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ON

SOUNDING FOR GALL-STONES.

BY

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ON SOUNDING FOR IMPACTED GALL-STONES.[1]

THAT within the last fifty years the whole theory and practice of Medicine has undergone a complete revolution, no one seeks to deny. That a new era dawned upon our art when the microscope, stethoscope, test-tube, and thermometer crossed the threshold of the sick-chamber, all readily admit. But there are still amongst us many who insufficiently appreciate the immense collective advantages which have accrued to Rational Medicine from the hundred and one trifling physical aids to diagnosis which have been introduced during the last couple of decades. This arises from the majority of persons overlooking the fact that a few easily recognisable physical signs are worth a whole cart-load of describable symptoms in the detection of obscure disease. For while symptoms are, even at best, merely fluctuating quantities, not alone from their intrinsic value materially depending upon the mental capacity, moral courage, and veracity of the narrator, but from their very significance being complex. A physical sign, when correctly interpreted, has always the same definite and indisputable value, from its being an independent factor, which the interrogator sees, feels, or hears for himself. Added to this, the knowledge of the fact that the cable of symptomatology is nearly "payed-out," and consequently the onward career of Rational Medicine to her legitimate goal—that of an exact science—must in future almost entirely depend

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on the acceptance and judicious application of easily workable physical aids to the recognition of internal diseases, induces me to avail myself of this favourable opportunity of making known to my professional brethren an instrumental method of indubitably ascertaining the existence of impacted gall-stones. A point of no mean importance, seeing how many difficulties beset the symptomatic path of diagnosis in this most fatal form of affection. Before proceeding to do so, however, it is advisable for me to make a few prefatory remarks on the clinology of biliary concretions. For, judging from the reports of the speeches made at our metropolitan as well as our provincial medical societies, when the subject of gall-stones is discussed, a woeful amount of ignorance regarding both their symptomatology and pathology is prevalent in the profession. This may to some appear strong, if not even ungenerous, language. But everyone who has given attention to the reported remarks of some of the speakers, hospital physicians as well as surgeons, in the discussions which have followed the reading of recent papers, will acknowledge that they are perfectly justifiable. I even doubt not that some of the speakers themselves, after they peruse the facts I shall presently adduce, will feel that this stricture is by no means uncalled for.

One of the commonest of the false statements enunciated is that gall-stone affections are not generally dangerous. Exactly the contrary is the case. The general ignorance of the fatality of gall-stone cases being due to the unfortunate frequency with which patients succumb to them without the medical attendant's having had the remotest idea of the true pathology of the case he was treating. The reason of

this is not far to seek. It lies, I believe, in the fact of his having been falsely taught that all dangerous gall-stone cases are associated with jaundice and paroxysmal pain ; whereas it actually happens that the majority of fatal gall-stone cases are unassociated with either the one or the other of them. Incredible as this may appear, it is nevertheless perfectly true. For there is no jaundice, and no paroxysmal pain (indeed, in the first instance very little pain of any kind whatever) when a gall-stone ulcerates its way out of the gall-bladder. Should the stone in this case enter the peritonæum, a fatal peritonitis is the result. Should it enter the intestines, if large it kills the patient by ileus ; if small, it passes safely down the intestines until it reaches the ileo-cæcal valve where it often sets up such an amount of irritation as speedily induces a fatal enteritis. The unsuspected gall-stone may kill even more rapidly still. As when in the course of its perforating career it opens a blood vessel, which, if it pours its contents into the stomach, leads to the mistaken diagnosis of hæmatemesis ; if into the intestines, gives rise to bloody stools. Or it may burst into the peritonæal cavity and the patient become suddenly collapsed, and die without either a single trace of the hæmorrhage or its exciting cause being visible to reveal the true nature of the case. That such fatal cases of gall-stone perforation are far from uncommon I know from personal experience. No less than four, and strangely enough all in gentlemen of above forty years of age, have fallen under my notice within the last year. One died six hours after I saw him, another within twelve, a third within forty-eight, while the fourth happily recovered, and that, too, notwithstanding that pure blood was passed both by mouth and rectum.

As it may appear to some a novelty to be told that gall-stones are so often fatal without so much as their existence having been suspected, and a single illustrative example is more impressive than a whole column of general remarks, I shall briefly relate one of the fatal cases just referred to, which has the additional advantage of showing how, even when gall-stone symptoms exist, one may be entirely misled in both diagnosis and treatment, from their not being in exact accordance to what is regarded as orthodox law. Early in the present year I was summoned to Brussels to see a Belgian gentleman, aged 58, along with Mons. Capart. On reaching the patient's bedside I found him exsanguine, and almost pulseless. He complained of dull pain in the lower part of the liver, with great tenderness on pressure in the region of the gall-bladder, which was not distended. The liver was of the normal size, and there was no jaundice. The history I received was, that he had always been a bilious subject, and had suffered from painful dyspepsia, that he once had jaundice, and passed a small gall-stone. The dyspeptic symptoms not improving under treatment, he betook himself to Paris, and consulted the gentleman who was recommended to him as being the leading physician. After a careful examination of his case it was diagnosed "hepatalgia," and a course of electricity was prescribed. Feeling no better after several weeks of daily galvanism he returned to Brussels. His symptoms gradually became more severe, and four days before I saw him he was suddenly seized with coffee-ground vomiting, and tarry-looking dejections. Seeing that the case was undoubtedly one of gall-stone perforation, and that the patient was already blanched from loss of blood, I naturally enough prognosed that if the hæmor-

rhage was not immediately arrested, death was inevitable. For twelve hours he rallied under treatment, but within the next twenty-four, pure blood began to come away, both upwards and downwards, and in less than forty-eight hours from the time I first saw him he was a corpse.

The prevailing ignorance regarding the fatality of gall-stones may also in a measure be due to the fact that not only are the poor far less liable to them than the rich, but when they seek relief for them in hospitals, the prominent sign instead of the pathological conditions giving rise to it is often treated as the disease. As well as that from its being no rare occurrence for gall-stones of considerable size to be met with at the autopsies of patients who, during their sojourn in the hospital, never manifested a single symptom of them, even hospital physicians have been led to regard them as harmless. The entire absence of both signs and symptoms in many gall-stone cases is, however, readily explicable, without its entailing a belief in their non-dangerous nature. For it is due to the fact that, from the majority of gall-stones being slowly formed in the gall-bladder itself, they give rise to no signs or symptoms as long as they remain there. No, sometimes not even to biliary functional derangement, though the viscus be choke-full of them. This is on account of a gall-bladder not being essential to life, as is proved by the fact that people have grown up to adult life without having ever possessed a vestige of one. And many species of animals have normally no gall-bladders, for example the horse and the deer. There is nothing then surprising in the fact that gall-stones, though fatal things, may yet be found at necropsies in the gall-bladders of persons who never complained of them.

Indeed, it would rather be surprising if it were otherwise, seeing that they are usually formed there, and that their career of discomfort and mischief only begins when they attempt to get out of the gall-bladder either by directly perforating through its coats, or by forcibly entering the cystic duct.

From the remarks which fell from the speakers, at the discussion on my recent paper on "Gall-Stone Sounding," at the Royal Medical and Chirurgical Society, it further appears to be very far from generally known that, notwithstanding that a dozen—even a thousand—gall-stones may exist for years in a patient's body, without giving rise to a single sign or symptom by which their presence can be suspected, all the most marked signs as well as symptoms, given in text-books as indubitable evidence of the existence of dangerous gall-stones, may be present without a single stone or biliary concretion of any kind whatever existing in the sufferer's body. This is a startling fact no doubt, but it is nevertheless quite true, as I shall now proceed to show. For :—

(*a*) Gall-stones never produce jaundice, pipe-clay stools, nor bilious urine, except when they become impacted in a duct. And the only ducts in which their impaction leads to this result are the hepatic and common bile ducts.

(*b*) Not only can their presence in these ducts in the majority of cases be recognised, but even differentiated. And what is more, their impaction in the intra-hepatic as well as in the cystic duct can also be detected, though in these cases there is no jaundice, no pipe-clay stools, and no saffron-coloured urine. In order to make this perfectly plain I shall put the matter in the form of an easily comprehensible table.

THE PRESENCE OF THE SIGNS AND SYMPTOMS IS INDICATED BY THE FIGURES.
THE ABSENCE BY THE LINES.

Gall-stones Impacted in.	Distended Gall-bladder.	Enlarged Liver.	Jaundiced Skin and Eyes.	Pipe-clay Stools.	Saffron or Black-coloured Urine.	Rigors or Chills.	Vomiting or Nausea.	Flatulent Dyspepsia.	Hepatic Tender-ness.	Spasmodic Pain.
The Common Bile Duct... ...	1	2	3	4	5	6	7	8	9	10
Hepatic Duct	—	1	2	3	4	5	6	7	8	9
Cystic Duct	*	—	—	—	—	1	2	3	4	5
Intra Hepatic Ducts	—	—	—	—	—	—	—	1	2	3

* Although the gall-bladder is in these cases never distended with bile, if the impaction be complete, and is continued sufficiently long, it may become distended by white mucus-secretion. For the *modus operandi* in the formation of white liquids in the gall-bladder, see the writer's book on the Liver, where its physiology as well as pathology is given in detail.

After having thus shown how comparatively easy it is not only to diagnose, but even to differentiate the various forms of impacted gall-stones, the reader may perhaps wonder why I take so much trouble to make known an instrumental method for detecting them. Here is my reason, and a very potent one it is. More than twenty years' experience of gall-stone cases has not only convinced me that many patients annually die from the effects of impacted biliary concretions, whose lives might in all probability be saved were the obstructing body artificially extracted; but at the same time made me painfully conscious that, as has just been shown, all their most characteristic signs and symptoms may be manifested by a patient who has not a vestige of a biliary concretion of any kind whatever within his body. I believe therefore that it would not only be injudicious, but criminal for any physician to recommend to a patient to submit to what a hospital-surgeon had the temerity, at the debate on my paper, to deliberately propose doing as a means of diagnosis. Namely, to incise a patient's abdomen, cut open his gall-bladder, stitch its edges to the lips of the wound in the abdominal parietes, and then search for the impacted stone in it. Showing that his idea was, that dangerously obstructing calculi are to be found in gall-bladders. Moreover, be it noted that this formidable diagnostic procedure was proposed by him as being simpler than the operation of sounding with a trocar not bigger than a knitting needle. I shall now show how this venturesome form of surgical prospecting is unjustifiable. For even should an inoffensive calculus be accidentally found in the gall-bladder and removed, it would not as a sequence follow that the patient's abdomen had been necessarily and advantageously incised. For the following potent reasons :—

(*a*) It is in no case the stone itself which produces the dangerous symptoms. But solely the obstruction to the flow of bile into the intestines. In so far then as the stone is concerned, did it not prevent the passage of the bile into the duodenum, it would in all probability lie as inoffensively in the bile duct as stones are known to lie in the bile reservoir.

(*b*) It being the obstruction then, and not the stone itself which is the real source of danger to life, any other equally potent obstructing cause acts in precisely the same way as an impacted stone does. This is no mere supposition, it is a fact.

(*c*) For it is found that the identically same signs of jaundiced skin, pipe-clay stools, bilious urine, &c., are met with when the hepatic or the common bile duct is obstructed by entozoa, cancerous or other tumours growing within them. Or when by external pressure a tumour of the head of the pancreas, of the pylorus of the stomach, or of the liver itself blocks up the channel of the duct. An additional common cause of permanent obstructive jaundice, is the closing up of the duodenal orifice of the bile duct by a cicatrised ulcer. All of which non-gall-stone forms of obstruction not unfrequently baffle even the most skilled specialists to differentiate. It is scarcely surprising then that I strongly advise practitioners to make themselves perfectly sure of the obstruction being due to a gall-stone before proceeding to lay open their patient's abdomen in the sanguine expectation of finding one.

Although my method of sounding for stones may not be entirely devoid of danger—for no operation on the human abdomen is, not even the simple one of tapping—it certainly has the advantage of being less rash, as well as less dangerous to life than that of cutting

down with a knife, either on ducts or gall-bladders, in search for gall-stones which may have no existence. Moreover, I have already performed the operation successfully, and what has been done once may be done again. The instrument employed was a six-inch long French exploring trocar, of somewhat less diameter than an English No. 1 catheter. And I now recommend that it should be provided with a blunt-nosed steel pilot, to be introduced after the trocar has been inserted into the abdomen, and before the search for the stone is proceeded with.

After the patient is put under the influence of an anæsthetic, the operation of sounding may be performed in the following wise.

1st. Push the trocar through the abdominal parietes in the direction of the common bile duct.

2nd. If the instrument impinges on no hard solid, withdraw the stilette and judge of the situation of the cannula's point by observing what kind of fluid flows from its free orifice—bile, abdominal serum, blood or intestinal fluid.

3rd. Being satisfied that the point of the cannula occupies no dangerous position, introduce the blunt-nosed pilot, and proceed to search about in all directions for the stone. The presence of one will be readily recognised by the fact that no hard substance whatever exists in the neighbourhood of the gall-bladder and bile ducts. And a gall-stone when struck, either in the gall-bladder or ducts, gives the same characteristic sensation to the fingers as a urinary calculus.

As several of the speakers at the debate on my paper objected to this plan of sounding, on the ground of the danger of peritonitis being induced by the bile escaping into the peritonæal cavity, notwithstanding

that I had cited a case where no less than thirteen pints[1] were removed by tapping from the abdomen of a boy whose gall-bladder had been ruptured three weeks previously. And they ought to have known that both distended gall-bladders and bile ducts have been beneficially tapped, I deemed it advisable to see what would actually be the result of puncturing a distended gall-bladder with my exploring trocar. Especially as one of the speakers had, forgetting that the coats of bile ducts and gall-bladders are elastic, inconsiderately suggested that the moving about of the instrument would enlarge the puncture.

Accordingly, along with Prof. Schäfer, I performed the following experiment: — A dog which had been kept fasting for 26 hours, in order that his gall-bladder might be fully distended, was rendered insensible with chloroform. The abdomen was opened, and into the distended gall-bladder I inserted my trocar. Twisted it about and then withdrew it. No spurt of bile whatever took place. Nothing more than an oozing followed. The oozing even soon ceased, from the coats of the gall-bladder (which, be it remembered, are even very thin in a small dog) contracting as the viscus emptied itself. In order, then, that all risk of a dangerous exudation of bile into the peritonæal cavity may be avoided, it is merely necessary to withdraw some of it before removing the cannula.

In those cases where the obstruction has given rise to great distension of either the bile duct or the gall-bladder, and from the orifice of the cannula

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[1] Medical Chirurgical Society's Transactions, Vol. IV.

bile flows when the stilette is withdrawn, it might perhaps be advisable to empty them of their biliary contents before proceeding to search for the suspected stone.[2]

I shall now give the history of the case of impacted gall-stone in which I successfully performed the operation.

The patient, a delicate constitutioned lady, aged 36, married, and the mother of several children, had for many months suffered from all the worst signs and symptoms of obstructed common bile duct. Not only was her abdomen greatly distended with ascitic fluid ; but she was so weak and near to the point of death that both Dr. Diver—her regular medical attendant—and I, believed that the only chance of prolonging her life lay in the artificial removal of the obstruction. Before, however, calling in an operative surgeon to perform bilotomy, we deemed it prudent to make perfectly sure that the obstruction of the bile duct was due to the presence of a stone, as neither of us had any wish to see the poor sufferer's abdomen unnecessarily opened. Accordingly, a day or two after a gallon of ascitic fluid had been withdrawn from her abdomen, she was made insensible with A. C. E. anæsthetic mixture (given because of her having a weak heart). I then introduced an exploring trocar (in the manner before described) at a point midway between the lower margin of the

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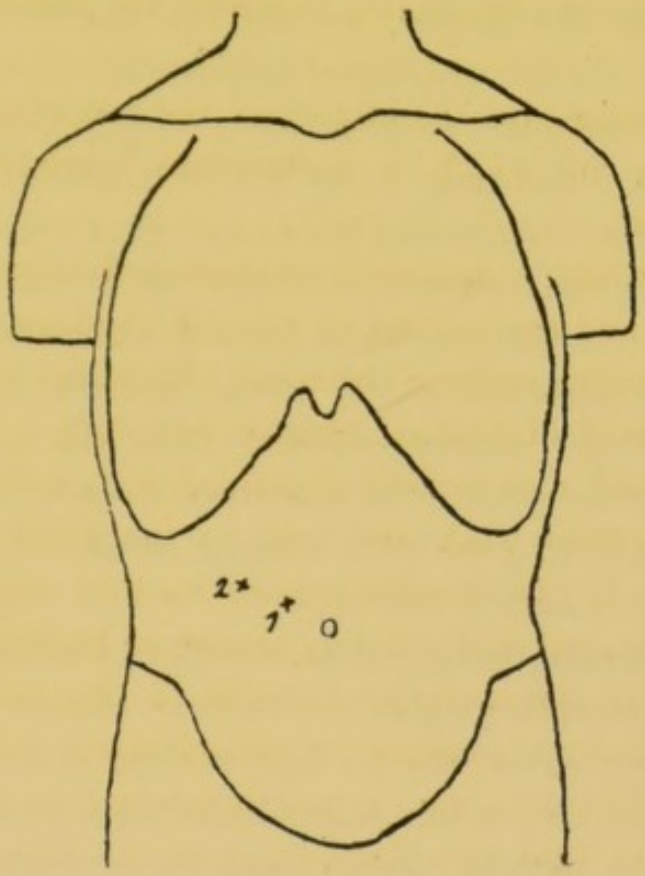
[2] Dr. Whittaker detected gall-stones in the gall-bladder by means of an aspirating needle (*New York Medical Record*, 1882), and on one occasion, while I was exploring a liver, the trocar accidentally penetrated the gall-bladder and struck a calculus, which subsequently, at the autopsy, was found to be of the size and shape of an apricot stone.

liver and the umbilicus; but an inch and a half to the right of it. Fig. 1.



The instrument was then slowly pushed upwards, outwards and backwards in the direction of the common bile duct; but although it was inserted up to its hilt (six inches) in the still distended ascitic abdomen no hard substance was encountered. In order to ascertain the exact position of the cannula's point, I withdrew the stilette to see if any, and what kind of fluid would flow from it. As nothing but ascitic fluid came away, its point was known to be free in the abdominal cavity, so I proceeded to search with it in all directions for the suspected stone. The search proving unsuccessful, the instrument was withdrawn and reinserted an inch higher up, a little more to the right. Fig. 2. On again pushing it in the direction of the common bile duct, just as it reached its full depth

of six inches, its point not only impinged upon, but stuck in a hard substance. The sensation communicated to the fingers, as well as the faint sound emitted when this was tapped against with the blunt end of the cannula, left no doubt upon my mind that it was a calculus. The next point was, if possible, to ascertain its size, by pressing the end of the cannula firmly against it, and running the point of the instrument round it. The impression so derived was that the stone was of the size and shape of an ordinary hazel nut. As no blood whatever flowed from the punctures, either during or after the operation, these orifices were simply covered over with a piece of sticking plaster, and the abdomen bound up.

The sounding having thus completely confirmed the symptomatic diagnosis, and further shown that the obstructing stone was no bigger than a moderately sized hazel nut, it was deemed advisable, before subjecting the patient, in her exceedingly weak state, to the severe operation of bilotomy, to delay a few days in the hope that under the influence of medicine, the stone might pass along the duct into the intestines. Most fortunate this determination turned out to be ; for at my next visit—six days after the sounding—I found all the signs and symptoms ameliorated. The stools had not only already become of their normal colour (which they had not been for many weeks), but the urine had lost its bilious hue, and the skin was less jaundiced. Besides which, the previously distended gall-bladder was now no longer perceptible to the touch. Changes which, when considered collectively, led to but one conclusion, namely, that the duct was free—that the stone had passed. As it had not, however, been found in the stools, it was thought to be

still within the bowels, experience having taught me that stones after having safely reached the intestines do not always immediately come away, but often remain in them for weeks, sometimes even for months.

No untoward symptom resulted from the operation. Everything went on well until the eleventh day after the sounding, when pain and tenderness were complained of in the right iliac region. The pulse became rapid. The temperature rose, and signs of enteritis speedily followed, no doubt from the usual cause in such cases, namely, the irritation produced by the stone getting lodged in the ileo-cæcal valve. Its ordinary concomitant, peritonitis, supervened, and notwithstanding that the patient had regained considerable strength during the eleven days of convalescence after the sounding, she sank and died twenty-seven days after the operation, which had so fortunately led to the accidental dislodgment of the stone, after its having been for so many weeks previously firmly and dangerously impacted in the duct. A theory of the cause of the sudden extrusion of the stone shall be given presently. Meanwhile I will give the result of the necropsy, which consisted of an examination of the liver, its biliary appendages, and their intestinal attachments, all of which parts were kindly forwarded to me by Dr. Diver. Their examination yielded the following interesting information :—

1st. The gall-bladder, in so far as bile was concerned, was found empty, for it contained not more than half a drachm, clearly proving that the obstruction to the outflow of the bile had ceased before the patient's death.

2nd. The gall-bladder contained thirteen biliary calculi. The three largest lay in a row, and fitted on to each other's ends by facets. The largest of all,

which lay with its broadest end downwards against the orifice of the cystic duct, was seven-eighths of an inch long, and six-eighths of an inch broad. In contact with its upper facet was an angular cornered stone of the dimensions of a moderately sized hazel nut, against the upper end of which lay the smallest of the three. It differed from its two companions in being facetted at its lower end only. The gall-bladder was contracted upon the stones.

3rd. The fact of the calculus impinging on the orifice of the cystic duct having a facet at its lower end of the same size as that at its upper, and there being no stone to correspond either in size or shape to it in the gall-bladder or bile ducts, leads to the irresistible belief that the calculus which belonged to this facet must have not only escaped from the gall-bladder, but from the common bile duct during the lifetime of the patient.

4th. The fact of all the signs of an obstructed bile duct having suddenly vanished after the sounding, favours the theory that the passage of the stone from the bile duct was in some way or other directly connected with the operation.

5th. The extrusion of the stone from the duct after having been so long and so firmly impacted in it, may be accounted for in the following manner :—

Assuming that it was as angular at its corners as the hazel-nut sized one found in the gall-bladder, it is easy to imagine that it was sticking angular-wise in the duct when the sounding was performed, and that the pressure exerted on its corners, when the cannula was being passed firmly round it in order to ascertain its size, altered its position in the duct ; and from its assuming a more longitudinal one (the other

stone was slightly oblong) it was enabled to slip along and out of the duct into the intestines.

Now comes the important question :—

Of what practical good is the narration of this case ?

I reply—Of great practical good, if its teachings are properly considered. For its history clearly establishes the following points :—

A. That the presence of an impacted gall-stone may, under similar circumstances as the above, be indubitably ascertained by instrumental means.

B. That not only can the exact position and probable size, but under favourable circumstances even the very shape of an impacted gall-stone be instrumentally ascertained.

C. That the operation of sounding for gall-stones in the way here advocated is as safe in skilled hands as the tapping of a distended gall-bladder or ovarian cyst.

D. A knowledge of the clinical facts adduced may possibly deter enterprising surgeons from laying open the abdomens of patients in search for gall-stones which not only possibly but even probably have no existence whatever.

E. While the fact of being able to indubitably ascertain the existence of a gall-stone without undertaking the severe operation of incising the abdomen, on the mere chance of finding one, may induce physicians to recommend patients suffering from suspected dangerously impacted biliary concretions to submit to the operation of sounding. With the ulterior view, if a stone should be detected, of advising its extraction. Seeing that in a number of instances the removal of the impacted stone from the duct by the surgeon's knife offers the only chance of saving the patient from an untimely grave.