GALL-STONES:
A PLEA FOR EARLIER OPERATION.*

By D'ARCY POWER, LONDON.

IN thinking over the various operations which I have performed at different times, it seemed that the most brilliant as well as the most disastrous results had been obtained from patients who suffered from gall-stones. Brilliant, because from a state of chronic invalidism repeatedly culminating in what is perhaps the most acute pain that can be endured by man, the patient was restored to health and comfort. Disastrous, because in looking through the records of the cases, the mortality is out of all proportion to the exciting cause—a gall-stone. No such mortality is expected, nor would be tolerated, after such an operation as a gastro-enterostomy, a lateral anastomosis, or removal of the appendix, where the peritoneal cavity is of necessity opened; nor after removal of a stone from the kidney or the bladder where the peritoneum remains untouched. Yet the operation for the removal of gall-stones need be no more serious than any of these if it be undertaken at a correspondingly early period. But for some reason the operation of cholecystotomy has never met with the same amount of favour as nephrolithotomy, and patients with gall-stones are left to suffer for years, whilst if the calculus had been in the kidney it would have been removed immediately. In operations for gall-stones, therefore, the surgeon too often operates upon patients exhausted by prolonged illness, or suffering from acute inflammation of a chronically diseased organ, whilst in renal calculus the inflammatory changes are of comparatively recent origin. Many general practitioners still hesitate to advise their patients to undergo an operation for the removal of gall-stones, and recommend palliative measures, which they would not countenance for a moment in the case of a renal calculus. It is difficult to account for this difference of procedure in the operations of nephrolithotomy and of cholecystotomy. The two operations were introduced nearly simultaneously, but perhaps it is the atavistic fear of interfering with the liver, or opening the peritoneal cavity, which has lingered here after it has deserted all the other abdominal organs. The fact remains, however, that even at the present day calomel and large doses of olive oil are still given to patients suffering from gall-stones, in the hope that they will be more readily passed. Such treatment is on a level with that of the lithontriptic period of medicine when Parliament, in 1739, paid Joanna Stephens £5,000 for her stone solvent, which proved to be burnt eggshells and snails with Alicant soap. Horace Walpole gives a caustic little account of it in one of his letters to Horace Mann. He says: "My father has been extremely ill this week with his disorder; I think the physicians are more and more persuaded that it is stone in his bladder. He is taking a preparation of Mistress Stephens's medicine, a recipe of one Dr. Jurin. I made his physician

* A Paper read at the Cardiff Medical Society, February 28, 1913.

angry with me by arguing on this medicine, which I never could comprehend. It is of so great violence, that it is to split a stone when it arrives at it, and yet it is to do no damage to all the tender intestines through which it must first pass. I told him I thought it was like an admiral going on a secret expedition of war, with instructions which are not to be opened till he arrives in such a latitude." Our pathological knowledge about vesical calculi has improved ; but there are many who are still in the dark ages as regards biliary calculi.

History.—The history of gall-stones is unusually short, since they do not appear to have attracted the notice of medical writers in classical times. There is no doubt that they have always existed, because Prof. Elliot Smith observed a large gall-stone in the mummy of an Egyptian priestess. Rhazes knew that they occurred in animals, although he makes no mention of them as a cause of disease in the human. Gentilis de Foligno noticed them in the thirteenth century, and their origin was discussed, as soon as anatomy began to be studied, by such acute observers as Andreas Vesalius and Fernelius in the sixteenth century. Their surgical treatment was first considered by Maître Jean Louis Petit in 1743. Petit (1674-1760), who was the best French surgeon of his day, and came nearly to our ideal of a first-rate surgeon of the old school, read a most illuminating paper upon "Tumours of the Gall-bladder."¹ In this paper he lays down clearly the diagnosis of gall-stones, and quotes cases which he had seen during the stage of acute biliary colic. He watched the patients for years after their recovery, until their death enabled him to obtain an examination for the purpose of ascertaining the pathological causes and effects of the symptoms he had observed and recorded during the acute attack. He learnt by these means that an inflamed gall-bladder might become adherent to the abdominal wall, that gall-stones might ulcerate into the colon, and that the gall-bladder might be reduced to a mass of fibrous tissue. In this paper, too, he advances the opinion that the gall-bladder may be opened with safety when it has become adherent to the abdominal wall—a fact which could hardly have escaped the notice of contemporary surgeons—but he went a step farther, and advocated the deliberate opening of the gall-bladder for the removal of gall-stones. He states that he had seen such an operation performed accidentally in three cases where the swelling had been mistaken for an abscess of the liver. Two of the patients died, the third recovered. On the analogy of the urinary bladder, from which stones are safely removed by lithotomy, he thought it quite possible to extract biliary calculi from the gall-bladder. He advises, therefore, that the gall-bladder should be punctured with a trocar and cannula when it forms a palpable tumour. Some of the bile is withdrawn, and if a gall-stone is felt, a bistoury is passed through the cannula, and the gall-bladder and abdominal wall are divided from within outwards as the bistoury and cannula are withdrawn. The incision should be large enough to admit the surgeon's finger, and the gall-stone is to be removed through the wound thus made. Petit claims that the operation is a new one, and of his own invention ; but it does not appear from his paper that he had ever performed it, and, if it was done by his pupils, it must have proved too dangerous for ordinary use, and it soon fell into oblivion.

The modern history of cholecystotomy dates from 1879, when Lawson Tait read a paper on November 11, before the Royal Medical and Chirurgical

Society. The paper is headed, "A Case of Cholecystotomy performed for Dropsy of the Gall-bladder due to Impaction of a Gall-stone."² Mr. Lawson Tait introduced his communication with the following remarks: "The great success which has followed the performance of operations for ovarian tumours has led to the extended use of abdominal section in directions which could hardly have been hoped for till within the last few years. My own experience of nearly two hundred cases of abdominal section has been such as to lead me to the conclusion that no abdominal or pelvic tumour ought to be left unexplored if it seems to affect seriously the life and comfort of the patient, unless it be incontestably of a cancerous character.

"Dr. Marion Sims attributes to Dr. Handfield Jones, and I think correctly, the merit of first suggesting that the liver and gall-bladder should be included within the field of surgical practice more fully than they had been up to that point, and particularly that surgical interference should be made in cases where death is threatened from the impaction of a gall-stone.

"To Dr. Marion Sims himself must be given the credit of having followed out this suggestion with his usual boldness and ability, and he himself points out that the case in which he did it was not successful only because the operation was too long delayed. To my good fortune it has fallen to be the first to follow out Dr. Handfield Jones' idea and Dr. Sims' plan successfully."

The patient upon whom this first successful operation was performed was a woman, aged 40, who had suffered for a few weeks from symptoms of gall-stone colic. The gall-bladder was opened on August 23, 1879.

Cases.—The text of my present address consists of ninety cases of disease of the gall-bladder which have been under my observation at St. Bartholomew's Hospital and elsewhere during the years 1900–1912. The first seventy-three patients suffered from cholelithiasis, the remaining seventeen had inflamed gall-bladders which needed surgical interference, the inflammation being due to various causes, but there were no gall-stones. I am indebted to the kind help of one of my dressers, Mr. Edward Brunton, for making abstracts of the notes, and for afterwards writing to the patients to ascertain their condition in December, 1912.

Table A (p. 27) contains a short record of the cases, giving the sex, age, duration of symptoms, result of treatment, and a note of the salient features of each case.

Of the total number of ninety cases, fifty-eight were women and thirty-two were men. The age of the patients varied from five years to eighty-two years. The patient aged five was a boy with an empyema of the gall-bladder, who died of a sarcoma of the gall-bladder two months after the operation. The symptoms had lasted from a few days to twenty years or more. Fifty-seven of the patients were jaundiced at some period of their illness; the remaining thirty-three had never suffered from icterus. The gall-bladder was palpable through the abdominal walls in twenty-two cases, and in the remaining sixty-eight it could not be felt. Except in the fattest people, there was a localized tension of the abdominal wall in the right hypogastric region even when there was no localized tenderness. Many of the patients had been treated for very long periods of time; some knowingly for gall-stones; others for indigestion, and a few for ague or some other

form of intermittent fever. All had suffered from attacks of biliary colic ; some so slightly that close questioning alone elicited the history ; others so often, and so severely, that they were at last driven to surgery for relief ; whilst others again had suffered from a single attack of such severity that an operation had to be performed at once, or immediately after it had subsided. None of the attacks were really without warning, in the sense that perforation of a duodenal ulcer occurs without warning, because, when careful investigation was made subsequently, there was always a history of symptoms which, if properly interpreted, would have given a clue to the fact that the patient had been suffering from cholelithiasis for some length of time. The absolutely sudden attacks of hepatic colic in persons who had considered themselves healthy up to the instant of the seizure, proved to belong to the second group of cases in the table where acute infection was found without any gall-stones.

This second group (Nos. 74-90) contained some of the most interesting cases in the series. In only two of the sixteen cases had the patients suffered from gall-stones, the one nine and the other fourteen years previously ; and even in these patients no fresh gall-stones were found at the time of the operation. The exploration of the gall-bladder showed that the symptoms were due to acute or chronic inflammation of the gall-bladder, with or without the formation of pus. The other patients had malignant disease in the neighbourhood of the gall-bladder. One man (No. 87), aged 57, had a round-celled sarcoma of the liver. The sarcoma contained a large cyst which showed evidence of extensive and recent degenerative changes ; another (No. 77)—the five-year-old boy already mentioned—had a spindle-celled sarcoma of the gall-bladder, which at the time of the operation contained five ounces of pus. He died two months later. A man, aged 56 (No. 89), had a greatly distended gall-bladder which contained neither gall-stones nor new growth. He died six weeks later, and the post-mortem examination showed that he had a carcinoma of the duodenum involving the opening of the common bile-duct. A woman, aged 51 (No. 90), had suffered from indigestion for many years, but had never been jaundiced. She had noticed a small, painless swelling in the right hypochondrium for two years. Two months before her admission to the hospital the swelling increased in size, became painful, and she began to lose flesh rapidly. An abdominal exploration showed that the patient had malignant disease of the liver, gall-bladder, and small intestine. She died nineteen days later.

It is interesting to notice that in several cases where great thickening of the tissues near the gall-bladder was observed at the time of the exploration, and a prognosis of cancer was given, the patient is alive and well to this day. Here is such a case : M. M., aged 70, was admitted on account of a painful lump in the right hypochondrium. She had been jaundiced twenty years ago, fourteen years ago, and seven months since, and when she was seen her skin was of a deep yellowish-brown. Examination showed that her abdomen was distended, and that the outline of the small intestine was visible through the parietes. A tumour could be felt just below the 9th costal cartilage on the right side. It was connected to the liver by a stalk, and was hard, irregular, and elongated. The liver itself was natural, but the abdominal cavity contained some free fluid. At the operation, the gall-bladder was found to be enlarged ; it contained blood, degenerated material, and forty gall-stones. The tissues underlying it were so

thickened and adherent, that she was thought to be suffering from cancer. The gall-bladder was stitched to the abdominal wall and drained. The sinus soon closed, and she left the hospital six weeks later. She died of bronchitis two years afterwards without any further symptoms of abdominal mischief. Such cases show that the long-continued irritation of gall-stones may lead to a thickening of the surrounding tissues, such as is known to occur in chronic duodenal ulceration and in some cases of non-suppurative appendicitis. The surgeon should be careful not to give too absolute a prognosis when he meets with such a condition, and the knowledge of its occurrence should make him the more insistent upon the necessity of removing gall-stones as early as possible. It is most likely to occur when the common bile-duct actually runs for some distance in the substance of the pancreas before it opens into the intestine.

Table B (p. 32) gives the results of the treatment of gall-stone by surgical methods. The cases fall into three groups—for I have adopted Prof. Kehr's classification, and have added for comparison the statistics which he collected up to the year 1908.³ *Group I* comprises operations where there were no complications, and the gall-stones were removed easily. *Group II* includes the more difficult cases where there were minor complications to overcome. *Group III* contains all those desperate cases where the operation was one of urgency and left the patient no choice.

Group I.—There is little to be said about the first group. They are analogous to the removal of a diseased appendix during the quiet stage, and the mortality is comparable with that operation. In them the gall-bladder is opened, the gall-stones are removed, the impaction in the cystic duct is slight, and the coats of the gall-bladder are comparatively healthy. The incision in the wall of the gall-bladder can often be sutured at once, and the abdomen closed without drainage. All the patients have done well, whether they were treated in this manner, or by attaching the cut edges of the gall-bladder to the abdominal wall—excluding the skin—and allowing the wound to heal by granulation.

Group II.—In the second class are placed the patients with minor complications—those whose gall-bladders were found to be adherent to the surrounding tissues; to be shrunken; fibrous; thickened; inflamed, or softened; to contain mucus or much débris—where the gall-stones were difficult to remove on account of their size, their number, or because they had become so firmly impacted in the bile-ducts as to need considerable manipulation before they could be extracted. The gall-bladder in these cases was always drained, and in many cases the fundus, at least, was removed.

Group III.—The serious complications occurring in the third class were: rupture of the gall-bladder, with or without suppuration, gall-stones lying free in the peritoneal cavity at the time of the operation; necrosis of the gall-bladder, either wholly or in patches; where there was perforation of the duodenum or colon resulting from ulceration due to the passage of gall-stones; where there were symptoms of acute intestinal obstruction with or without the impaction of a gall-stone in the intestine; where there was an abscess in the neighbourhood of, but not limited to, the gall-bladder; where there was a co-existing appendicitis, an inflammation of the pancreas, or a thickening of the tissues round the gall-bladder, raising a suspicion of malignant disease; and, finally, the emergency

cases where the patient was moribund on his admission to the hospital, or where there was serious hæmorrhage, either immediate, reactionary, or secondary.

Table B also gives the percentage mortality of the cases in each group as well as the total mortality of the whole series. In calculating this mortality I have followed the excellent advice offered by Messrs. W. J. and C. H. Mayo,⁴ which is, "that in estimating the death rate we have charged as a death from operation every patient who died in the hospital, without regard to the cause of death, or the time which elapsed between the operation and the fatal issue. It includes the patients dying as long as three months after operation, and from intercurrent disease or accidental cause, such as apoplexy, pneumonia, heart disease, chronic nephritis, etc. A percentage of the deaths could be fairly excluded, but as the object is to show the relative curability rather than good statistics, we have concluded that the above method is at least unprejudiced. It undoubtedly has a tendency to exaggerate the dangers of operation, particularly in common-duct disease, where long-continued infections of the bile-passages have resulted in blood changes causing death at a late period. But it also illustrates the dangers of delay and the tendency to produce complications which operation may be unable to relieve." In other words, patients who left the hospital alive are counted as cured. Taking the figures on this principle, the results of my cases show that there was no mortality in the simple cases, for there were twenty-six operations without a death. Three of the patients were men, and twenty-three were women.

There were twenty-seven cases in which the slighter complications were met with, eight being men, and nineteen women. Six died—three men, and three women—giving a mortality of 22.2 per cent.

In twenty cases the complications were so serious that it is probable all the patients would have died unless an operation had been performed. Six were men, who all died; fourteen were women, of whom five died. The mortality, therefore, was 55 per cent; but this should be looked upon as 45 per cent saved, and not as 55 per cent dead.

The total mortality of the operable cases, that is to say, of cases operated upon with a reasonable chance of success, was 11.3 per cent; whilst the total mortality of all the cases, taking operable and inoperable together, was 23.3 per cent.

Prof. Hans Kehr, of Halberstadt, has collected the statistics of gall-stone operations from all sources published to the end of the year 1908.³ He finds, following the system of classification which I have adopted from his tables, that:—

1. 2,494 simple gall-stone operations have been performed, with a mortality of 3.6 per cent, for there were eighty-nine deaths.

2. 341 patients were operated upon where there were slight complications, and of these forty-seven died, giving a mortality of 13.8 per cent.

3. 408 patients had severe complications, of whom 250 died, giving a mortality of 61.3 per cent.

He concludes, therefore, that there were 2,653 operable cases of gall-stones, with a mortality of 5.9 per cent; whilst the total mortality of operable and inoperable cases together was 12.9 per cent, since 3,254 cases are recorded, with 422 deaths.

TABLE A.—CASES OF OPERATIONS ON THE GALL-BLADDER
BY D'ARCY POWER, F.R.C.S.Eng.

No.	SEX	AGE	DURATION OF SYMPTOMS	RESULT	REMARKS
1	M	56	Five years	*R	Jaundiced, increased resistance over region of gall-bladder: 35 gall-stones: gall-bladder sutured.
2	F	70	Two years	R	No jaundice: palpable tumour: one gall-stone weighing an ounce, much mucus and bile: gall-bladder sutured.
3	F	46	Three years	R	No jaundice: repeated biliary colic: one large gall-stone: gall-bladder drained.
4	F	62	Thirteen years	R	Jaundiced: repeated biliary colic: 27 gall-stones: gall-bladder drained.
5	F	27	Twelve months	R	No jaundice: repeated colic: one gall-stone: gall-bladder small and shrunken: gall-bladder sutured.
6	F	—	" Since childhood "	R	No jaundice: repeated colic: one gall-stone weighing an ounce: gall-bladder sutured.
7	F	71	Twelve years	R	Jaundiced: repeated colic: resistance over region of gall-bladder: 6 large gall-stones: gall-bladder sutured.
8	F	22	" Some months "	R	No jaundice: repeated colic: one gall-stone as large as a walnut: gall-bladder sutured.
9	M	52	Twenty years	R	Jaundiced: repeated colic: palpable tumour: two gall-stones: gall-bladder thickened and suppurating: gall-bladder drained.
10	F	50	Eight years	R	Jaundiced: repeated colic: 8 gall-stones: gall-bladder contracted, very adherent to colon and duodenum: gall-bladder drained.
11	F	49	Six months	**D†	Jaundiced: repeated colic: 1 stone: gall-bladder small and contracted. Death from collapse same day.
12	M	45	Two years	D†	Jaundiced: repeated colic: has passed 6 gall-stones: 96 stones removed: gall-bladder sutured. Death from peritonitis four days later.
13	M	42	Three years	D†	Jaundiced: repeated colic: gall-bladder undiscoverable. Death from collapse three days later. P.M. very fat: gall-bladder shrivelled: surrounded by adhesions: contained a few drachms of green pus and a gall-stone at junction of cystic and hepatic duct.
14	F	46	Ten months	R	Continued jaundice: 54 gall-stones: mass of disease felt behind gall-bladder: (?) pancreatitis: gall-bladder drained.
15	M	68	Eight years	D†	No jaundice: palpable tumour: gall-bladder thought to be malignant mass and not opened. Died of bronchitis 13 days later. P.M. gall-bladder contained many gall-stones: calculus at junction of cystic duct and neck of gall-bladder: common bile-duct obstructed by several small gall-stones.
16	M	48	(?)	D†	Traumatic rupture of gall-bladder softened by cholelithiasis: gall-stones free in peritoneal cavity. Death same day.
17	F	53	Nine years	D†	Repeated colic: at operation large abscess of gall-bladder opening into duodenum, one faceted gall-stone in abscess. P.M. many secondary deposits, walls of abscess cancerous.
18	M	82	Several years	D†	Deeply jaundiced: gall-stones: pancreatitis: no operation. Died two days after admission.

* R = Recovery.

** D† = Died before leaving the hospital.

CASES OF OPERATIONS ON THE GALL-BLADDER—*Continued.*

NO.	SEX	AGE	DURATION OF SYMPTOMS	RESULT	REMARKS
19	F	47	Eight weeks	R	Palpable gall-bladder: slight jaundice: eight gall-stones removed: gall-bladder drained.
20	M	42	Six months	R	Not jaundiced: a greatly thickened gall-bladder containing a large friable gall-stone removed piecemeal: gall-bladder drained.
21	F	48	Nine weeks	D†	Palpable tumour: constant pain since first onset of symptoms: jaundiced: gall-bladder a mass of dense fibrous tissue containing one large round stone. Death two days later after hæmorrhage: prolonged P.M. examination failed to show cause of death. Very fat.
22	M	40	(?)	D†	Admitted moribund with general peritonitis: abscess in region of gall-bladder: gall-stones free in peritoneal cavity.
23	F	40	Ten years	D†	Jaundiced: fundus of gall-bladder removed with 2 gall-stones: many adhesions between gall-bladder, colon, and liver. Death from asthenia one month later.
24	F	75	Many years	R	Appendicitis and cholelithiasis.
25	M	60	Several years	D†	Jaundiced: admitted with acute obstruction of one week's duration: ileo-colostomy. After death hepatic and common bile-duct filled with gall-stones.
26	F	35	Ten months	D†	Jaundiced: fundus of gall-bladder removed with one large stone: gall-bladder adherent to colon and duodenum. Death 48 hours afterwards. P.M. many small abscesses round bile-ducts: a sloughy cavity connected with the duodenum.
27	F	73	Fourteen days	R	Jaundiced: gall-bladder palpable: 183 small stones removed: pus in gall-bladder: much thickening behind gall-bladder, which was drained. (Death 2½ years later.)
28	F	40	Fourteen years	R	No jaundice: gall-bladder palpable: 9 stones removed: gall-bladder drained. (Survived 3 years, and died of acute bronchitis.)
29	F	40	Fourteen years	R	No jaundice: gall-bladder palpable: refused operation.
30	F	68	Five years	R	Slightly jaundiced: gall-bladder palpable: one stone size of a hazel nut removed from enlarged and inflamed gall-bladder: gall-bladder drained.
31	F	70	Twenty years	R	Jaundiced: tumour palpable: 40 gall-stones: many adhesions: much thickening at back of gall-bladder: blood and degenerated material in gall-bladder.
32	F	36	One year	R	Repeated colic: no jaundice: one gall-stone in dilated cystic duct: gall-bladder filled with clear mucus: gall-bladder drained.
33	F	39	One year	R	No jaundice: fundus of gall-bladder a mass of fibrous tissue: several faceted stones removed from cystic duct: fundus removed: drained.
34	F	43	Five weeks	R	No jaundice: gall-bladder palpable: 34 gall-stones removed: pus at base of gall-bladder: then mucus: then calculi: drained.
35	F	48	Eight months	R	No jaundice: one gall-stone in contracted gall-bladder: bound down by adhesions: drained. Given a belt. (Alive and well five years later.)
36	F	66	(?)	R	No jaundice: several small gall-stones and much thick pus removed from gall-bladder: drained.
37	F	54	Many years	R	Slight jaundice: gall-bladder palpable: several small stones removed from necrosing gall-bladder: fundus removed: drained.

CASES OF OPERATIONS ON THE GALL-BLADDER—*Continued.*

NO.	SEX	AGE	DURATION OF SYMPTOMS	RESULT	REMARKS
38	F	47	Fourteen years	R	No jaundice: gall-bladder palpable: many small stones and fundus of gall-bladder removed: drained.
39	F	43	Eight years	R	Jaundiced: refused operation.
40	F	50	Seven months	R	Jaundiced: 16 gall-stones and fundus of gall-bladder removed: many adhesions. (2½ years later in good health, no further attacks.)
41	F	44	Seven years	R	No jaundice: gall-stones and fundus of gall-bladder removed: difficulty in stopping hæmorrhage: wound plugged.
42	F	53	Three years	R	Jaundiced: 23 gall-stones: gall-bladder drained. (Well two years later, no recurrence of colic.)
43	F	74	Twenty years	R	Jaundiced: palpable gall-bladder: 50 gall-stones and an ounce of pus in gall-bladder: drained. (Died 15 months later, no return of colic.)
44	M	54	Nine months	R	Jaundiced: 3 gall-stones pushed into duodenum: gall-bladder not opened. (3 years later, no return of colic: excellent health: wears belt for hernia.)
45	M	33	Six years	R	Jaundiced: 4 stones and fundus of gall-bladder removed: gall-bladder much contracted. (No return of colic after sixteen months: health excellent.)
46	M	25	A few days	R	Sudden violent onset of pyloric pain with rigid abdomen: fundus of gall-bladder removed: pus and one gall stone: drainage.
47	F	72	Four years	D†	Jaundiced: repeated colic: several small stones. Died of cholæmia five days after operation.
48	F	40	Two years	R	Jaundiced: repeated colic: two calculi: pus: gall bladder drained.
49	M	70	Eight months	D†	Jaundiced: repeated colic: a large mushroom-shaped calculus: gall bladder sutured. Death from hæmorrhage into bowel 48 hours later.
50	M	36	Three years	R	Not jaundiced: repeated colic: palpable tumour: many gall-stones and pus in gall-bladder: drained.
51	F	48	Many years	R	Not jaundiced: palpable tumour: no typical biliary colic: over 600 calculi of varying sizes removed: gall-bladder drained.
52	F	32	Three months	R	Not jaundiced: increasing colic: three gall-stones: drainage.
53	M	66	Several years	D†	Jaundiced: one small gall-stone. Death from interstitial pancreatitis and cancer of liver 6 months later.
54	F	62	Sixteen months	R	Jaundiced: repeated colic: several stones removed: fistula: fundus of gall-bladder removed by secondary operation and cholecystenterostomy. Cure.
55	F	72	Several years	D†	Not jaundiced: no typical colic: intestinal obstruction 12 hours: large gall-stone removed from upper part of jejunum. Death from collapse same night. Very fat.
56	F	55	Twelve months	R	Not jaundiced: palpable tumour: declined operation: appendix removed 18 months since.
57	F	70	Nine months	D†	Jaundiced: repeated colic: gall-bladder explored: no stones found. Death 18 days later. Very fat. P.M. dense adhesions round contracted gall-bladder: common bile-duct contained 4 small calculi and right hepatic duct 1: no biliary obstruction: great fæcal impaction.
58	F	50	Five weeks	R	No jaundice: palpable lump: no colic, only dull pain: gall-bladder distended with mucus: two stones, one blocking cystic duct: drained.

CASES OF OPERATIONS ON THE GALL-BLADDER—*Continued.*

NO.	SEX	AGE	DURATION OF SYMPTOMS	RESULT	REMARKS
59	F	46	Five days	R	No jaundice: sudden attack of pain with intestinal obstruction: gall-stone removed: extensive thickening of gall-bladder, liver, and colon: inoperable carcinoma. Discharged to a home three weeks later.
60	F	55	Four years	R	No jaundice: no typical colic: 3 large calculi removed from a thickened gall-bladder distended with mucus: appendix had been removed 3 years, and both breasts for carcinoma 10 and 9 years ago: recurrent axillary glands removed 8 years ago: hæmorrhoids tied 4 years ago: wore a belt for movable kidney 18 months.
61	F	45	Fourteen years	R	No jaundice: severe colic: palpable tumour. Many gall-stones removed from a contracted and adherent gall-bladder containing mucus and afterwards muco-pus. Cholecystectomy had been performed 14 years previously, when 4 gall-stones were removed. Drainage each time.
62	M	33	Six years	R	Jaundiced: palpable tumour: severe colic two days before admission: 4 stones removed from a gall-bladder surrounded by recent adhesions. Cholecystectomy: drained.
63	M	53	Thirty-one years	R	Not jaundiced: increasing colic: localised tenderness: gall-bladder small, tightly adherent, filled with tough mucus: containing 3 stones. Cholecystectomy: drained.
64	M	41	Many years	R	Not jaundiced: all his life dyspeptic: seized with sudden pain on the day of the operation; gall-bladder adherent to surrounding structures: a few small gall-stones squeezed along duct.
65	F	46	Seven months	R	Jaundiced: colic: refused operation.
66	F	50	Eight weeks	R	Jaundiced: colic: very fat: no tumour palpable: 1030 calculi removed, 7 measuring $\frac{3}{4}$ in.: drained.
67	F	46	Six months	R	No jaundice: colic: 2 large gall-stones and fundus of gall-bladder removed: appendicectomy at same time: no drainage.
68	F	49	Three years	R	Jaundiced: repeated colic: 28 gall-stones: drainage.
69	F	56	Some months	R	Jaundiced: several gall-stones: pus in gall-bladder; drainage.
70	F	38	2½ years	R	No jaundice: 4 gall-stones removed: drainage.
71	F	32	Five years	R	No jaundice: palpable lump; 138 gall-stones removed: drainage.
72	M	60	Six years	R	Jaundiced: repeated attacks: 102 gall-stones removed: drainage.
73	F	46	Seven months	R	No jaundice: gall-bladder palpable: pus: mucus: one large gall-stone: drainage.
74	F	57	Twelve years	R	Passed 3 gall-stones 9 years ago: repeated attacks of pain during last four months: many adhesions: no gall-stones.
75	F	35	Two years	R	Constant pain, with localized hypogastric tenderness: cholecystectomy: mucous membrane of gall-bladder like a strawberry.
76	F	30	Three weeks	R	Very jaundiced: palpable swelling: gall-bladder distended and inflamed: no stones: drained.
77	M	5	Three months	D†	Jaundiced: palpable swelling; 8 ounces of pus in gall-bladder. Death 6 weeks later from spindle-celled sarcoma of gall-bladder.

CASES OF OPERATIONS ON THE GALL-BLADDER—*Continued.*

No.	SEX	AGE	DURATION OF SYMPTOMS	RESULT	REMARKS
78	M	22	One month	R	Ailing since influenza 2½ years ago: no jaundice: tumour palpable: 8 ounces sterile pus evacuated from liver near gall-bladder.
79	M	29	Ten years	R	Jaundiced: stone removed 4 years previously: gall-bladder very distended and adherent: no stone: cholecystectomy.
80	M	28	Three years	R	Jaundiced: pain in hypogastric region: general distention: gall-bladder nothing abnormal detected.
81	M	59	Five years	R	Jaundiced: palpable swelling: gall-bladder full of pus: drainage.
82	M	42	One week	R	Jaundiced: gall-bladder inflamed, thickened: full of pus: drainage.
83	M	40	Four months	R	Jaundiced: gall-bladder inflamed and thickened: no gall-stones or pus.
84	F	58	One year	R	Very jaundiced: gall-bladder distended, but no cause found: drainage.
85	F	49	Four years	R	Jaundiced: gall-bladder full of foul-smelling bile, from which a pure culture of <i>B. coli</i> was obtained: drainage. (Well 20 months afterwards.)
86	M	63	One month	D†	Jaundiced: common duct surrounded by new growth, which also involved pancreas.
87	M	57	Seven months	D†	Jaundiced: large swelling in epigastrium: operation showed it to be a round-celled sarcoma containing a large cyst.
88	F	37	Six weeks	D†	Jaundiced: malignant growth in head of pancreas: distended gall-bladder. Death a fortnight later.
89	M	56	Ten weeks	D†	Jaundiced: palpable swelling: gall-bladder greatly distended: no stones or growth. Death six weeks later. Carcinoma of duodenum: two secondary nodules in liver.
90	F	51	Two years	D†	No jaundice: palpable swelling. At operation malignant disease of liver, gall-bladder, and small intestine discovered. Death 19 days later.

Commentary.—The first point which arises from a study of the two tables which are here offered for consideration is the frequency with which gall-stones occur. It is clear that they are not rare in London, if a single general surgeon like myself operates upon eight or nine cases a year; because for one patient who is operated upon, there must be at least ten who suffer from gall-stones and are allowed to go without surgical intervention. The incidence of cholelithiasis varies somewhat in different parts of the world. Dr. Rolleston⁵ says that "in routine post-mortem work gall-stones are usually found in 10.5 per cent of the subjects. In 10,866 cases, obtained by combining the figures of Roth, Schloth, and Schroeder, gall-stones were present in 1,029 or 9.4 per cent. This agrees with Kehr's statement that one-tenth of the adult German population is affected with cholelithiasis. In America and England the percentage is lower. In 1,655 American cases there were 115, or 6.9 per cent, with gall-stones. At the Middlesex Hospital, Voelcker found gall-stones in 8.5 per cent; and Colwell, at a later period (1900-1904), in 5.4 per cent; Brockbank, at Manchester, found 101 cases of gall-stones in 1,347 necropsies, or 7.4 per cent. At St. George's Hospital there were 268 in 4,616, or 5.8 per cent. Among 4,544 necropsies in India (93 per cent on natives and 7 per cent on Europeans), Rogers found 233, or 5.4 per cent, with gall-stones."

It is clear that many of these gall-stones gave rise to such slight symptoms as to cause them to be overlooked. It is well-known, too, that gall-stones are often passed spontaneously, or as a result of adequate medical treatment. The surgeon cannot, and should not, interfere under these conditions; but a large residuum of cases remains which ought to come under his care at a very much earlier period than is now the custom. Indeed, the second point, which is brought into prominence by *Table A*, is the extraordinary patience of those who suffer from gall-stones. The duration of the symptoms in many cases has been "for years;" "from childhood;" "for eighteen months;" very rarely for days or weeks. The patients have suffered during these long periods from repeated attacks of gall-stone colic, with or without jaundice. They have had constant dyspepsia, and they have frequently had local tenderness in the right hypochondrium. Their patience has been fortified in too many cases by their doctors—sometimes from a natural reluctance to recommend what seemed to them a hazardous operation; sometimes from that habit of procrastination which so often governs the treatment of disease when the symptoms are intermittent and only occasionally severe; sometimes, and I am afraid rather frequently, from an error in diagnosis. There seems to be a general impression that gall-stones cannot be present without jaundice or biliary colic, and this leads to the treatment of symptoms, when a physical examination would quickly clear up the cause of the patient's continued ill-health. It cannot be insisted upon too strongly, therefore, that dyspepsia with flatulence and occasional attacks of ill-defined pain demands a physical examination of the abdomen, and not the bottle of physic containing gentian, rhubarb, or bismuth, which is generally prescribed and repeated for long periods of time.

When gall-stones are present, examination of the abdomen often reveals a tender spot in the right hypochondrium, at a point which is too high for the pain of appendicitis, whilst it differs from that of a pyloric or duodenal ulcer, because in these conditions the pain is not felt until the inflammatory condition has

penetrated to the peritoneal coat, or in other words, until the ulcer has begun to leak. In these cases there is often a second point of tenderness in the right and, perhaps, the left iliac regions, so that a patient may be operated upon for appendicitis, or for a left pericolic abscess, when in reality *she* is suffering from gall-stone, or *he* has a leaking duodenal ulcer. The localized tenderness over the region of the gall-bladder is naturally associated with some rigidity of the upper part of the right rectus abdominis muscle, and even when tenderness is not a marked feature, the slight tonic contraction of the muscle can be detected by a careful and gentle observer if the patient is sufficiently thin to allow the abdominal muscles to be felt. The localized tenderness and rigidity are naturally best marked when there has been recent inflammation of the gall-bladder, although skilled palpation will reveal it in most of the cases where the patient has suffered from painful flatulent dyspepsia, which operation afterwards shows was associated with gall-stones. It is not probable that a mistaken diagnosis will be made when the patient has had a well-marked attack of biliary colic, because the symptoms of gall-stone colic are characteristic, and cannot be better described than in the words of Sir Berkeley Moynihan,⁶ who says :—

The symptoms caused by the impaction of a stone in the cystic duct are quite characteristic. There is probably a sense of gastric uneasiness, with flatulence, belching, and a sense of distention, as is so often the case in the cholelithic patient after meals. Quite suddenly, however, often with onset as instant as if he were stabbed, the patient is seized with the most acute pain, felt across the epigastrium, often more on one side than the other, and nearly always through to the back, near the tip of the right shoulder. The agony may be terrific, and the patient may reach the very limit of human endurance. He is infinitely restless, and in this differs from the rigid and motionless patient who has suffered the perforation of a gastric or duodenal ulcer. He is moaning and moving without pause, pressing the body with one hand or both, or bending over a chair or clutching a hot bottle to the abdomen. He sweats and yet feels cold and clammy. He breathes with difficulty, owing to a spasm of the diaphragm, which, like the other abdominal muscles, is tightly contracted to form that firm muscular splint whose purpose it is to keep at rest and free from harm a lesion in need of protection. Nausea, and nearly always vomiting, occur, and vomiting may cause relief, probably by reason of the muscular relaxation which it induces. Very often the pain disappears with absolute abruptness. One moment the patient writhes in agony, the next he smiles in relief. The instant beginning and the instant cessation are characteristic of cystic-duct obstruction—they never occur in any other form of gall-stone obstruction with anything like the same precision. The pain is almost always referred to the back, and Boas' sign can often be elicited in and after a seizure. If an attack last for some hours, the distended, tense, and tender gall-bladder may be felt. It is often exquisitely sensitive, and may remain so for many days. The importance of tenderness along the lower border of the liver in cholelithiasis was first indicated by Naunyn, who wrote that, in patients who have recently suffered from an attack of colic, "pain is induced when, during a deep inspiration, pressure is made with the hand as far upwards as possible beneath the right costal border. At the moment when the liver impinges upon the tips of the fingers the patient experiences a deep-seated pain."

No patient should be allowed to pass through the ordeal of repeated attacks of biliary colic if the cause of his complaint can be discovered by other means. Neither should it be possible for a greatly enlarged gall-bladder to be discovered accidentally, as is too often the case.

There are good scientific reasons for operating early in cases of gall-stones, quite apart from the clinical reasons—relief of pain and restoration of the patient

to a state of health. Gall-stones are the result of a chronic infection of the gall-bladder and its duct, the micro-organisms usually gaining access to the gall-bladder by means of the blood-supply, though it is possible that they may sometimes find their way directly from the intestine. The gall-stones are formed in the gall-bladder itself, and are only driven into the cystic and common bile-ducts by secondary processes. It must be assumed, therefore, that a gall-bladder which contains gall-stones is never in a healthy state. The inflammation leading to their formation is chronic, and their presence in the inflamed gall-bladder leads to still further changes, some of which are protective, whilst others are destructive in their character. The most common result of the long-continued irritation which they cause is a fibrosis. The gall-bladder becomes thickened and shrivelled (*Table A, Nos. 21, 33*) until it may be represented by a mass of fibrous tissue, in the centre of which is a gall-stone. In other cases, where a small gall-stone has blocked the cystic duct, the fundus of the gall-bladder atrophies so completely that it is impossible to find it at the time of the operation, and it is only recognized with difficulty when the liver has been removed at the post-mortem examination (*Table A, No. 13*). Sometimes the gall-bladder becomes dilated instead of shrivelling, and its walls may be so thin that it is a mere cyst full of calculi. Midway between these two extremes is the thick-walled gall-bladder (*Table A, No. 16*) which is so softened that it readily ruptures from an injury which would have had no effect upon a healthy organ. General suppurative peritonitis may follow upon such a rupture, and the patient may die as a direct consequence of a gall-stone of whose existence he was hardly aware. But it does not always require an injury to rupture a softened gall-bladder; suppuration is a common cause: the abscess bursts, and is either localized, or becomes the starting-point of a general peritonitis (*Table A, No. 22*). Sometimes the chronic inflammation ends acutely, and the gall-bladder undergoes necrosis either wholly or in parts (*Table A, No. 37*); whilst in other cases there has been ulceration involving the colon or duodenum (*Table A, No. 26*), cancer (*Table A, No. 59*), chronic inflammation of the pancreas (*Table A, No. 53*), impaction of a gall-stone in the intestine (*Table A, No. 55*), or the formation of dense adhesions (*Table A, No. 23*) leading to prolonged and difficult operations. Examples of all these conditions have come under my own observation, and the general conclusion at which I have arrived is that patients with a long history of painful and flatulent dyspepsia, raising a suspicion of the existence of gall-stones, require much more serious operations if they wait until acute symptoms compel them to seek surgical assistance, than those who are operated upon before such a critical stage is reached. The difficulties lie chiefly in the complexity of the adhesions, and in the impaction of gall-stones far away in the ducts. It is possible, too, that the continued irritation may lead to carcinoma of the gall-bladder, as it is thought to do in other parts of the body; my own experience is neither for nor against the theory as regards the gall-bladder. If, as is undoubtedly the case, the irritation produced by gall-stones leads to the various disastrous conditions here enumerated, there are good pathological reasons to insist upon an early operation in every case where a patient is thought to be suffering from cholelithiasis when it has been shown that other treatment is ineffective.

An examination of *Table B* shows that the risk attending operations in cases of uncomplicated gall-stones is extremely slight. I have been fortunate enough

to have had no deaths in twenty-six cases ; whilst Prof. Kehr's statistics show that the average mortality in this class is only 3·6 per cent, for there were eighty-nine deaths in 2,494 operations. The mortality was much higher where the operation had been delayed until it was attended with even minor complications, for six of my patients died in a series of twenty-seven cases, the mortality being thus 28·5 per cent. It is noted in three of the cases that the patients were so extremely fat as to be bad subjects for operation. In the most serious cases the mortality was extremely high, reaching 55 per cent in my own cases, and 61·3 per cent in Prof. Kehr's series. It is interesting in this connection to observe how badly men bear gall-stone operation. In my own cases eight men recovered and nine died after operation ; whilst forty-eight women recovered, and only eight died. Prof. Kehr's figures are ; 526 men recovered and 123 died, an average of 23·4 per cent ; whilst 2,494 women recovered and 275 died, giving a mortality of 11 per cent ; the total average mortality for all cases of gall-stones operated upon being 12·9 per cent.

Final Results after Operation.—Mr. Edward Brunton, whilst acting as one of my dressers, has been successful in obtaining twenty-three replies to the fifty-six letters of enquiry he sent to patients who had recovered from operations for gall-stones. Those who know how difficult it is to trace hospital patients will appreciate the success of his efforts in this direction. Each patient was asked as to the condition of his general health, whether he had suffered any fresh attacks of pain since the operation, how long the wound had taken to close when the gall-bladder had been drained, and for any remarks he might choose to make. It was ascertained by these means that three of the twenty-three cases had died at varying periods after leaving the hospital from causes unconnected with the liver or gall-bladder. Fourteen of those living were reported as being in good health, without any return of their symptoms. Four complained that they still had attacks of pain from time to time. They said that it was not of a colicky character, but was rather of a dragging type, and it was, I suppose, due to adhesions. In no case was there any evidence of fresh gall-stones having been formed. When the gall-bladder had been drained and allowed to heal by granulation it is noteworthy that a permanent sinus had never been left, and each of the patients stated that the wound had closed within six or eight weeks after leaving the hospital. Two of the patients who had been operated upon for an abscess in the neighbourhood of the gall-bladder, and who were otherwise well, stated that they had a ventral hernia, for which a belt was worn.

CONCLUSIONS.

The results obtained from these tables show that gall-stones should be removed as soon as is convenient after they are known to exist, and when it is certain that nature, assisted by medicinal means, is not going to allow them to pass without pain or much discomfort. I even go so far as to doubt whether, under the present policy of waiting for the stones to be passed spontaneously, the sum of human suffering produced by gall-stones is materially less in the twentieth century than it was when Jean Louis Petit wrote about them more than a hundred and fifty years ago. There is plenty of evidence to show that every attack of

colic, and even the long-continued presence of stones in the gall-bladder without the production of acute symptoms, is detrimental to the gall-bladder and the bile-ducts. No one thinks now of waiting until repeated attacks of appendicitis have destroyed the appendix, or caused it to become adherent to the surrounding structures. When a stone is recognized in the kidney it is removed before a chronic pyelitis has been produced, and if it is in the bladder there is no object in waiting until a cystitis has been set up and there is a septic infection of the urinary tract. An early operation is undertaken in each of these cases, and often with such signal success that drainage is dispensed with, and union takes place by first intention. Earlier operation in cholelithiasis would eliminate most of the complications which increase the severity of surgical measures and heighten a mortality which is otherwise insignificant. Mucocoeles, empyemata of the gall-bladder, adhesions, ulcerations, necrosis, and localized peritonitis would be abolished, or would become much less frequent. The gall-bladder could be sutured in many more cases than is possible at present, and the patient would be able to continue his life's work, or take her place again in society, without undergoing the purgatory of suffering through which the present contemplative method of treatment compels them to pass.

When an operation is decided upon for the removal of gall-stones at the present time, it is usually done at an earlier period in hospitals than in private practice. It is important that a hospital patient should not lose his work owing to chronic invalidism or repeated attacks of illness. He is willing, therefore, to submit himself to operation as soon as he recognizes that medicine is useless. The wealthier class nearly always postpone a visit to the surgeon until they have exhausted all other measures, and have undergone "cures" at the various health resorts at home and abroad. The more difficult cases, therefore, and those attended by the highest mortality, are more likely to occur in private than in hospital practice. There ought to be no such difference. Poor and rich should alike receive the same advice, and everyone should be told that the proper treatment for gall-stones is early removal.

The exact operation performed does not seem to make a material difference to the result obtained. In my earlier cases the gall-bladder was usually opened, drained, and allowed to heal by granulation. The "ideal" operation was performed occasionally; that is to say, the gall-bladder was incised, the gall-stones were removed, and the gall-bladder was sutured at once without any drainage. This method has always seemed to me to be attended with some degree of risk, because the complete closure of an unhealthy gall-bladder may fail to occur, however satisfactory the line of suture may appear at the time of the operation. When the abdomen is closed, the surgeon is left in ignorance of many serious post-operative complications, such as leakage from or hæmorrhage into the gall-bladder, which may need immediate treatment to be effective. I have, therefore, abandoned the "ideal" operation except in the very simplest cases, and even in those I employ it with a certain degree of reluctance. In the future, perhaps, when gall-stones are removed as soon as they are recognized, and in accordance with the canons of modern surgery, the "ideal" method will come into greater use. In looking through the notes of the operations, I find that for the last two or three years I have done more cholecystectomies than I did at first; that is to say, I have removed the fundus of the gall-bladder in most of the cases, ligaturing

the neck, disinfecting the stump, and afterwards burying it by bringing the peritoneum over it on the same lines as is usual in appendix operations. In nearly all these cases drainage has been employed for twenty-four hours, either by means of a tube or a piece of gauze. Gall-stones are not usually reproduced after removal. They are formed in the gall-bladder itself and not in the ducts. Comparative anatomy teaches us that the gall-bladder is a convenience rather than a necessity. It is well, therefore, to reduce to a minimum the slight risk of recurrence of biliary calculi by removing the gall-bladder at the time the calculi are removed. Perhaps it is by this means that I have been so fortunate as to escape the necessity of performing many secondary operations; my table shows that this has only been done once in the series.

As I am dealing more especially with gall-stones in their surgical aspect, I am not concerned with their treatment by medical means, even if I were competent to speak upon the subject. It is sufficient, therefore, to state that when gall-stones have been removed, the patient should be told that his method of life must be altered lest they should be formed again. More fluid, more exercise, more careful regulation of the bowels, are the chief points to which attention should be directed, on the assumption that gall-stones are the result of a chronic infective process starting in the alimentary canal. Whilst the gall-stones are present, it is useless to attempt to dissolve or dispel them by such means, but when they have been removed much can be done to restore the biliary apparatus to a healthy condition by curing the chronic cholangitis which originally led to their formation.

Finally, I would sum up the results at which I have arrived in the following propositions:—

1. The removal of gall-stones is not attended by serious risk in uncomplicated cases.
2. The continued presence of gall-stones in the gall-bladder and bile-ducts leads to chronic inflammation of the neighbouring tissues and organs.
3. This chronic inflammation is the chief cause of the complications which increase the danger attending operations for the removal of gall-stones.
4. Early operation is the best method of avoiding complications.
5. Early operation demands early diagnosis. It is the duty, therefore, of the general practitioner to examine his cases of chronic dyspepsia with greater care, and not to wait until attacks of jaundice, biliary colic, or even more acute symptoms make an examination of the gall-bladder imperative. The earlier the diagnosis is made, the less will be the average mortality of the operation.

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