitis was made, for there was evidence of beginning adhesions about the cæcum, and had the gall-bladder been opened at the beginning the peritoneal cavity would not have been so soiled.

CASE II.—Man, aged sixty-seven years. Admitted August 20, 1911. Ambulance at 3 P.M. Operator Dr. McWilliams. Complaint, pains all over abdomen, mostly on right side. About two months ago patient had very severe attack of pain on right side just below ribs. Had to stop work for a week. Had constant attacks of nausea and vomiting. Appetite poor. Bowels constantly constipated. Pains gradually wore away. Well until yesterday when suddenly, while bending over a lathe, sudden abdominal pain, so severe that patient could not stand up and knees were drawn up while in bed. Pain was all over abdomen, but most of the tenderness below ribs and lower down on right side. Nausea was extreme and he vomited a great deal of greenish-brown fluid. Took cathartic and bowels moved well.

Examination.—Markedly prostrated, tongue heavily coated. Pulse 88, fair force, slightly irregular. Temperature 99.4°, leucocytes 24,000, polymorphonuclears 92 per cent. Abdomen held rigid, tympanitic over all, with partial obliteration of normal liver dulness. Entire right side of abdomen very rigid, board-like as one finds in stomach perforation, extending to a less degree to left rectus. Excessive tenderness just above right internal ring. Left inguinal hernia, but easily reducible. Right external ring dilated but no impulse. No peristalsis could be heard over abdomen. Some tenderness on rectal examination.

Clinical Diagnosis.—Intestinal obstruction, origin unknown.

Operation at once. Kammerer incision over appendix. Bile poured out of wound in great amount. Removed by passing Blake's irrigating tube into pelvis. Vertical right upper rectus incision. Large amount of bile escaped with particles of fibrin mixed with it, and pus. Large perforation of fundus. No stones in bladder, but finger felt a large rough one impacted in cystic

duct. Extracted with Blake's gall-stone forceps. Common duct free, but foramen of Winslow obliterated. Rubber tube sewn into opening in gall-bladder, and the edges of the bladder inverted about the tube by two purse-string sutures of plain catgut. Two rubber tubes, one containing gauze strip, into Morrison's pouch. One tube in appendix wound. Both wounds closed about tubes.

Patient made an uninterrupted recovery. Discharged Sept. 22 to his own physician, with a granulating wound discharging a small quantity of bile. Patient seen, Dec. 1, 1911. Entirely healed and perfectly well. No gastric nor intestinal disturbances.

CASE III.—Man, twenty-six years of age. Admitted Jan. 20, 1907. Operator, Dr. McCosh. Private patient. Three years ago attack of jaundice, grew deeper for a few days, and one night attack of pain for an hour in right hypochondrium. Five months ago similar attack but much severer, lasting for five days and with deep jaundice. Four months ago another attack and also three weeks ago, which last attack has not as yet subsided. Skin jaundiced, stools clay-colored. Pain now severe in right hypochondrium.

Examination.—Prostrated, deeply jaundiced. Abdomen held rigid on entire right side, most markedly so in right upper quadrant. Tenderness over whole of right side of abdomen and dulness over gall-bladder region. Temperature 101° , pulse 104, leucocytes 11,660, polymorphonuclears 80 per cent.

Operation at once. Incision over gall-bladder, which was found gangrenous and perforated at fundus, and surrounded by large amount of bile and pus. No stones found anywhere nor in common duct. Cholecystectomy. Tube into stump of gall-bladder. Uninterrupted recovery.

CASE IV.—Male, forty-nine years old. On Medical Division for nine days. While there temperature 99.5° to 102.4° . Leucocytes on admission 36,000, on day of operation 40,000. When brought in gave a history that three weeks ago, severe frontal headaches and diarrhoea. Two weeks ago began to have pain in right upper quadrant. Next day went to bed with a temperature of 102° . Chill the day before admission. No vomiting, bowels loose. Two days before admission became acutely delirious and was then brought into the hospital.

Examination.—Large mass made out occupying right side of abdomen, tender, and muscular rigidity. Dulness over it, evidently an abscess.

Operation, Dr. Brown, Sept. 20, 1901. Incision through right upper rectus, giving exit to large amount of bile and pus with a stinking odor. Numerous adhesions. Gall-bladder perforated at fundus, and from it was removed a single, non-facetted stone, the size of a pigeon's egg. Tube drainage of bladder and a second tube into the space below the gall-bladder.

Uninterrupted recovery. Discharged Oct. 19, 1901, with a sinus still discharging pus.

CASE V.—Male, forty-nine years of age. Private patient of Dr. Blake. Three months ago vague shooting pains, worse when stomach was empty and relieved by food. No vomiting. Alkali treatment, and got well. Two days before admission, marked abdominal discomfort, vague in character, localized in right upper quadrant of abdomen and small of back. Sense of fatigue and constant desire for food. These symptoms continued until today, when he was seized with sharp pain localized in right upper quadrant.

Examination.—Acute tenderness in right side of abdomen, more so over gall-bladder, with great muscular rigidity. No mass could be made out.

Operation at once. Bile free in abdomen and a collection of it in right gutter. Gall-bladder gangrenous in spots and contracted. Interior full of small stones. Gall-bladder removed. General abdominal irrigation with Blake's irrigating tube. Tube into stump and two tubes in bed of gall-bladder.

Uninterrupted recovery. Smears and cultures taken at the time of the operation were sterile.

CASE VI.—Male, thirty-one years of age. Operator, Dr. Hawkes, March 17, 1906. An Italian. Heavy drinker up to three years ago. Never an attack similar to present one, which began four days before admission with sudden onset of pain under right lower ribs, with chill, fever, nausea, vomiting, prostration, and constipation. Pain did not radiate and was increased by movements in bed. Vomitus contained food remnants, no bile nor blood. Pain continuous ache, gnawing, not colicky, and none in shoulder. Did not notice that he was jaundiced until attention was called to it in hospital.

Examination.—Temperature 101°, pulse 120, leucocytes 15,000, polymorphonuclears 84 per cent. Exquisite tenderness and rigidity of right rectus, especially its upper part. Respiratory

movements much limited on right side. Somewhat distended. On account of rigidity and tenderness, no mass could be made out, but marked flatness below right costal arch. Deeply jaundiced.

Operation: Liver edge found adherent to transverse colon and to anterior abdominal wall by recent adhesions. Gall-bladder not made out. On breaking through adhesions toward duodenum, profuse discharge of thick, creamy, foul-smelling pus mixed with bile. Rubber drainage tube, surrounded by gauze.

After-course.—Jaundice never lessened. Profuse discharge of bile from wound. Had occasional chill and sweat. Lost ground gradually. Temperature remittent, as high as 103° some days. Leucocytes on April 3, 39,000, on the 5th, 62,300, with polymorphonuclears 91.5 per cent. Went into coma and died on the twenty-first day after operation. No autopsy.

Pathology.—The ordinary peritonitis arising from the gall-bladder is usually due to simple diffusion of infection through its walls to the peritoneum. It may result in a collection of pus of greater or less extent about the gall-bladder, but it is almost always well walled in by adhesions and represents a beautiful example of curable localized peritonitis. A very rare condition indeed is a generalized peritonitis due to lack of adhesions and without perforation. Korte has, however, reported three such cases. There are four cases recorded in the literature in which bile was found free in the peritoneal cavity, but in which there was no perforation of the biliary system. One is by Richardson, who says: "In one instance I found the right upper quadrant flooded with bile which had escaped from a gall-bladder that was apparently normal. Drainage was successful." Similar cases are recorded by Clairmont, Schivelbein, and Finsterer.

Much more serious, however, in its consequences and with a mortality rate not much under that of perforations of the alimentary tract must be ranked perforations of the biliary system into the free peritoneal cavity. Normal bile is sterile and is fairly well tolerated in large amounts and for a long time by the peritoneum, in which is set up a chronic irritation which results in the walling-in of the bile. This is well illus-

trated in traumatic rupture of the gall passages. Witness the interesting case of Garre, in which, two months after the injury, a large quantity of bile was evacuated and the patient was then cured by hepatocholeangio-enterostomy; or the case of Hildebrandt, in which operation on the twenty-third day after the injury disclosed a tear in the hepatic duct, recovery following.

In rabbits Noetzel has demonstrated that after an aseptic laparotomy the gall-bladder can be incised and left to drain into the free abdomen, after which the abdominal wound is tightly closed. The animals regularly survived this procedure. In a second set of experiments, he demonstrated that, after opening the peritoneum, the animals recovered after infections were introduced into the cavity, of certain amounts of *Staphylococcus aureus*, in other animals of *Bacillus coli communis*, in others of *typhoid bacilli*, and in others of *streptococci*. He also demonstrated that if even smaller amounts of these organisms were injected into the abdomens of animals and, at the same time, their gall-bladders were incised and left open in the abdomens and the abdominal wounds were then closed, the animals regularly died of septic peritonitis. These experiments show the deleterious effect of bile in contact with peritoneum in exalting the virulence of the organisms. In addition bile diminishes phagocytosis, and by this double mechanism it decreases the means of natural defense of the peritoneum toward infection. Conradi has shown that bile for typhoid bacilli is a good culture medium. He has also shown that the addition of bile to a normal blood-serum promptly does away with the bactericidal properties of such serum, for, if we take 0.3 c.c. normal guinea-pig serum in a dilution of 1 to 80, we will find that this amount will kill 20,000 typhoid bacilli in two hours. If we now add 1.1 c.c. of bile to the same amount of normal guinea-pig serum, a bactericidal effect of the serum cannot be demonstrated, but on the contrary the added typhoid bacilli will grow without any hindrance.

Neufeld and Handel have shown through experiments

that this paralytic effect upon the bactericidal quality of the blood evidently rests upon the energetic binding of the complement with the salts of the bile. According to them, sodium taurocholate unites not only with the bactericidal complement, but also with the hæmolytic. These experiments explain why such a rapid destruction of the animals takes place when bile is mixed with weak infections in the abdomens of the animals. There results a great decrease in the bactericidal properties of the serum poured out into the abdomen in response to the irritation, and the animals die of sepsis, or rather of septic peritonitis.

Etiology of Perforation.—We may group these as follows:

1. Rupture from overstretching, with or without stones.
2. Perforation from pressure of a stone upon the wall, causing ulceration.
3. Perforation from gangrene, due to (*a*) thrombosis of vessels, with or without stones; (*b*) cutting off of circulation from pressure of a stone; (*c*) diphtheritic, ulcerative infection of wall, with or without stone.

It is not necessary to do more than state these facts, and discussion of them would be superfluous. The important point from a prognostic and therapeutical aspect of the subject is the amount and virulence of the infection present in the biliary system at the time of the perforation. We may group the cases then into two classes:

1. Those patients with latent stones in their biliary systems who have had no attacks of infection for some time. The contained bile is evidently not perfectly sterile, and if one were to take cultures from it, one would find numerous pathogenic bacteria, but they are actually well tolerated. Such a bladder may become distended, due to obstruction from impaction of a stone in the cystic duct or neck of the bladder, or, if no stones be present, from stricture of the duct with a coincident swelling of the mucous membrane, or from a kink in the cystic duct. Its walls may become paper-thin from overstretching, or very brittle from old chronic inflammation, or weakened from ulceration due to the pressure of a stone. In

such conditions it may be brought to sudden bursting by reason of the compression exercised upon it by the abdominal muscles in the act of coughing, or vomiting, or of bending over. There results a pouring out into the peritoneal cavity of a quantity of bile of a little septic character. It is mechanical in origin and infection plays a small part in the process. There is no great reaction of the peritoneum as a result of its contact with the bile, save in the formation of more or less abundant fibrinous adhesions. An intervention leads to a good prognosis, provided it be not too long delayed, for it prevents the development of secondary infectious complications which are likely to follow if one abandons the patient to his own means of defense; for as we have already seen, the previously existing latent infection may become exalted in its virulence, due to the bactericidal effect of the serum poured out into the peritoneum being diminished by reason of its mixture with bile, while at the same time there is no exit to the infectious fluid which itself is a good culture medium. In addition, one must not lose sight of the fact that infectious agents may emigrate directly from the intestinal canal into the peritoneal cavity through the perforation. Blake reports a case in which there was a primary abscess about the gall-bladder which later burst into the general peritoneal cavity with a fatal issue.

2. The second and grave type is that in which the perforation is directly due to infection and its results. There is present a more or less acute cholecystitis, with obstruction, and the gall-bladder may rupture from increasing tension or through a spot of gangrene of its wall, which may occur because of the cutting off of the circulation through thrombosis of its vessels or by reason of the pressure of a stone. Or an abscess situated in the wall may rupture, thus weakening the wall and leading to a perforation through distention. The process is much less mechanical than infectious, *i.e.*, the calculus plays a secondary rôle, and may be entirely absent. Obstruction may occur through the swelling of the mucous membrane dependent upon the intense inflammation of the

mucous membrane of the cystic or common duct. The perforation may be very sudden and acute, so that the peritoneal cavity is inundated by a very septic fluid with a resulting more or less general peritonitis. The prognosis in such a case may be very grave and may tax the surgeon's judgment to the utmost. A contracted gall-bladder will not contain very much fluid and, if, at the time of rupture, there be no relief in the obstruction, it will take several days for much bile to collect in the abdomen. If, on the other hand, the gall-bladder be thin-walled and much distended, the amount of fluid escaping through the perforation will be very large.

Between these two types there are all grades of commingling. In some cases there is difficulty in saying which element predominates, the mechanical or the infectious. It would seem in some patients with chronic empyema of the gall-bladder as though the calculus and the microbes mutually agree to end in perforation. In the vast majority of cases, perforation of the walls does not progress so rapidly as to take the peritoneum unawares, so that adhesions have time to form. In the rare case, however, with rapid perforation, no adhesions are present, and the rapidity and extent of the consequent peritonitis will depend on the amount of the extravasated bile or pus, and the virulence of its contained organisms. A pinhole perforation of a contracted bladder with a stone blocking the escape of bile will cause the development of a slow, more or less localized peritonitis, while a large sudden perforation in a much distended and infected bladder will cause an overwhelming general peritonitis similar to that which we find in perforation of the stomach or duodenum.

The gall-bladder mucosa presents numerous alveoli formed by fibromuscular bands. They are of various sizes and shapes, and in them we often find large or small calculi which are difficult to enucleate and are, as it were, let into the wall. The alveoli also contain septic fluid and are therefore an excellent culture medium for micro-organisms. The result is an ulcerative process which may lead to perforation and peritonitis. Dieulafoy says that the *Bacillus coli communis* seems to be an essential agent in the ulcerative process. Certain it is that

nothing can be elicited from the reported cases as to the bacteriology of these perforations, for in but very few cases have cultures been taken at the time of operation.

Of 90 cases in which the situation of the perforations is mentioned, 82 of them, or 91 per cent., occurred in the gall-bladder, 3, or 3.3 per cent., occurred in the cystic duct, 4, or 4.4 per cent., in the common duct, while but 1, or 1.1 per cent., occurred in the hepatic duct.

In 80 out of 108 cases, or 74 per cent., stones were found at the time of the operations for perforation. From this fact we may infer that calculi, single or multiple, are a great factor in causing perforation. In 14 cases, or 13 per cent., it was found that no stones were present after adequate search. In the 14 remaining cases, or 13 per cent., stones may or may not have been present, as no mention is made of them. Many of these cases were simply drained without search being made for stones.

In but 9 cases is it distinctly stated that gangrene was present. It usually was simply a small area of gangrene, and through this the perforation took place.

Frequency of Occurrence.—That general peritonitis due to a perforation into the free cavity is a rare occurrence the following table of frequency will indicate. No one operator has had many cases, and our ideas of the lesion can only be gained by putting together the single observations of many. Because of the heavy mortality following perforation of the biliary system into the free peritoneal cavity, probably most of the isolated cases have not been reported, so that to gain information as to the relative frequency one must go through the reported series of operations on the biliary system.

	No. of Operations	Cases of Perforation
Adám	112	3
Robson	539	3
Ochsner	48	1
MacLaren	80	4
Kehr	1526	1
Korte	254	7
Jenckel	210	3

	No. of Operations	Cases of Perforation
Ferguson	46	1
Pres Hosp. (McWilliams)	365	6
Totals	3180	29*

Thus we see that the occurrence of perforation into the peritoneal cavity is a very rare accident indeed. There were but 29 cases in 3180 biliary operations. One almost never finds it mentioned in text-books or articles on the differential diagnosis between acute lesions in the upper abdomen. While the lesion is a rare one, it is not so infrequent as one would be led to suppose from the small number of cases published. Are not many of these cases unrecognized? If a calculus completely obstructs the cystic duct, there will be nothing but pus in the gall-bladder with the formation of a purulent peritonitis after perforation, without free bile in the cavity. If there be nothing in the history to call the surgeon's attention to the gall-bladder, there may be nothing found on opening the abdomen in the usual positions to cause one to suspect that the gall-bladder is at fault, and a right diagnosis may not be made until the autopsy table be reached.

Age and Sex of the Patients.—There were 99 patients whose ages are given, and the average age was 50.2 years. The youngest patient was No. 49, whose age was 21 years, while the oldest was No. 44, who was 80 years of age. The disease is one of advanced life as the following statistics show: Between 20 and 30 years: recovered 7, died 2; between 30 and 40 years: recovered 7, died 5; between 40 and 50 years: recovered 14, died 9; between 50 and 60 years: recovered 14, died 21; between 60 and 70 years: recovered 7, died 7; between 70 and 80 years: recovered 4, died 2. Before 50 years there were 44 cases, while there were 55 cases beyond 50 years. Before 50 years there were 63 per cent. of recoveries, while there were but 46 per cent. after 50. How great an influence diseased blood-vessels have upon necrosis and gangrene of the gall-bladder it would be difficult to say.

* Or 0.9 per cent.

The statistics as to sex are as follows: Females: recovered 35, or 56 per cent.; died 27, or 44 per cent.; total 62, or 60 per cent. Males: recovered 19, or 46 per cent.; died 22, or 54 per cent.; total 41, or 40 per cent. From this we find that 60 per cent. of the cases occurred in women and that they stand the disease better than men, the mortality in women being 44 per cent. as against 54 per cent. in men.

Symptoms and Diagnosis.—Peritonitis due to perforation is a most treacherous complication. It may come on during an attack of biliary colic, and as the symptoms in each case are similar (violent pain and vomiting), it may cause serious mistakes. If an attack of colic leaves a very tender gall-bladder region, the patient should be operated upon at once, but if, for any reason, this be not done, then the patient should be very carefully watched. The degree of spread of infection from the gall-bladder is the important point, as judged by the change in the extent of the abdominal rigidity, tenderness, fever, pulse, leucocytes, and polymorphonuclears. All the cases of perforation were ushered in by pain. If a cholecystitis had been present, then the character of the pain changes. From being a more or less dull, continuous localized ache it becomes generalized over a greater extent of the abdomen, down the right side, and to the navel. There may be in some cases at the time of perforation a sense of temporary relief as the tension of the distended gall-bladder is relieved by the fluid effused from its cavity. This is followed by the signs of peritonitis, more extensive rigidity and tenderness, nausea, vomiting, distention, rapid pulse, temperature, and prostration. In some cases perforation is sudden and without warning, and the symptoms are then like those in perforation of a stomach ulcer. More than one patient with perforated biliary system has been operated upon with the diagnosis of perforated gastric ulcer. In this type we find sudden intense pain, which cannot often be localized but is said to spread over the whole abdomen. The patients become rapidly prostrated, collapsed, vomiting soon follows, and the rigid and tender abdomen becomes distended, flatus

ceases to pass, and the pulse becomes rapid and irregular. After a few hours the patient may rally, having the "interval of repose" seen in all forms of perforation within the abdomen.

The tendency of the material which escapes from the gall-bladder is to gravitate downward along the outer side of the ascending colon into the appendical region, which becomes tender and rigid, and at once gives rise to the opinion that one has to deal with a perforated appendix. This is a very frequent mistake in these cases. A careful history and the location of the early symptoms, such as pain and muscular rigidity in the region of the gall-bladder, will enable us often to make a differentiation. A right diagnosis will spare the patient an unnecessary incision and the loss of valuable time with the added danger of opening up protective adhesions. In both my own cases, a wrong diagnosis was made, in one case being due to the inability to get a proper history. A Chinaman (Case I) who spoke no English was operated upon under the diagnosis of perforated appendix, and an appendix incision made. It was not until a large collection of bile was opened into in searching for the appendix that the diagnosis was made of perforated gall-bladder. Thus the gravely infected bile was spread widely, and likely contributed to the fatal outcome, in addition to the added shock of the prolonged operation. The outcome of my second case was more favorable because the infection was not so virulent, due to the earlier operation. The diagnosis was probable intestinal obstruction of unknown origin. On making a Kammerer incision over the appendix, bile at once flowed out and the diagnosis was at once clear. Other diagnoses have been volvulus (Case 81), intestinal obstruction (Cases 18, 24, 91, 97), intussusception (Case 23), intestinal perforation (Case 98), perforated gastric ulcer (Case 47), and appendicitis (Cases 108, 92). One remarkable case is recorded by Kummel, in which a tumor supposed to be ovarian became acutely inflamed, peritonitis followed, with death in two days. The tumor on autopsy was found to be a distended gall-bladder.

The puzzling cases are those in which there is no sudden

large amount of effused fluid, but in which there is a steady small leakage. The pain in these cases is not very great in the beginning if the fluid be not very septic. The diagnosis of intestinal obstruction is apt to be made in these cases, due to the pressure of the collection of bile on the intestines and the paralyzing effect of its contained infection.

In 11 cases it is distinctly stated that jaundice was present at the time of the operation. Of these 6 recovered and 5 died. Its presence indicates an advanced case because, if not present at the time of the perforation, it comes on later from absorption of biliary pigment by the peritoneum.

What a large element infection plays in these cases is shown in the relative mortality of operations for traumatic rupture. Thus Ricketts reports 28 cases operated upon for traumatic rupture with 22 recoveries, or 78 per cent.

PROGNOSIS AND RESULTS OF OPERATION.

Duration from Perforation to Operation	Recovered	Died	Per cent. of Recoveries	Per cent. of Deaths
Within 12 hours...	6	1	85.7	14.3
1 day	10	5	66.6	33.3
2 days	7	7	50.0	50.0
3 days	8	8	50.0	50.0
4 days	2	8	20.0	80.0
5 days	3	4	42.8	57.2
6 days	2	2	50.0	50.0
7 days	1	1	50.0	50.0
10 days	2	1	66.6	33.3
11 days	0	1		
14 days	2	0		
Totals	43	38	53.0	47.0

The above table very graphically represents how important it is for these patients with perforation to be operated upon as soon as possible after the perforation. Thus in 7 cases operated upon within 12 hours of the perforation 6 recovered, or 86 per cent.; of 15 cases reported operated upon when the perforation had existed for one day, 10 recovered, or 66 per cent.; of 14 cases operated upon after two days, 7 recovered, or

50 per cent.; of 16 cases operated upon after 3 days, 8 recovered, or 50 per cent. Operations after four days give a very poor prognosis, for in 10 cases only 2 recovered, or 20 per cent. The recoveries then increase, due probably to the fact that the patient has developed his opsonins sufficiently to overcome the infection to a greater extent, for of 7 cases operated upon after 5 days, 3 recovered, or 43 per cent. The sixth and seventh days have each 50 per cent. recoveries.

Of the total number of cases that I have obtained from the literature, 108 in number, 56 recovered, or 51.8 per cent., while 52 died, or 48.2 per cent. Ricketts reported 160 cases which were not operated upon and of this number but 6 recovered, or only 3.7 per cent. We may say then that without operation a patient with a spontaneous perforation of the biliary system is in a hopeless condition, and even with operation nearly half the patients will die.

Treatment.—Prevention is the key-note in modern medicine. As Korte has said, "To prevent perforation, one should immediately operate when one finds a greatly distended and sensitive gall-bladder with peritoneal irritation." The custom is fairly general of waiting for the disappearance of infectious symptoms in a frank case of cholecystitis. Most of these symptoms will subside and then there is hesitation about operating until another attack occurs. Each attack produces its effect in changing the pathology of the gall-ducts, rendering a subsequent operation more serious for the surgeon and for the patient. In any attack the stretched biliary system may rupture, producing either a local or general peritonitis and rendering an immediate operation imperative.

Perhaps in no acute condition in the abdomen is one compelled to exercise so much judgment at the time of operation as in these perforations into the peritoneal cavity. He who is the keenest observer of the conditions found in the abdomen, who can best estimate the virulence of the infection present, the degree of adhesions, and the pathological conditions present in the gall-bladder system, who can make a good mental estimate of how much or how little the patient can stand,

who can get in and get out of the abdomen the quickest, inflicting the least possible trauma, will have the greatest success in these trying cases.

The age of the patient must be taken into account in considering what had best be done. Of 100 patients with perforation into the peritoneal cavity, over 56 per cent. occurred in persons over 50 years of age. These elderly persons do not stand infections of their peritoneum well, for 63 per cent. of patients under 50 recovered, while but 46 per cent. of those over 50 years got well. Everything should be done to minimize shock in these elderly persons.

The old question of cholecystostomy *versus* cholecystectomy is naturally one which must be quickly decided upon as the operation proceeds and the conditions are revealed. I have endeavored to get some light on this question from analyzing the reported cases. If we take the cases which were operated upon within 24 hours of the perforation, there does not seem to be a great deal in favor of one procedure over the other, although the cases are too few to draw any very definite conclusions. This is what one would expect because in these early cases one will find few adhesions, and in order to do an ectomy, one would open comparatively few fresh avenues for spread of the infection. Thus, 20 cases were operated upon within 24 hours after perforation: cholecystostomy: recovered 11 or 68 per cent; died 5 or 32 per cent.; cholecystectomy: recovered 3 or 75 per cent.; died 1 or 25 per cent. From this we might argue that the balance is in favor of an ectomy in these early cases.

The operative measures in general which have been used in treating these cases, taken as a whole, are as follows with the results: (1) suture of perforation with drainage of peritoneum: recovered 1 or 20 per cent.; died 4 or 80 per cent.; (2) tamponade of the biliary region: recovered 10 or 47 per cent.; died 11 or 53 per cent.; (3) cholecystostomy: recovered 30 or 61 per cent.; died 19 or 39 per cent.; (4) cholecystectomy: recovered 16 or 48 per cent.; died 17 or 52 per cent.

Suture of the perforation needs merely to be mentioned to

be condemned, as it violates all our modern ideas of the treatment of biliary diseases.

Simple incision of the abdomen with drainage of the biliary region gave 47 per cent. of recoveries. Cholecystectomy accomplished very little more, 48 per cent. recovering. The best results were obtained with cholecystostomy with which 61 per cent. recovered. Many of the cases with simple incision were in desperate condition, and the gravity of the general state seemed to contraindicate further measures. It is a question open to discussion how much better results would have been obtained had a better means of drainage been provided, in some of the cases. Thus, the case of Korte (No. 31), which died on the eighteenth day, that of Hawkes (No. 95), which died on the twenty-first day after operation, and of others, brings up the question of whether an intervention more direct to the seat of infection with the drainage of the infected bile to the surface would not give better results. Each operator will have to decide this question for himself in each individual case.

How does it stand with cholecystostomy *versus* cholecystectomy? On first sight one is struck with the success of the former as compared with the latter, 61 per cent. of recoveries with cholecystostomy as against 48 per cent. with cholecystectomy. Cholecystostomy for the average operator is the less dangerous procedure, and should therefore be preferred in these perforative cases. But are there exceptions and, if so, what are they? Cholecystostomy has given brilliant results in some apparently hopeless cases, such as those of Korte, Kummel, Lecene, Mosetig-Moorhof, Thiel, Jaboulay, Whitacre, and others. In other cases the outcome has been such as to suppose that cholecystectomy would have been better. Witness the case of Hirschel (No. 16) who did a cholecystostomy in a patient with acute cholecystitis with gangrene of the neck of the bladder. At first he recovered, but died on the twelfth day of pulmonary gangrene. The same occurrence took place in a patient of Narath (No. 80) on the tenth day. Also the patient of Hartig (No. 12) who

had scarcely left the hospital after a cholecystostomy before he had a second perforation of his gall-bladder with a second operation, as a result of which he succumbed. Whitacre's case (No. 86) had two perforations at different times with two different operations with a successful outcome. These secondary ill-results would likely have been avoided by a primary cholecystectomy. The cases with pulmonary gangrene probably had their origin in a persistence of the focus of infection in the bladder gangrene. As a rule, then, we are justified in saying that cholecystostomy should be the operation of choice in cases in which there is little sepsis. In cases, however, where there is a severe infectious cholecystitis with an ulcerative or gangrenous process, *i.e.*, the grave cases, it were better to remove the focus by a cholecystectomy where this is possible. By this means some of the infecting process will be removed. A drain should always, however, be placed in the stump of the cystic duct, and the peritoneum also be drained. Adhesions should not, however, be broken up to accomplish this except to a slight degree. Should bile be free in the abdomen, it would be well to flush the whole cavity quickly with salt solution and to place a drain possibly in the suprapubic area. Nothing by mouth for a few days (the Ochsner treatment), salt solution by rectum according to Murphy continuously, colon irrigations, and the Fowler position should constitute the after-treatment. Gall-stones should be removed at the time of the operation, and in draining, it should be borne in mind that the right kidney pouch forms a distinct peritoneal pocket and that a drainage tube applied through a stab opening in the right loin affords a free exit for extravasated fluids coming from the neighborhood of the gall-bladder.

There is great difference of opinion as to the wisdom of performing a cholecystectomy in these perforative cases. Summers (ANNALS OF SURGERY, July, 1911), says: "All infections of the gall-bladder, empyema, gangrene, should be treated by simple incision and drainage after a protective gauze packing off of the peritoneal cavity. I have known

disaster follow cholecystectomy in such cases—the crushing of the cystic duct and its artery, more especially of the poison laden lymphatics; the trauma to the peritoneum passing from the gall-bladder neck to the gastrohepatic omentum can and does in some instances lead to a thrombophlebitis and fatal infections. By free incision into the gall-bladder, gangrene will probably not extend and tension will be relieved.” Robson (“Gall-Stones,” 1909, p. 161) regarding perforative cases remarks: “Should marked cholecystitis be found, the question of cholecystectomy may be worth considering; but when the patient is in a critical condition, it is a mistake to attempt too much, and, as a rule, cleansing and free drainage will be all that are necessary or advisable at the time, the removal of the cause being left until the patient is better able to bear a more prolonged operation.” Moynihan writes regarding the treatment of perforative cases (“Gall-stones and their Surgical Treatment,” 1905, p. 279): “In all probability cholecystectomy followed by free drainage will prove to be the safest method of treatment.” Cotte and Arnaud say (*Revue de Chirurgie*, March, 1911, p. 358): “In all biliary perforations without a concomitant grave infectious state, one can in general content himself with making a simple drainage of the biliary system. In the grave forms, on the contrary, which result from an active process of ulceration or of gangrene, every time that the situation permits it, one should prefer the ablation of the gall-bladder.” Mayo, in Keen’s “Surgery,” vol. iii, says regarding perforations of the gall-bladder: “The treatment should be immediate abdominal section for the removal of the gall-bladder and free drainage.”

CONCLUSIONS.

1. In 3180 operations on the biliary system, acute spontaneous perforation into the free peritoneal cavity occurred 29 times, or 0.9 per cent. It is thus a very rare accident.
2. In 90 cases of perforation, 82 of them, or 91 per cent., occurred in the gall-bladder, 3, or 3.3 per cent., perforated through the cystic duct, 4, or 4.4 per cent., through the com-

mon duct, while but 1, or 1.1 per cent., perforated through the hepatic duct.

3. Calculi are a great factor in causing perforation, for in 80 out of 108 cases, or 74 per cent., stones were found at the time of the operations. In 14 cases, or 13 per cent., it was found that no stones were present after adequate search. In the 14 remaining cases, or 13 per cent., stones may or may not have been present as no mention is made of them.

4. In but 9 cases is it distinctly stated that gangrene was present.

5. Of 99 patients whose ages are given, the average was 50 years. Before 50 years, there were 44 cases with 63 per cent. of recoveries, while beyond 50 years there were 55 cases with 46 per cent. of recoveries. Between 50 and 60 years, there were 35 cases with but 14 recoveries.

6. Sixty-two of the cases occurred in women, or 60 per cent., and they stand the disease better than men, the mortality in women being 44 per cent. as against 54 per cent. in men.

7. Of 108 cases operated upon, 56 recovered, or 51 per cent., while 52 died, or 48 per cent. This is in contrast to the 28 traumatic ruptures, reported by Ricketts, operated upon with 22 recoveries, or 78 per cent. The difference is due to infection.

8. Early operation, as in all forms of peritonitis, is the best guarantee of success; thus, of 7 cases operated upon within 12 hours of the perforation 6, or 85 per cent. recovered; of 15 operated upon within one day of the perforation, 10, or 66 per cent. recovered; of 14 within 2 days, 7 recovered, or 50 per cent.; of 16 operated upon within 3 days of the perforation, 8 recovered, or 50 per cent.; while of 10 cases that had gone 4 days before operation only 2 recovered, or 20 per cent.

9. Suture of the perforation is to be unhesitatingly condemned. Four out of 5 cases thus treated died. Simple incision of the abdomen with drainage of the biliary region gave 47 per cent of recoveries. With cholecystectomy 48

per cent. recovered. The best results were obtained with cholecystostomy, with which 61 per cent. recovered.

ABSTRACT OF 108 CASES OF BILIARY PERFORATION FROM LITERATURE.

Case 1 (Von Arx): Female, 48; colics for 2 months, acute for 20 hours; perforation at neck, free bile. Suture of perforation. Cholecystostomy. Recovered. One calculus in gall-bladder.

Case 2 (Baldwin): Female, 50; colics for years, symptoms for one day; perforation in body, free bile. Cholecystostomy. Recovered. Six calculi in gall-bladder.

Case 3 (Baldwin): Male, 55; indefinite colics four days; perforation in body, gangrene. Cholecystectomy. Died. Several calculi in gall-bladder.

Case 4 (Baldwin): Male, 27; symptoms three years, colic two days; perforation in fundus, extensive adhesions. Cholecystectomy. Recovered. Twelve calculi in gall-bladder.

Case 5 (Brunner): Female, 56; symptoms one year, colics not stated; perforation of hepatic duct, abdomen full of bile. Tamponade only of abdomen. Died. Stone in ampulla and two in common duct.

Case 6 (Brunner): Female, 50; stomach symptoms 24 hours; gall-bladder perforated, abdomen full of bile. Cholecystectomy. Died. Calculi in gall-bladder.

Case 7 (Czerny): Female, 61; symptoms five days; perforation of gall-bladder, gangrene; abdomen contained bile. Partial cholecystectomy and suture; abdominal drain. Died. Calculi in gall-bladder.

Case 8 (Delageniere): Perforation of gall-bladder and gangrene. Cholecystectomy. Died. Calculi in gall-bladder.

Case 9 (Finck): Male, 54; symptoms three days; perforation of gall-bladder. Tamponade only. Recovered.

Case 10 (Hallet): Female, 45; colics one day; perforation of gall-bladder. Cholecystostomy. Recovered. Four calculi free.

Case 11 (Hallet): Female, 50; colics fifteen hours; pressure perforation at fundus, free bile. Cholecystostomy. Recovered. Numerous calculi in gall-bladder.

Case 12 (Hartig): Female, 42; symptoms four days; perforation of gall-bladder twice, free bile. Cholecystostomy twice. Died. Calculus in gall-bladder. Two operations.

Case 13 (Hartig): Male, 62; previous colics; perforation of gall-bladder, free bile. Cholecystostomy. Recovered. Perforation over calculus.

Case 14 (Hartig): Female, 53; symptoms six days; perforation in fundus, adhesions. Cholecystectomy. Died. Three calculi in gall-bladder.

Case 15 (Hirschel): Female, 27; symptoms two days; perforation in fundus, localized. Cholecystostomy. Died. Several great calculi.

Case 16 (Hirschel): Male, 57; symptoms four days; perforation near neck by pressure. Cholecystostomy. Died. Single calculus; pulmonary gangrene on eleventh day.

Case 17 (Hirschel): Female, 59; perforation; suture of perforation. Died. Stones not stated; death from pneumonia.

Case 18 (Hocheneegg): Female, 45; symptoms 12 hours; perforation at middle; suture of perforation. Cholecystostomy. Recovered. Diagnosis, intestinal obstruction; stones present.

Case 19 (Jaboulay): Male, 66; symptoms two years, colics three days; perforation. Cholecystostomy. Died. One calculus; great.

Case 20 (Jenckel): Female, 45; symptoms three days; perforation at summit. Tamponade only. Died. Stone not stated.

Case 21 (Aurray): Female, 48; symptoms 12 hours; perforation of neck. Suture of perforation. Died. General peritonitis; stones present; no jaundice.

Case 22 (Kehr): Female, 51; symptoms four days; perforation of common duct. Cholecystectomy. Died. Calculi in common and hepatic ducts; perforation of common duct; jaundice.

Case 23 (Konig): Female, 70; symptoms two days; perforation by pressure of gall-bladder. Cholecystectomy. Recovered. Diagnosis, invagination of intestines; calculi numerous.

Case 24 (Korte): Male, 56; colics five days; several perforations in gall-bladder. Cholecystectomy. Recovered. Diagnosis, intestinal obstruction; large calculus; intestinal cavity washed.

Case 25 (Korte): Female, 37; colics three days; several perforations in gall-bladder. Cholecystostomy. Recovered. Calculi present; no jaundice.

Case 26 (Korte): Female, 30; colics three days; perforation of gall-bladder. Cholecystectomy. Recovered. Calculi at entrance of cystic duct.

Case 27 (Korte): Female, 72; perforation of gall-bladder. Cholecystostomy. Recovered. Several calculi; secondary ectomy two months later.

Case 28 (Korte): Female, 63; symptoms four days; perforation of gall-bladder. Cholecystectomy. Died four weeks after operation of embolism; one calculus.

Case 29 (Korte): Female, 51; perforation of cystic duct; drainage in common duct, also cystic duct. Cholecystostomy. Died. Calculi in common and hepatic duct. None in gall-bladder.

Case 30 (Korte): Male, 30; symptoms five days. Tamponade, incision only. Died. Stones not mentioned.

Case 31 (Korte): Female, 56; symptoms five days; perforation of gall-bladder. Tamponade, incision only. Died on eighteenth day after operation.

Case 32 (Kummel-Goldammer): Male, 57; symptoms two days; perforation of fundus, free bile. Cholecystostomy. Died. Calculi present.

Case 33 (Kummel-Goldammer): Female; symptoms three days; free bile. Cholecystostomy. Died. Calculi present; death after a number of days.

Case 34 (Kummel-Kammerer): Female, 33; gangrene with perforation. Cholecystostomy. Recovered. Calculi present.

Case 35 (Kummel-Kammerer): Male, 65; gangrene with perforation. Cholecystostomy. Died. Calculi present.

Case 36 (Kummel-Goldammer): Male, 54; gangrene with perforations. Died.

Case 37 (Kummel-Goldammer): Female, 50; symptoms two days; empyema and perforation. Died. Numerous calculi.

Case 38 (Kuster): Female, 57; symptoms 28 hours; perforation from pressure of calculi. Closure of perforation. Died. Calculi present.

Case 39 (Lecene): Female, 62; symptoms three days; perforation at fundus. Cholecystostomy. Recovered. Single calculus; second operation two months later; cholecystectomy.

Case 40 (Maire): Male, 36; symptoms ten days; perforation of gall-bladder, free bile. Cholecystectomy. Died. Icterus present; cholecystitis; calculus in ampulla removed; hepatic drainage.

Case 41 (Martens): Female, 58; symptoms three days; perforation of cystic duct, gangrene from pressure. Cholecystectomy. Died from pneumonia; calculi present.

Case 42 (Marwedel): Female, 27; symptoms two days; perforation of gall-bladder. Cholecystostomy. Died. Numerous calculi.

Case 43 (Meriwether): Female, 62; symptoms one day; perforation of gall-bladder by pressure. Cholecystostomy. Recovered. No calculi.

Case 44 (Meriwether): Male, 80; symptoms five days; perforation of gall-bladder. Tamponade only. Died. Numerous calculi.

Case 45 (Von Mosetig-Moorhof): Male, 59; symptoms four days; perforation of gall-bladder at fundus. Cholecystostomy. Recovered. Several calculi.

Case 46 (Neck): Female, 43; symptoms three days; perforation of gall-bladder at summit. Cholecystostomy. Recovered. Numerous calculi.

Case 47 (Newbolt): Female, 48; symptoms two days; perforation of gall-bladder; gangrene; suture of perforation and of abdomen. Died. Stones removed; one impacted in cystic duct. Diagnosis, perforation of gastric ulcer; no jaundice.

Case 48 (Nordmann): Female, 49; tamponade only. Recovered. Stones not stated.

Case 49 (Nordmann): Female, 21; symptoms one day; perforation of gall-bladder, free bile. Cholecystectomy. Recovered. Drainage of common duct; numerous stones; numerous abscesses in gall-bladder wall.

Case 50 (Riedel): Female, 74; symptoms 36 hours; perforation of fundus. Cholecystectomy. Died. Single large stone in neck.

Case 51 (Riedel): Female, 55; symptoms seven days; perforation at fundus. Cholecystectomy. Died. Numerous calculi.

Case 52 (Riedel): Male, 56; symptoms three days; perforation of gall-bladder and of common duct. Cholecystostomy. Died. Pigeon's egg calculus in common duct; hepatic drainage, also Douglas.

Case 53 (Routier): Female, 56; symptoms one day; perforation of common duct, free bile. Cholecystostomy. Recovered. Numerous stones, secondary ectomy.

Case 54 (Schnitzler): Female, 55; symptoms five days; perforation of gall-bladder, gangrene. Cholecystectomy. Recovered. One stone; jaundice.

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Case 55 (Schonborn): Female, 50; symptoms three days; abdomen alone drained, free bile. Tamponade of abdomen only. Recovered. No stones found.

Case 56 (Straetter): Female, 63; symptoms five days; perforation of gall-bladder. Cholecystostomy. Recovered. Numerous stones.

Case 57 (Thiel): Female, 59; symptoms three days; perforation of fundus. Cholecystostomy. Recovered. One large stone.

Case 58 (Torrance): Male, 59; symptoms four hours; perforation of gall-bladder, free bile. Cholecystectomy. Recovered. Gastro-enterostomy, appendectomy; stones not stated.

Case 59 (Ullmann): Male, 42; symptoms six days; perforation from pressure of stone in gall-bladder. Cholecystectomy. Died. Numerous calculi, one in cystic duct; no jaundice.

Case 60 (Ullmann): Female, 53; symptoms twelve hours; perforation of gall-bladder, free bile. Tamponade only. Recovered. Numerous stones; no jaundice.

Case 61 (Verral): Female, 44; symptoms four days; perforation of fundus; suture of gall-bladder. Recovered. Numerous calculi.

Case 62 (Villard): Female, 35; symptoms three days; perforation of gall-bladder. Tamponade only. Died. Numerous calculi.

Case 63 (Weigel): Male, 45; symptoms one day; perforation of fundus, free bile. Cholecystostomy. Died. Calculi removed from cystic duct and gall-bladder.

Case 64 (MacLaren, Case III): Male, 50; symptoms ten days; perforation on anterior wall. Cholecystostomy. Recovered. No stones.

Case 65 (Vaughan): Male; symptoms three days; perforation of gall-bladder; drainage of abdomen only. Died. No stones; developed during typhoid and operation for supposed perforation.

Case 66 (Rixford): Male; symptoms two days; perforation at fundus. Cholecystectomy. Recovered. Aseptic perforation; numerous calculi in gall-bladder.

Case 67 (Haggard): Male; perforation of gall-bladder. Drainage of abdomen only. Recovered. Stones free in abdomen.

Case 68 (Moynihan): Male, 46; symptoms eleven days; perforation at fundus, free bile. Cholecystostomy. Died. Seven stones in gall-bladder.

Case 69 (Walker): Male, 27; symptoms three days; perforation at fundus by pressure, free bile. Cholecystectomy. Recovered. Numerous stones; one large one by pressure caused perforation.

Case 70 (MacLaren, Case VIII): Male, 45; symptoms two weeks; perforation at fundus; enormous abscess with bile. Cholecystostomy. Recovered. Stones removed at secondary operation; subdiaphragmatic abscess opened; jaundice present.

Case 71 (MacLaren, Case IX): Female, 31; symptoms ten days; perforation at fundus; large abscess and stones. Tamponade only. Recovered. Jaundice.

Case 72 (MacLaren, Case X): Female, 32; large abscess with stones.

Cholecystostomy. Recovered. Followed on typhoid; secondary cholecystostomy with removal of stones.

Case 73 (Ferguson): Female, 35; perforation at fundus, free bile. Cholecystostomy. Recovered. Several stones; jaundiced.

Case 74 (Noetzel): Male, 52. Cholecystectomy. Died. Stones not stated.

Case 75 (Noetzel): Male, 63. Cholecystectomy. Died. Stones not stated.

Case 76 (Noetzel): Female, 62. Cholecystectomy. Died. Stones not stated.

Case 77 (Noetzel): Female, 65. Cholecystectomy. Recovered. Stones present.

Case 78 (Noetzel): Female, 59. Cholecystectomy. Died. Stones not stated.

Case 79 (Noetzel): Female, 23. Cholecystectomy. Recovered. Single stone present.

Case 80 (Narath): Male, 59; symptoms four days; perforation of gangrenous spot, free bile. Cholecystostomy. Died from pulmonary gangrene. One stone in gall-bladder.

Case 81 (Kranze): Age 67; symptoms two days; perforation at fundus, free bile. Cholecystostomy. Recovered. Diagnosis before operation, volvulus; no stones.

Case 82 (Kranze): Age 70; symptoms six days; perforation at neck, free bile. Cholecystostomy. Recovered. No stones.

Case 83 (Neupert): Female, 42; symptoms 14 hours; perforation of common duct at juncture with cystic duct, free bile. Cholecystectomy. Recovered. Jaundice; acute impaction of stone in common duct. Removed.

Case 84 (Whitacre): Male, 72; symptoms 12 hours; no stones; perforation of gall-bladder, free bile. Cholecystostomy. Recovered. No stones; no jaundice.

Case 85 (Whitacre): Female, 42; symptoms one week; fundus perforated, free bile. Cholecystostomy. Recovered. Many stones in gall-bladder; no jaundice.

Case 86 (Whitacre): Female, 26; first operation 24 hours, second operation 27 hours; perforation in fundus, free bile. Tamponade only in both operations. Recovered. Three operations; two first were cholecystostomies, third was cholecystectomy; two perforations at different times; gallstones present in gall-bladder; jaundice not mentioned.

Case 87 (Whitacre): Male, 58; symptoms two days; perforation in fundus, free bile. Cholecystostomy. Recovered. Stones in gall-bladder; no jaundice.

Case 88 (Whitacre): Female, 50; symptoms one day; free bile. Tamponade only. Died. Stones not stated; no jaundice.

Case 89 (Whitacre): Female, 28; symptoms several days; free bile. Tamponade only. Recovered. Stones not stated; no jaundice.

Case 90 (Kiliani): Male, 40; symptoms four weeks; two perforations

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in fundus. Cholecystectomy. Died. Two small perforations of ileum found; two stones present.

Case 91 (McWilliams) : Male, 67; symptoms one day; perforation in fundus, immense pocket of bile. Cholecystostomy. Recovered. Diagnosis, intestinal obstruction or appendicitis; two incisions; no jaundice; stone removed.

Case 92 (McWilliams) : Male, 38; symptoms three days; perforation of cystic duct. Cholecystostomy. Died. Diagnosis, appendicitis; two incisions; stone present.

Case 93 (Dr. Brown) : Male, 49; symptoms two weeks; perforation at fundus. Cholecystostomy. Recovered. One stone removed.

Case 94 (Dr. Blake) : Male, 49; symptoms two days; perforation at fundus, no adhesions, free pus. Cholecystectomy. Recovered. Many stones; general abdominal irrigation.

Case 95 (Dr. Hawkes) : Male, 31; symptoms four days; large abscess, adhesions. Tamponade only. Died twenty-one days after operation. No stones; jaundice present.

Case 96 (Dr. McCosh) : Male, 26; adhesions about gall-bladder, gangrene, bile, and pus. Cholecystectomy. Recovered. No stones; jaundice present.

Case 97 (Roersch) : Female, 67; symptoms one day; perforation of gall-bladder, free bile. Cholecystostomy. Died. Operation for intestinal obstruction; single stone present.

Case 98 (Erdmann) : Female, 46; symptoms 12 hours; perforation of gall-bladder, free bile. Cholecystostomy. Recovered. Diagnosis, intestinal perforation; stones present in gall-bladder; typhoid present.

Case 99 (Jopson) : Female, 51; symptoms 72 hours; perforation not located, free bile. Cholecystostomy. Recovered. Stone impacted in cystic duct; jaundice present.

Case 100 (Fritz-Koenig) : Female, 70; symptoms two days; perforation at fundus. Cholecystectomy. Recovered. Numerous stones; jaundice.

Case 101 (Williams and Sheidd) : Male, 31; perforation of gall-bladder. Tamponade only. Recovered. During typhoid, no stones.

Case 102 (Adám) : Female; perforation of gall-bladder. Cholecystostomy. Died. Stones not mentioned.

Case 103 (Adám) : Cholecystostomy. Died. Stones not mentioned; jaundice present.

Case 104 (Adám) : Cholecystostomy. Died. Stones not present; jaundice present.

Case 105 (Mayo-Robson) : Male, 45; several pints of bile and pus. Cholecystostomy. Recovered. Stones not mentioned.

Case 106 (Mayo-Robson) : Female, 47; symptoms six days; perforation of fundus. Cholecystectomy. Recovered. Several stones removed; deeply jaundiced.

Case 107 (Gordon) : Male, 50; symptoms four days. Tamponade only. Died. Calculi present; jaundice present.

Case 108 (Grant) : Male, 53; symptoms 15 hours; quart of bile. Tamponade only. Died. Diagnosis, appendicitis; no stones; no jaundice.

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