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DIAGNOSIS OF GALL-BLADDER DISEASE.

By WILLIAM FITCH CHENEY, M.D.,

CLINICAL PROFESSOR OF MEDICINE, STANFORD UNIVERSITY MEDICAL SCHOOL,
SAN FRANCISCO, CALIFORNIA.

THIS paper is based upon experience derived from two sources: (1) from work for twenty years past in medical wards, and (2) from private practice for the same period in internal medicine. But the records of patients seen in wards have been accumulated by various observers, including interns, students and laboratory workers, and, furthermore, are not available now for study; they are therefore excluded from consideration, except as they have influenced the formation of opinions here expressed. All records made in private practice to April, 1906, were destroyed in the fire that swept San Francisco then. During the following thirteen years, from January, 1907, to January, 1920, there were seen for diagnosis and advice 6180 different patients, all of whose records have been preserved. But because the earlier ones of these are not as complete and detailed as the later, only the records for the past eight years have been reviewed as a basis for this study. During this period the total number of patients seen has been 3513, and among these there have been 114 where the diagnosis made was gall-bladder disease.

The methods employed to reach this diagnosis have been the usual ones of history, physical examination, laboratory and roentgen-ray investigations.

I. History. The value of this is so great, especially in all digestive disturbances, that no amount of time spent in eliciting it is ever

wasted. In all these records the history has been taken personally, not through assistants; has been written out in detail, often in the patient's own words; has been revised and supplemented at succeeding interviews, as the case progressed; and has certainly played the most important part in solving the problems presented. But there are numerous variations in the story told by the patient with gall-bladder disease and no one account fits every case. There seem to be four distinct groups, according to history, as follows: *Group 1.* Recurring attacks of colic, with good health between. *Group 2.* Recurring attacks of colic, with more or less constant indigestion between. *Group 3.* Chronic stomach trouble, with subacute gall-bladder attacks. *Group 4.* Chronic stomach trouble, with no history whatever pointing to gall-bladder over long periods of time.

GROUP 1. These are the patients with attacks of biliary colic recurring at irregular intervals, with good health for months or years between. The description they give is usually so characteristic that the story by itself makes the diagnosis. The sudden onset without known cause, the violence of the pain, its site at the right costal margin, its radiation under the right shoulder-blade, its duration for hours at least, all combine to make a picture that is unmistakable. Such a history as the following is typical of this group:

A woman, aged fifty-one years, complains that for the past five years she has had recurring attacks of pain in the upper abdomen. These may come once a month or even once a week, but she has gone two or three months without one. In the interval between attacks she feels perfectly well. The pain comes and ends very suddenly; is felt in the pit of the stomach and across the upper abdomen, radiating to the back, under the right shoulder-blade; its character is colicky and griping; its intensity is very great at times but not always equally so; its duration is very variable but never less than two hours. The attacks bear no relation to food and may precede or follow a meal. During the pain she is nauseated but rarely vomits. After one severe attack distinct jaundice followed. At operation this patient had a small contracted gall-bladder, containing two large stones which completely filled it.

Certain variations of this typical picture may, however, mislead. For instance, the pain may be situated in the epigastrium and radiate straight through to the back, leading to an indefinite diagnosis of indigestion or gastralgia; it may radiate to the left side rather than to the right and so create a suspicion about the heart; it may radiate upward beneath the sternum and thus closely simulate angina pectoris; or it may radiate downward along the right side of the abdomen and so point to the appendix as the site of disease. As regards jaundice, its occurrence as a sequel to the attack of colic makes gall-bladder disease practically a certainty; but its absence

from the story does not throw doubt on the diagnosis when other details are characteristic. Many attacks at their height are accompanied by vomiting, after which the pain subsides; so that the patient is convinced the stomach caused the attack, and this error may be shared by the physician unless he takes into consideration all other parts of the story. But these minor variations in radiation of pain and the presence or absence of jaundice, accompanying stomach symptoms, are all insignificant in comparison with the main features of sudden onset, severity of suffering, site of the pain, repetition of attacks after an interval of good health, and their occurrence unexpectedly, night or day, with no recognizable cause. This history is the most frequent of all in gall-bladder disease, and in this group 45 cases have been recorded out of the total of 114 diagnoses made.

GROUP 2. This group presents not only the story of these recurring attacks of colic but also a complaint of constant stomach trouble between. In fact, the suffering caused by indigestion so obsesses the patient that not infrequently the paroxysms of pain are forgotten in the history unless direct inquiry is made about them. Their features are the same when described as in the cases in Group 1, and the only difference lies in the distressing dyspepsia that fills the intervals between. The following case history is typical of Group 2.

A woman, aged fifty-nine years, complains of spells of what she calls "indigestion" ever since she was twenty: at first coming years apart, but gradually more often, so that now they recur every few months. These spells are characterized by very severe pain, always requiring morphin for relief. This pain comes on gradually and gets worse and worse; is felt in the pit of the stomach, running through to the back; is steady and continuous, not colicky; not accompanied by nausea or vomiting; lasting for hours or until morphin is given; and frequently followed by jaundice for a day or two. In addition to this story she has another of constant trouble with her stomach for twelve years past. She retains her food about three hours, then distress comes on, her stomach grows sour and she has to vomit to get relief because nothing else will give it. She feels better at once after eating, but about two or three hours later her stomach feels too full and burns so that she drinks soda and warm water until she vomits. This condition goes on regularly every day and after every meal and has done so for twelve years. This woman at operation was found to have a small thickened gall-bladder containing one large stone and many small ones.

The manifestations of stomach disturbance are not always the same in gall-bladder disease. Many times the story told corresponds closely to that we are accustomed to attribute to gastric ulcer, because the symptoms are really due to hyperacidity: heartburn,

water-brash, belching, pain, nausea, vomiting, coming on regularly an hour or two after meals. But in other cases the story resembles that found in chronic gastritis and due to hypo-acidity; distress, fulness, sense of weight and distention occurring soon after eating, with persistent belching of gas. The relative frequency of these two varieties of dyspepsia produced by gall-bladder disease will be considered later, when we come to discuss what stomach contents show after a test-meal. But there is nothing about the patient's description of his stomach trouble to identify the gall-bladder as the cause. The evidence that does fix the blame is furnished by the intercurrent attacks of biliary colic, similar in all respects to those described in Group 1. There were 25 cases seen during the past eight years whose history corresponded to the one given in detail for this group.

GROUP 3. The history here varies from both the preceding in that there are no attacks of violent pain. The chief complaint again is of the stomach, and indigestion makes up the main part of the patient's story. But in addition there is given, or can be elicited by questioning, the account of another kind of annoyance or suffering, not so constant but recurring from time to time in "spells." Sometimes the symptoms in these spells amount only to discomfort; sometimes they are more severe; but they never approach in severity or character the typical biliary colic. The location of these manifestations, which the patient recognizes as different from the constant stomach distress, is usually the right side under the ribs, where there is a feeling of fulness and soreness and of something in the way. The following case history presents the story usually told by patients in this group.

A woman, aged sixty years, first seen in January, 1915, complains of stomach trouble she has had for years, characterized by a heavy aching that comes on two or three hours after eating, persisting often until the next meal, with much belching of gas. Her bowels are never constipated but she suffers frequently from diarrhea. The stomach symptoms are nearly constant, the attacks of looseness of the bowels last for several days in every month. Besides these disturbances of health, she describes still other attacks, characterized by dull, aching pain, or "a hurting," as she expresses it, in her right side for days at a time, particularly after getting very tired or after taking a long ride. This pain is never sharp or severe, always dull, aching, annoying and nagging. This patient was found to have complete achylia; was dieted and treated medically at intervals without much benefit; until finally, in April, 1919, she had for the first time in her life an attack of very violent pain, typical of biliary colic, followed by jaundice. She then consented to the operation repeatedly advised during the preceding four years, and was found to have a gall-bladder, with walls greatly thickened and very tough, containing one large round stone.

Other patients in this group tell of a feeling in the right side as if there was "a sore ball" there; of a beating and throbbing and tenderness; or as if something there was going to break because of the sense of fulness; or as if there was something in the way when they bend forward or when they raise the right arm. These symptoms come only at intervals, lasting usually for a day or a few days; but the stomach symptoms are practically constant. The latter are not always the same and there is nothing characteristic about them to identify them as due to gall-bladder disease. This condition is not an unusual one, for there were 34 patients who presented the typical story that placed them in this group.

GROUP 4. There remain certain patients that complain much of the stomach over long periods of time, with no explanation to be found in their history as to the real cause. Sometimes the symptoms they describe correspond to the so-called gastric ulcer type; sometimes to the so-called chronic gastritis type; sometimes a story of gradual loss of weight, in connection with that of chronic dyspepsia, causes suspicion of cancer of the stomach. Frequently in former days these patients were set down as suffering from a "gastric neurosis;" and not infrequently even to this day some of them are labelled with a diagnosis of "achylia gastrica." There are no attacks of biliary colic to direct attention to the gall-bladder, and not even the less serious discomforts described in Group 3. There is really no way to be sure that these cases are due to gall-bladder disease until suddenly, sooner or later, perhaps after the lapse of years, comes a typical attack of severe pain like that described in Groups 1 and 2 to settle the matter definitely; or until, in despair, after trying repeated dietetic and medicinal methods of treatment, without benefit, the patient submits to exploratory operation. That such cases exist, any clinician of experience comes gradually to realize; and though over long periods we cannot reach certainty by any method of diagnosis, we learn to suspect the existence of gall-bladder disease in certain types of history, even though no definite proof is furnished by other methods of investigation. To this group ten cases have been assigned during the past eight years. Others perhaps exist in these records that have been classified under some other name than gall-bladder disease, and that will ultimately reach their proper diagnostic group as development bring out their true nature. A brief *résumé* of the story of several of the cases placed in Group 4 will best show the difficulties of the diagnostic problem.

CASE I.—A man, aged fifty-three years, complains of stomach trouble for about four or five months. He has no appetite and fears to eat because all food causes a feeling of fulness and oppression soon after eating, even while eating. He belches much gas, but has no pain or nausea or heartburn. He has lost twenty pounds since his illness began. His stomach analysis shows complete achylia. Continuing to lose steadily in weight and improving in no respect

on diet and digestive aids, he finally submits to exploratory operation, when the only pathology found is a large single gall-stone, completely filling the gall-bladder. After its removal his symptoms all disappear.

CASE II.—A man, aged forty-two years, first seen in April, 1915, complains of indigestion off and on for the preceding three years. When this occurs he loses his appetite, food causes distress soon after it is taken, he feels too full and distended and belches much gas. He has no nausea or vomiting. He has lost in weight and strength and become very nervous. His stomach also shows complete achylia. The indigestion subsequently continues at intervals in spite of medical treatment, though never sufficient to incapacitate him, until finally, after a Thanksgiving dinner in 1919, he has for the first time after eight years of "stomach trouble" an attack of very severe pain in the upper abdomen, lasting for many hours, with persistent vomiting and followed by jaundice. After this he himself discovers a lump in the upper abdomen the size of a turkey egg, and operation shows a large gall-bladder distended by mucus, the cystic duct blocked by a large stone and many other stones free in the gall-bladder.

CASE III.—A woman, aged thirty-eight years, seen first in February, 1911, complains that she is nauseated nearly all the time, bloats after eating, her food causes heartburn, belching and much gas, but she has no pain and never vomits. She is set down at that time as a case of gastric neurosis, and continues to have more or less similar trouble with her stomach for nearly six years following. Then in December, 1916, begin a series of attacks of very severe pain in the pit of the stomach through to the back, with nausea and vomiting, lasting until morphin is given. Finally, operation in February, 1917, revealed a contracted gall-bladder with thickened walls, containing one large stone.

CASE IV.—A man, aged sixty-two years, complains of stomach trouble present for six months previous. At the outset this was not constant, but lately the stomach never seems right. The appetite is poor and food causes distress, coming on several hours after eating. There is no severe pain every day, but at times it is so severe he cannot sleep, its recurrence depending apparently on what he eats, though any food causes more or less distress. There is much gas and belching. There is no nausea but when a severe spell comes he forces himself to vomit for relief. He has lost about twenty-seven pounds in weight since his illness began. Because of marked hyperacidity found by stomach analysis, and the evidence given by roentgen-ray plates, this man is thought to have duodenal ulcer. He is treated for this and after a month's routine his symptoms all disappear. He remains well for nearly a year, then the symptoms all recur; and this time, after two weeks of gastric disturbance, suddenly comes a typical attack of biliary colic followed by jaundice.

Operation showed the usual thickened and contracted gall-bladder containing two large stones.

Thus in Group 1 of gall-bladder histories, recurring attacks of biliary colic characterize the story, with good health between. In Group 2 stomach symptoms play a prominent part but the colic attacks still form the diagnostic feature. In Group 3 the stomach symptoms preponderate, colic has disappeared and the gall-bladder symptoms have quieted down to minor importance. In Group 4 there are no symptoms but those produced by the stomach, over months or years, and the gall-bladder speaks only vicariously, calling no attention directly to itself. There should really be a Group 5 described where the gall-bladder contains stones, but gives rise to no symptoms of any kind; until either some sudden violent attack of pain, or operation performed for some other ailment reveals cholelithiasis. But these cases sooner or later develop symptoms that put them into one of the four groups described, and they cannot be diagnosed until they do.

II. Physical Examination. In gall-bladder disease this method of diagnosis stands next in value to history, but even so the evidence it gives is very uncertain. The possible results are of three sorts: (1) entirely negative; (2) purely subjective; (3) definitely objective as well as subjective.

1. *Negative Findings.* To anyone who has witnessed operations on the gall-bladder and has noted how far this organ lies beneath the costal margin; furthermore, how small and shrunken the diseased organ is, no surprise is caused by the fact that physical examination so often gives negative results. Nothing abnormal can ordinarily be made out by palpation, during long periods when a diseased gall-bladder is quiescent, even though reflexly it is causing incessant gastric distress.

2. *Subjective Evidence.* Tenderness may be elicited by various manipulations beneath the costal margin, with the patient in different postures; but at the same time no change from the normal be conveyed to the examiner's fingers at all. What the patient feels and the diagnostician does not feel must always be considered with due allowance for individual susceptibilities.

3. *Objective Evidence.* Objective evidence found in gall-bladder disease is of two kinds: (a) increased tension and rigidity, and (b) palpable tumor.

(a) Increased resistance in the right hypochondrium as compared with the left, combined with tenderness on deep pressure there, is the sign we expect to find when cholecystitis is present. But this may not be discovered at one examination and found at another. It is much more likely to be elicited soon after an attack of biliary colic or during the periods of dull ache and sense of fulness described in Group 3. This definite abnormality is probably due to acute exacerbations of a chronic cholecystitis, and disappears again as

soon as the acute inflammation has subsided, so that its absence over long periods of time does not indicate the absence of gall-bladder disease, which may in fact be extensive and advanced.

(b) The discovery of a palpable tumor in the gall-bladder area may possibly mean nothing but chronic adhesions about the organ and gall-stones within it. But usually it means more—either an obstruction to the cystic duct with retention of bile or else a neoplasm. It is a law of clinical medicine, long ago announced by Courvoisier and since confirmed by many observers, that in chronic jaundice due to obstruction of the common duct by a gall-stone the gall-bladder is small, while in chronic jaundice due to neoplasm the gall-bladder is distended. This law is based upon the fact that chronic cholecystitis and cholelithiasis make the gall-bladder small, thickened and contracted; and if on physical examination a tumor is palpable with or without jaundice, the conclusion is therefore justified that something unusual has been added to the clinical picture, and that there exists distention of the gall-bladder by accumulation of bile and mucus within its cavity or else neoplasm that has developed in its walls. But as these conditions are unusual so ordinarily no tumor is palpable in gall-bladder disease.

III. Laboratory Examination. No diagnostic evidence is furnished by blood counts in gall-bladder disease. The urine may be dark in color and show bile, while the feces are light in color and show deficient bile, during or shortly after an attack of biliary colic, even though the skin and conjunctivæ are not noticeably yellow. But urine and feces convey no information of diagnostic value in gall-bladder disease except at the time of such emergencies. As regards direct examination of bile obtained by duodenal tube, as described by Einhorn, Rehfuss, Lyon and others, attempts have been made in this series of cases to employ this method, but not with satisfactory results. The objections found have been with the practicability of the method not with its value; but this value has not been found so great as to offset the obstacles offered in securing duodenal contents and in getting them properly examined chemically, microscopically and biologically.

As regards stomach analysis, it tells us when abnormalities in secretion exist but nothing as to their cause; and there is no type of abnormality absolutely diagnostic of gall-bladder disease. In the series of cases reviewed, gastric analysis was made 81 times. With stomach contents removed forty-five minutes after the Ewald test-meal and assuming the normal range of total acidity to be 40 to 60, the results found were as follows: total acidity under forty in 26 cases and under twenty with complete absence of free HCl in 12 of these; total acidity over sixty in 38 cases; all the other seventeen analyses within normal limits. There were therefore more patients found with hyperacidity than with hypo-acidity in this series. From experience acquired not only in these gall-bladder cases but in many

other gastric disorders from which these have been sifted out the truth seems to be as follows: gall-bladder disease may be associated with either hyperacidity or hypo-acidity; but while hyperacidity is found as frequently with ulcer or chronic appendicitis as with gall-bladder disease, hypo-acidity, and particularly achylia, is found with gall-bladder disease more often than with any other pathology except cancer. Therefore the discovery of achylia with a dubious history of chronic stomach trouble, as in the cases in Group 4, adds much to the suspicion that disease of the gall-bladder is the underlying cause.

IV. Fluoroscopy and Roentgen-ray Plates. Much information of great value is supplied by this method of diagnosis in gall-bladder disease; nevertheless, it may in a given case add nothing to the facts already collected by other means, and, on the other hand, the testimony it gives may appear to implicate the gall-bladder when no disease is there. The evidence obtained by this method of investigation is of three kinds: direct, indirect and eliminative. (1) Direct evidence means the demonstration of changes in the gall-bladder itself, either the shadow of its outlines or of stones within it. But these findings are unfortunately not the rule even when other evidence is conclusive. A liberal estimate seems to be that one-half the cases of gall-bladder disease give such direct signs by means of the roentgen ray, and possibly this estimate should not be more than one-quarter. (2) By indirect evidence is meant demonstration of effects produced on other surrounding parts by the gall-bladder disease, such as flattening or deformity of the duodenal cap; pulling of the stomach to the right, or a high position and fixation of the hepatic flexure of the colon. But all of these signs are caused by pericholecystitis, leading to adhesions between the gall-bladder and adjacent organs, and as pericholecystitis does not always occur, even with long-standing gall-bladder disease, none of this indirect evidence may be found. (3) By eliminative evidence is meant the exclusion of other pathology possibly causing the history and physical signs and disturbances of stomach function. It greatly simplifies the diagnosis in certain cases to have positive demonstration by fluoroscope and by roentgen-ray plates that no cancer or ulcer exists at the pylorus or in the duodenum; that no changes are found to indicate disease about the appendix or cecum; that there is no break in the continuity of the colon and no marked ptosis of stomach or bowel. These negative findings are certainly of great value and justify the investigation even though no positive signs are found that point to gall-bladder disease.

But interpretation of what is shown by fluoroscope and by roentgen-ray plates is always open to error and must not be accepted as final when it disagrees with evidence obtained by other means. For instance, in several of the cases reviewed in this series, with

most positive history pointing to gall-bladder disease and with gall-stones subsequently found at operation, the roentgen-ray report was entirely negative, no direct or indirect evidence being furnished of the condition present. Again, with chronic gastric disturbance due to hyperchlorhydria as shown by gastric analysis, with no history pointing to gall-bladder disease, and with much depending on roentgen-ray examination to throw some light on the pathology present, the report comes back of a deformed duodenal cap leading to a diagnosis of ulcer. But ultimately an attack of biliary colic justifies a revision of this diagnosis, and at operation the deformity of the duodenum is proved to be due to adhesions. Great, therefore, as is the value of roentgen-ray evidence, it must be remembered that it is not infallible, and its testimony must not be accepted as unassailable.

Such are the methods by which we recognize the presence of gall-bladder disease. There are not many forms that this presents. Probably cholecystitis is always the first phase, and this must exist for a variable length of time before gall-stones are added and the condition becomes cholelithiasis. Theoretically we ought to be able to distinguish one from the other, but practically we are not; and, after all, it makes no great difference, for a diseased gall-bladder needs to be removed whether it does or does not contain stones. When a stone becomes lodged in the cystic duct and the gall-bladder consequently distended because its outlet is blocked, an elastic tumor forms that is easily palpable and usually can be recognized without difficulty. If a hard tumor is found instead, whether smooth or irregular, suspicion should be aroused at once of cancer. But here again differential diagnosis should not take up much time, because either condition calls for surgery as promptly as possible after a tumor is discovered. As it is difficult to decide where cholecystitis ends and cholelithiasis begins, so it is equally difficult to tell where cholelithiasis ends and cancer begins. We have no methods, unfortunately, for the recognition of malignant degeneration of the gall-bladder before a palpable tumor has formed, and then it is usually too late for the surgeon to successfully remove it, because of metastases.

In conclusion, history seems to be the most valuable aid in the recognition of gall-bladder disease. When this is characteristic, as in Groups 1 and 2, it makes the diagnosis, no matter whether or not at a given time signs are found by physical examination, no matter what the stomach analysis shows, no matter whether the roentgen-ray report does or does not present any direct or indirect evidence. When the history is less characteristic, as in Group 3, it still remains the most important factor in diagnosis; but physical examination comes next in value and may give signs that with the history serve to remove all doubt, regardless of laboratory and

roentgen-ray reports. When we come to Group 4 history alone makes us only suspect, and we need all the clues we can get from physical signs, secretory disturbances and roentgen-ray shadows to enable us to pass beyond suspicion that the gall-bladder is diseased. Without enough collateral evidence to supplement deficient history in this group we cannot reach certainty, and so we usually wait for months or years, indefinite and undecided, until at last it is history that settles the matter by introducing an attack of biliary colic. Thus we come back in the diagnosis of gall-bladder disease to old and well-tried methods as the most useful; to careful and painstaking history and to such facts as we can elicit by the unaided senses—by sight and by touch particularly. We do not neglect any possible laboratory or instrumental aid, but we place most reliance on what the patient tells us and on what we see and feel for ourselves.

INVOLVEMENT OF THE AURICLE AND CONDUCTION PATHWAYS OF THE HEART FOLLOWING INFLUENZA.¹

BY WALTER W. HAMBURGER, M.D.,

CHICAGO, ILL.

(From the Electrocardiographic Laboratory, Michael Reese Hospital, Chicago.)

DURING the past year a number of interesting postinfluenzal cardiac conditions, late results of the 1918 influenza epidemic and more recent complications of the epidemic of 1920 have been observed and studied in the electrocardiographic laboratory of the Michael Reese Hospital. Certain of these cases throw light on the mode and site of action of the influenza poison on the cardiac mechanism, particularly on the auricle and conduction system, and clarify, to some extent, the more general statements of observers in the earlier epidemics. It is for this reason that the following cases are reported.

A number of suggestive studies have already appeared, Lucke, Wight and Kime² from a detailed study of necropsies from 126 definitely proved fatal cases of influenza, concluded that in the majority of instances acute parenchymatous changes of the myo-

¹ Read at the Meeting of the Association of American Physicians, Atlantic City, May 4, 1920.

² Pathologic Anatomy and Bacteriology of Influenza, Arch. Int. Med., 1919, xxiv, 154.