An Address

ON THE

ACUTE EMERGENCIES OF ABDOMINAL DISEASE.

DELIVERED BEFORE A CONJOINT MEETING OF THE BRIGHTON, EASTBOURNE, TUNBRIDGE WELLS, AND HASTINGS DIVISIONS OF THE BRITISH MEDICAL ASSOCIATION.

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THE subject of my address to you to-day is one which has been chosen for us by your President, and the choice has my warm approval. It may perhaps be thought by some that it is already rather a hackneyed one, that the matter has been so often and so plainly discussed that little or nothing new or helpful remains to be said, and that hardly any further lessons remain to be learnt. If happily that were so, we should, I am sure, hear less of the matter; we should be less often shocked by the untimely loss of a valued life; and the awful death roll of abdominal diseases would be greatly curtailed. It is in medicine as in finance—much poverty and much paper may coexist. It is not the settled problems of medicine about which much is written, it is rather concerning those matters of which many things still need to be made clear. And so far as this question of the acute abdominal catastrophes is concerned, I feel that we are not yet in possession of the real secret of prevention, which is most important of all, of early diagnosis or even of treatment. There is much that has yet to be written for our admonition; there is still a great deal diligently to be learnt.

The most formidable and the most frequent of all the acute emergencies in abdominal disease is concerned with the vermiform appendix. An acute attack of inflammation in that organ, attended by gangrene or followed by perforation, is still the most common cause of a catastrophe, placing the life of the patient in instant jeopardy, and needing for its certain and most speedy relief the immediate intervention of the surgeon. I believe firmly that the serious characters and the terrible fatality of this disease are due very largely, if not exclusively, to the measures which are, with the best intentions but with profoundest unwisdom, directed to the relief of those earliest manifestations of the disease, the full significance of which is hardly yet appreciated.

Of the functions of the appendix we know almost nothing, but that they are of some real significance is probable from the fact that the vascular supply of this little tube is considerable and apparently out of all proportion to its size or manifest importance. The appendix communicates by a valvular opening with the interior of the caecum at a point an inch or more beyond the ileo-caecal valve. At this valve and in the lowest part of the ileum there is a development of the circular muscular fibres of the intestine to a degree which results in the formation of a sphincter muscle. The anatomical arrangement of the pyloric sphincter with the opening of the diverticulum of Vater at the beginning of the small intestine is in some degree reproduced here at the beginning of the large, and, though identity of architecture need not mean similarity of function, it seems reasonable to suppose that the glairy mucoid secretion of the appendix possesses some small digestive power. This function, however, is not to be condemned as trivial and without value because ablation of the appendix involves no digestive losses, for I can recall more than one case of permanent biliary fistula in the old days when every drop of bile was discharged on to the abdominal wall and was lost to the economy. In spite of this, there was no apparent diminution in bodily health or weight or capacity; yet no one was disposed to deny the value of this copious secretion. Because we do not know the use of the appendix and are unable to measure its function, we are not rashly to condemn it as devoid of worth. The position of the appendix at the junction of the small and large intestine is also noteworthy. The small intestine, as we know, is concerned almost exclusively in

the digestion and absorption of solid matters from the food. The solid particles which are to be absorbed first by one side and then by the other of the valvulae conniventes, as they are waved to and fro (and so filled and emptied) by peristaltic action, must be kept in suspension. If fluid were taken up in the small intestine there would be no vehicle for the conveyance of the solid matters downwards, and vast and various changes would be needed in the structure of the alimentary canal. It is roughly computed that only 10 per cent. of the fluid taken by the mouth is absorbed before the caecum is reached. In the ascending and transverse colon water is freely taken up, and the faecal residue is stored, till a convenient moment for discharge, in the sigmoid flexure. The fore-gut prepares the food, the mid-gut digests and absorbs it, the hind-gut stores and expels it. The mid-gut extends from the second part of the duodenum to the left end of the transverse colon; and the function is so divided that the small intestine appeases our hunger, the large intestine slakes our thirst. It is known that fluid taken by the mouth speedily excites a wave of peristaltic activity in the lowest ileum. In cases of typhlotomy or of enterostomy, in which the caecum or lowest ileum is opened, it can constantly be observed that the drinking of a little fluid excites a considerable disturbance in this region. I have elsewhere quoted instances to prove how excitable this part of the bowel becomes in response to the swallowing of fluids. If the interior of the caecum and the mouth of the ileo-caecal valve be visible (as in cases of typhlotomy) the increasing activity of the appendix, when water or other fluids are freely given, can be constantly witnessed, and never fails to excite wonder and surprise.

It has been shown by Harvey Cushing, Gilbert and Domenici, and others that the bacteria in the alimentary canal are most numerous and of greatest activity at the junction of the large intestine and the small. Harvey Cushing has also shown that starvation will render sterile all those parts of the intestine which can be caused to empty. On the other hand, it is also well proven that the administration of any aperient medicine not only excites a greater tumult of activity in the small and large intestines, but that secretion is more profuse and the bacterial virulence throughout the canal is considerably augmented. These points also can be corroborated by the examination of the patients upon whom typhlotomy has been performed. In order that we may see the bearing of these facts upon cases of appendicitis, let me recount to you the type history of a patient attacked by this disease. The first symptom in an attack of acute appendicitis is pain. It is always pain, and never sickness or vomiting, nor malaise nor any other symptom whatever. If pain should not be the inaugural symptom in a case of acute abdominal illness, the possibility of the appendix being at fault may definitely be excluded. The pain is absolutely abrupt in onset, it is of varying degree of severity, is often, indeed, usually at first referred to the epigastrium, but after the lapse of a few hours becomes as a rule distinctly worse in the right iliac fossa. The pain may be rapidly followed by a rigor or a sharp elevation in temperature, by vomiting, and frequently by diarrhoea. A slight elevation of temperature occurs without exception in cases of appendicitis in the early stages. The symptoms one and all show a tendency to steady abatement if proper treatment is adopted, if the patient is denied food of all kinds, fluid or solid, and if aperients are strictly and sternly withheld. It seems to be the natural and instinctive desire of the mother, wife, or nurse, in such a condition to administer forthwith a brisk purgative. It is held that something has "disagreed" with the patient, and the offending substance is to be sharply expelled. Castor-oil is the usual remedy in the district where I practise, and it is administered unsparingly. It is no uncommon thing to be told that because the first dose was vomited (a most proper act of rebellion on the part of the stomach) a second, or it may be a third, has been given. A few hours after the aperient is swallowed, frequently in the early hours of the morning, the patient is seized suddenly with a new and more intolerable agony, vomiting occurs, and diarrhoea may be repeated. The abdominal wall becomes rigid, tenderness spreads rapidly across the lower part of the belly, and at last is everywhere present; the pulse rises steadily, and all the signs and symptoms of an acute peritonitis are ushered in without delay. When an

operation is performed, a gangrenous appendix, very probably adherent near its attachment to the caecum, is found, and the peritoneum, already extensively and severely attacked by an acute inflammatory process, replies to the insult by pouring out freely a thin, clear, sterile, and actively bactericidal fluid. It is now about seven years since I was first brought firmly to the conviction that in cases of appendicitis it is the administration of an aperient that is responsible for the acute catastrophe of gangrene and perforation which ends in an acute peritonitis. I do not remember one single case that I have operated upon since in which it was not perfectly clear that the same sequence of events—pain, aperient, perforation—had occurred, and I therefore do not hesitate to say that in almost every instance of acute peritonitis due to the perforation of an appendix it is the treatment directed to the relief of the condition that is the cause of the serious and so often fatal catastrophe. The taking of a purgative medicine is something more than an impressive antecedent—it is, in my judgement, a definite cause. The only possible exceptions occur in those rare cases where direct violence gives rise to a rupture of the appendix or the laceration of the adhesions which enwrap it. In cases of appendicitis, however acute their origin may be, perforation followed by an acute general peritonitis does not seem to occur if no aperient is given and if absolute starvation is adopted from the first. The acute spreading or general peritonitis which occurs in this disease is due to treatment; it is a "therapeutic peritonitis." I am quite prepared to learn that this emphatic statement is received with a shrug of doubt and the tolerant smile of disbelief, but if strict inquiry is made into the intimate details of the history of the cases I cannot think that my experience of this disease will prove to be singular. In appendicitis perforation spells purgation.

The facts that I have already stated show that the indications for treatment at the onset of an acute inflammation in the appendix are absolute starvation, so that all peristaltic activity in the intestine is quieted, and the bacterial virulence of the contents of the bowel greatly reduced. The administration of fluids, which must reach the caecum to be absorbed, and the turbulent action and the high bacterial malignancy caused by an aperient are to be avoided. It is in the caecum that bacteria are most prolific and most virulent, and the vast increase in both these qualities which comes from the giving of aperients is especially to be avoided when the appendix, which opens into the caecum, is inflamed.

The theme, then, which I desire to expound in this connexion is that appendicitis is a disease which derives its fiercest activities from the means which are taken to treat it; that acute spreading peritonitis is rarely, if ever, the result of an untreated disease, and that it is the administration of aperients which transforms a simple disease into one of the most serious type. Peritonitis so arising is surely avoidable; the catastrophe is the result of misguided therapeutic activity.

I am coming again by degrees to the conclusion that, in spite of the undoubted advantages which may in many cases accrue from the starvation plan of treatment in acute appendicitis, early or instant operation is always desirable. If the surgeon, when he is called in consultation, hears that a purgative has been given, that alone should, in my judgement, decide him to advise an immediate operation. In children especially there must be no exceptions to this law. An acute attack in a child should always be treated surgically, for the usual signs and symptoms present in an adult are conspicuously lacking here. Twice within the last few weeks, and many times before, I have found on my arrival at the house to which I was summoned that the child I was asked to see was fast asleep, and on examining the abdomen I have found it flaccid and soft, though tender; and this in spite of the fact that at the operation I have found a gangrenous appendix and a widespread peritonitis to which no slightest barrier was set. I make, and admit, no exception to the rule that in acute appendicitis in children urgent and early operation is essential. And by some means or another parents should be made to know that the dosing of children with aperients is an evil, and that they must put a check upon those "philo-cathartic propensities" which seem inseparable from motherhood. I

would like to have the power to write in every nursery in the kingdom in large letters, in the most prominent place, the two words, "Avoid aperients." Or perhaps the warning and appeal might be brought home a little more forcibly in an amended edition of nursery rhymes:

* Perforation means purgation
With the appendix kinked and bad;
Both food and drink will worry him,
And aperients drive him mad.

To give aperients to children who have a "stomach-ache" is homicidal, yet so far as I can hear it hardly occurs to a mother or nurse to do anything but this the most disastrous thing of all. While I am speaking of this let me say that the evidence now appears to me conclusive that the "bilious attacks" of children, accompanied by pain of a griping or colicky character, by vomiting, occasionally by diarrhoea, by slight fever, and by headache, and ascribed to the greedy indulgence in "indigestible" foods, are nothing other than mild attacks of inflammation in the appendix. When an attack more severe than all the rest is plainly one needing operative treatment, and the appendix is then removed, nothing is again heard of the recurrent "bilious attacks." In these attacks, however, the appendix undergoes certain changes, for in my experience it is rare to find in operating upon cases of acute peritonitis, with gangrene or perforation of the appendix, that this structure is free from adhesion or obstruction. It is often difficult to deliver the caecum openly into the wound, because adhesion of the base of the appendix about one inch from its attachment to the intestine is so often found. I believe it therefore to be the rule, both in children and in adults, that an acute attack of inflammation of the appendix arises in an organ already diseased by reason of milder antecedent attacks, that perforation and the spreading peritonitis which it causes are almost invariably the result of the administration of aperients, and are accordingly preventable complications. There is here only one safe therapeutic rule, and it is "in all cases of abdominal pain, avoid aperients." It cannot be denied that in some cases of appendicitis in which the administration of an aperient has caused a perforation there is a history of one or many attacks having been relieved by the remedy which on this occasion has led to dire disaster. There is no difficulty in accepting and appreciating this statement. For there is little doubt that the manifestations of appendicitis are often due to obstruction in the lumen of this tube, and an aperient, by exciting an increased activity of muscular contraction, may at one time expel the obstructing material, and so give relief, and at another time, being powerless to overcome the block, may determine a rupture of the wall of the appendix at or behind the point of difficulty. If the general experience of others should coincide in these matters with my own, the conclusion must be drawn that in a very large proportion of the cases, probably I think in all, the serious complications of appendicitis could be prevented by a timely recognition of the disease, by absolute starvation from the first moment of suspicion, and by the strict avoidance of aperient medicines. But this state of perfection is not yet within sight, and we must accordingly be on the watch for those earliest signals which indicate that perforation has occurred and that peritonitis will be swift to develop. The most significant of all indications is indubitably abdominal rigidity. If a case of gangrenous appendicitis is seen at the very earliest stage there will be universal rigidity and immobility of the abdominal wall, but the rigidity is appreciably greater on the side and over the area of the lesion. The earliest case of acute gangrenous appendicitis I have seen was one to which I was summoned by Mr. F. H. Mayo:

P., male, aged 36, on January 7th, 1909, had a sudden attack of slight abdominal pain, which did not abate during the day. On the morning of January 8th he was still suffering from an aching pain and discomfort, and was unable to take his usual breakfast. At 11 o'clock, as the bowels had not acted, he took an aperient, and a little later a dose of Apenta water. During the afternoon he tried to attend to business, but had to return home. At 7 p.m. he took a little hot soup, and at 7.30 was seized with a most agonizing attack of abdominal pain, which prostrated him. His father, hearing him cry out, went upstairs to his room and found him lying on the floor, unable to raise himself. Mr. Mayo saw him within a few minutes, and I was in the house at 8.30 p.m. The patient was in great pain, and was huddled up on a couch, the thighs flexed on the abdomen.

The pulse was 90; the abdomen was everywhere resistant, but was intolerably sensitive over the right side. The abdomen was opened in a nursing home between 9.30 and 10 p.m., and the appendix was found very much swollen and injected in its distal end. The veins in the appendix and in the mesentery were thrombosed. There was an obstruction in the lumen of the appendix about 1 in. from the caecum.

This case showed that the sudden onset of thrombosis of the vessels of the appendix, as of the vessels in the enteric mesentery, is indicated by a sharp attack of prostrating pain, and by the instant setting up of a barrier of firmly contracted muscle, to act both as a protection and a splint.

The sudden onset of acute intolerable pain and the development of tense muscular rigidity in the whole belly wall—these two signs and these alone enable one to say that a serious lesion has occurred in the abdomen which for its most certain relief will need the intervention of the surgeon. A rapid pulse is never present, so far as we know, within the first two or three hours; in all the very early cases I have seen of perforation of any viscus the pulse at first was under 90. The alteration in its character and rapidity are, however, not long delayed, and a steadily augmenting rate, the pulse adding a few beats more hour by hour, is most significant. Nausea, vomiting, and diarrhoea may all be present, but hardly add anything of value to the other features of the disease. A strained and alert anxiety is noticed in the expression, and the breathing is rapid and shallow, and of the thoracic type. The diaphragm is as loth to move as the other muscles with which it forms a wall around the peritoneal cavity. It is, however, never held at first in so firm a contraction, in cases of perforative appendicitis, as in cases of rupture of the stomach or duodenum or gall bladder—lesions which are, of course, in closest proximity to it. This is another example of the fact that muscular rigidity, though universal, is most strongly developed in those parts which are most in need of rest and protection.

The catastrophe which in point of frequency comes next to appendicitis is concerned with the perforation of an ulcer of the stomach or of the duodenum. Of these ulcers there are, as we know, two types, the acute and the chronic. The acute is probably toxæmic in origin, and appears when an infection, generally of an unusually malignant character, is present in one part or another. In the course of typhoid fever, in cases of burns and scalds, in acute bullous pemphigus, in pneumonia, in cases of septic infections following operations or independent of them, and in erysipelas and the like disorders, an acute ulceration of the stomach or of the duodenum, attended by haemorrhage and perhaps proceeding to perforation, may be found. The frequency with which these ulcers are present in all periods of life is considerably under-estimated. For example, Helmholtz,* by devoting his attention to the subject of duodenal ulcer in children, found in six months as many examples as were contained in the whole literature up to that time. In approximately 50 cases of perforating ulcer that I have had under my care, once only has an acute ulcer been found. In the rest the ulcer has been of the chronic type, and it has for months or years declared its presence by the production and perpetuation of symptoms as to whose significance no doubt ought to have been felt. Not only does the ulcer which at last ruptures into the general peritoneal cavity give clear and sustained evidence of its presence, but in the few days or weeks preceding the final rent it often declares its greater activity and more pressing danger by a considerable exacerbation in the severity of the symptoms.

It is by degrees becoming more generally recognized that chronic ulcers of the stomach and of the duodenum are conditions that can be diagnosed with an approximation to accuracy which, though it leaves much to be desired in the case of the former, is almost exact in the case of the latter. And increasing confidence is being displayed in the view, which some among us have long expounded, that chronic ulcers are in all cases in need of surgical treatment. We may accordingly have reasonable expectations that with earlier and more confident diagnosis and with a speedier resort to operative measures, the final and often long-deferred catastrophe of perforation in a chronic ulcer may be wholly avoided. Whenever a patient who has complained at intervals of indigestion begins to suffer in the present attack more acutely than in an earlier

one, the signal of impending perforation is being raised and the clear warning should by no means go unheeded.

At the moment when perforation occurs there is the most agonizing and unendurable pain. Patients will afterwards say that there is no pain so horrible in its torture as this. The least movement seems to add something to its severity, so that a patient will perhaps remain for hours almost without stirring. A medical man upon whom I operated told me that the perforation had occurred while he was crouched on his hands and knees in bed in a position which seemed to relieve his pain. When the rupture of the ulcer took place he could not move to reach the bell, and had to wait motionless until help came to him in the early morning. The tense rigidity of the whole body is in striking contrast to the ceaseless unrest of a patient who is suffering the agony of hepatic colic. In him a constant change of position and of pressure seems in some measure to cause abatement of the pain, or, at least, to be imposed upon the patient in the search for relief that never comes. The abdominal muscles are found to be in a condition of inflexible rigidity, but even here some difference in the various parts of the abdomen can be felt. Over the ulcer the stiffness is of the most obdurate character; one might almost think that a disc of metal replaced the supple muscle. This local increase of a general resistance is most definite and distinct, as a rule, and it affords a decided help not only in the diagnosis of the lesion but in its location. The patient's expression is of one who is terror-struck. The approach of a hand to the abdomen for the purposes of examination is quickly resented, and the most piteous appeal for gentleness is made. The breathing is short, jerky, and shallow, and the patient may indeed cry out that he "cannot breathe." This is due in part no doubt to a spasm of the diaphragm, and in part also, I believe, to that great over-distension of the stomach which is so commonly seen when the abdomen is opened. Though the patient looks generally ill—with pallid face, staring eyes, and sweating brow—the pulse will be found at the first to be hardly altered in frequency or in volume. This is one of the surprises which must not fail to be recognized and remembered. I have often been told by medical men that at the first view of a case they could hardly bring themselves to believe in the occurrence of a perforation, since the pulse was so tranquil and full; and in a case I saw some years ago with Dr. Carlton Oldfield, we deliberately postponed for a few hours any question of operative treatment because the pulse, in rate and volume, was normal. Unhappily, this fact of the unaltered pulse-rate is even now not generally recognized; accordingly delay, which is always serious, may occur. The pulse increases in frequency and depreciates in value very soon, but this is due not to the perforation but to the peritoneal contamination which is the inevitable sequel. No one has any difficulty in recognizing the presence of peritonitis, but our aim must always be to discover at the moment of its occurrence the lesion to which the peritoneal infection is secondary. The symptoms and the signs of the perforation of a hollow viscus are not those of the peritonitis, which make haste to develop.

Among the catastrophes to which attention has been especially directed within recent years, the most remarkable, from many points of view, is that which involves the pancreas in an acute inflammation. For some time after the remarkable paper by Dr. Fitz in 1889, the condition of "acute haemorrhagic pancreatitis" was believed to be of great rarity; but, as in so many other cases, the recent investigations of the surgeon have shown that infrequency of occurrence meant inadequacy of observation. I have operated upon 11 cases of the most acute kind, and 7 patients (the last 6 in succession) have recovered. Of the less acute cases which pass over the initial stage, to be operated upon some days or weeks later, I have had several more.

The onset of pain in acute pancreatitis is usually sudden; a moment before the patient may have been going about in comfort, conducting the ordinary affairs of the day. The absolutely instantaneous onset of the very severe pain is constant, but some of the patients will say that they have been conscious for a few hours, or it may be for a few days, of a sense of discomfort or milder pain in the upper part of the abdomen. About one-third of the total number of observed cases have occurred in patients who

were the subject of recurring flatulent dyspepsia. The patients are generally stout; women are affected slightly more than men, and pregnancy would seem to be a factor of some importance in the causation. The intense pain, then, is sudden in onset, is confined within the abdomen to the upper portion, but passes almost always through to the back; it is agonizing beyond endurance, and is not seldom the cause of fainting or a profound collapse. The face is drawn and white, though the lips are often blue. In many of the cases I have seen there has been a curious leaden colour of the whole face, a slight but unmistakable and I think characteristic cyanosis. Halsted, an early and shrewd investigator, pointed out that lividity of the face and abdominal wall was often a striking feature of these cases. The whole appearance and attitude of the patient suggest that death may be imminent, for the extremities are cold, the heart beats with great rapidity, and the quality of the pulse is poor. Vomiting is an early symptom, is frequently repeated, and may last for days or weeks if the patient should survive so long. The food that has last been taken is the first to be rejected; afterwards all the vomited matters are deeply stained with bile, and pure bile, to all appearance, may be brought up in large quantities. This has suggested in several cases a diagnosis of high obstruction in the jejunum. The patient, as will be grasped from this description, presents the aspect and the symptoms of profound poisoning; and the researches of Gulecke, Egdahl, and others make it appear probable that the toxic substances are produced as a result of the digestion of the pancreas by its own escaped secretions. The abdomen, when examined early, presents the most indomitable rigidity and some fullness in the upper part; the remaining parts may be quite soft and flaccid, yielding readily to the hand, or they may be held with some degree of firmness. The upper portion of the abdomen, the epigastric region especially, never ceases to offer the most incoercible resistance, and, however gentle the examination may be, it is grievously resented and is repelled at the earliest occasion. When the records of published cases of acute pancreatitis are studied, it is seen that the number that have been correctly diagnosed before the operation is extremely small; yet I am confident that the symptoms are of such a character as to make a recognition of their cause a matter of very little difficulty. Briefly to recapitulate, there is, perhaps, in a patient inclined to stoutness a history of antecedent dyspepsia which presents nothing of the characteristic features of duodenal, or indeed of gastric ulceration, but which suggests rather the presence of stones in the gall bladder, and jaundice may have been noticed on one or many occasions. The severe pain comes quite suddenly, is beyond the limits of human fortitude to withstand, is associated with collapse of a profound character, and may cause the patient to swoon. The limbs are cold, the pulse extremely poor, rapid, and thin, or even hardly to be felt and not to be counted. The face may be cyanosed. The upper part of the abdomen is exquisitely tender, and all the muscles there offer the most resolute resistance to any examination. Vomiting is an early and often a conspicuous feature. I do not think a group of symptoms at all similar is to be found in any other form of abdominal calamity. There can be no doubt that, as in the case of perforations of the stomach or duodenum, recovery may follow an attack of acute pancreatitis. Every now and again I find the evidence of this in the abdomen. Very extensive fat necrosis in or upon the pancreas, and in its immediate vicinity, is to be seen, and the pancreas itself may show the remnants of old haemorrhages or contain a cyst, an abscess, or a slough. But these occasional survivals cannot impugn the fact that the safest course here also lies in early operation upon the lines first followed by Dr. Ramsay of Bournemouth. I have recently operated upon a case of acute pancreatitis with Dr. Macklin of Whalley, who had the fortunate opportunity of seeing the patient within a few minutes of the onset of the severe pain. He has kindly written for me the following very graphic account:

The patient was a lady, aged 54, of stout build. When summoned to her, about 3 p.m. on December 7th, 1910, I found the patient verging on collapse, suffering great pain and vomiting freely. The vomit was evidently partially-digested food of which she had partaken very heartily an hour or two before. There was no relief from the vomiting, and the pain was

aggravated on assuming the recumbent position, which I induced her to adopt, and almost immediately she had to resume the semirecumbent position in which I had found her. From the first the pulse was very rapid and very faint and the respiration very shallow and sighing. In about a quarter of an hour or so she became almost pulseless, the features very pinched and pale, although there was a suggestion of cyanosis in her appearance. At this point ether was injected hypodermically as she appeared to be about to die. The effect of this was seen very quickly as the pulse began to improve and the colour to return to her face. Soon after I had the patient removed to a couch, but she could not assume the recumbent position without aggravating the pain, which had begun to abate in some degree by this time. In the meantime the vomiting had diminished in frequency and profuseness, although from time to time a small quantity of fluid came up which was mostly water (of which she drank from time to time) stained with bile. Previous to my arrival the patient had had brandy, and some more was given by my instructions during my brief temporary absence to procure the ether. About two hours after the beginning of the attack she was removed home, less than a mile off, by motor and put to bed, which had previously been prepared for her reception. On examining the abdomen there was some considerable distension generally found, but more pronounced in the epigastric region, where there was great tenderness, so much so that the patient could hardly bear the slightest attempt at pressure. The lower part of the abdomen was very flaccid and not at all tender. Pain continued very severe and vomiting continued more or less frequently, but in all very small quantities. The pulse became very irregular and weak after the temporary increase during which she was removed home. The degree of prostration continued so great that I considered it advisable to inject an ounce of brandy per rectum from time to time during the night. About 4 a.m. I left her, as the severity of the symptoms had abated somewhat and the pulse had become more regular and stronger, but I felt it safer to leave a hypodermic with ether and strychnine with the nurse in case of emergency. At 9 on Thursday, the 8th, I found the patient still complaining of much pain and still vomiting at intervals, but otherwise better, wherefore I injected $\frac{1}{4}$ grain of morphine, which induced after a short time a few hours' sleep. Towards nightfall the patient began to complain of pain again, but more of a dull aching character, which was felt almost entirely to the left side, passing through to the back and shoulders. There was less tenderness on palpation, the abdomen was still tense, but no peritonitis was present; vomiting recurred, similar in character but small in quantity. Towards Friday morning, the 9th, the character of the vomit changed, and it became more abundant in quantity. The vomit consisted of a dark green looking fluid which had a suggestion of "coffee grounds" about it.

At the operation we found widespread fat necrosis especially in the upper part of Morison's pouch on the right side, an enormous enlargement of the pancreas, which was like a phlegmon, and a deep purple engorgement of the gall bladder. Cholecystotomy was performed, and thick black bile drained from the tube for two weeks; two drains of rubber tissue were also passed down to the pancreas. The patient made a most excellent recovery.

So far as my own experience goes, the only other abdominal emergency in which there occurs a profound collapse, with instant lowering of the blood pressure and a general depression of the circulation, is dependent upon the rupture of a tubal gestation. But in over a score of cases of this condition which I have treated I have only once felt any slightest doubt as to the diagnosis, and that was in a case which occurred twelve years ago, at a time when the diagnosis of abdominal diseases could not be made with that confidence and accuracy which we possess to-day. The history in cases of ruptured tubal pregnancy is characteristic. The patient is generally between the ages of 20 and 40, and one menstrual period has been missed. About two or three weeks after the time at which the period should have occurred (sometimes, though rarely, even later than this; in one of my cases over ten weeks after) there is a slight vaginal discharge of blood, and almost at the same time an attack of severe abdominal pain, followed very speedily by pallor, faintness, collapse, air-hunger, sighing restlessness, and all the symptoms of great loss of blood. The pain is acute, but does not even remotely approach in intensity that which is present in the conditions I have already described. The patients, indeed, usually say that they feel as if "something had given way" or as if "something had burst" within the body. The abdomen becomes full, especially in its lower half, where a feeling of tumidity, of "doughiness," is often present; and occasionally one side is more tender than the other. Resistance to the examining hand is not present. The muscles, it is true, may be in some degree tightened, by reason of the sudden increase in the contents of the abdomen, but the stubborn and unchanging muscular rigidity of the other catastrophes is never present

in this. In a few of my cases there has been, as it were, a miniature attack of this kind before the formidable and final seizure has come; such are due, no doubt, to little leakings from a tiny rent, whose edges are presently torn widely asunder to give vent to the profuse bleeding which is taking place. It is, I think, quite impossible for any one now to mistake this clinical picture for any other; the correct diagnosis should always be easily possible.

The crises that develop in the course of cholelithiasis are exceedingly few. In more than a thousand gall-stone cases I have only twice met with a sudden rupture of the gall bladder, only thrice with acute phlegmonous cholecystitis, and only once with acute gangrene with perforation of a common bile duct, which was completely occluded by a large stone. The attacks of hepatic colic, especially those which are due to the temporary impaction of a calculus in the cystic duct, are terrific in severity, but they are not lethal; the agony is almost unendurable while it lasts, and the very extremity of endurance is reached, but the danger to life is quite inconsiderable. The acute cholecystitis which results will almost without exception subside in the course of a few days, so that a deliberate operation can then be undertaken with every circumstance of care. That which chiefly distinguishes a patient suffering the torture of colic, whether hepatic, renal, or intestinal, from one in whom the perforation of a hollow viscus has occurred, is his ceaseless agitation and unrest. The former patient tosses and throws himself about, writhes on the floor or the bed, doubles and twists himself in the constant effort to get ease; the latter at the moment of the catastrophe seems to be struck motionless, and for hours may be hardly able to breathe or stir. However acute the torment of hepatic colic there does not seem to be any rigidity of the abdomen except in the immediate region of the gall bladder. All other parts are supple, and free from any tenderness. A rigor, or a brief shudder, with only a trivial increase of temperature, is seen not infrequently in cases of incipient cholecystitis. When perforation takes place the temperature always falls. In all my hospital experience I have only known one case of hepatic colic sent in as a case of perforated gastric ulcer, and in that case there was also a subacute pancreatitis, for when an operation was undertaken some days later recent evidences of fat necrosis were to be seen.

These are the chief among the various and most serious forms of calamity that occur in connexion with diseases of the abdominal viscera. Of all such it is true to say that they should rarely be allowed to occur. We are now able to recognize with rapidly increasing accuracy the correct interpretation of many symptoms formerly ascribed to "functional" causes. We are quickly being brought to realize that those recurring symptoms formerly supposed to indicate some vice in the action, some change in the secretion, or some disorder in the sensation of an abdominal organ, are in reality due to a perceptible alteration in its structure, and that though medical treatment and continued watchful care may allay for a longer or a shorter time the symptoms which such organic diseases arouse, surgical treatment alone is capable of giving complete and lasting relief. And so it would appear certain that by efficient treatment of the chronic disorder the acute emergency for which it is surely responsible will be forestalled. Yet still the need remains, not only that we should learn to evade the catastrophe whenever possible, but also that we should recognize with fullest accuracy all those manifestations which swiftly develop when once the crisis has occurred. We must free ourselves from the tyranny of the textbook, which still chiefly deals with terminal events, and make certain that we know the essential difference between the signs and symptoms of the primary catastrophe and those of the various complications which finally develop. We must have a conception of abdominal diseases which is radically wrong if we do not realize that the exigencies which spring up so quickly and prove so serious are each one of them a very heavy rebuke both to our power of early diagnosis and to the resources of medical and dietetic treatment.

CONCLUSIONS.

What, then, are the conclusions of the whole matter that we are entitled to draw? They are, I think, as follows:

1. The catastrophes which occur within the abdomen are not, strictly speaking, "acute"; they are, on the contrary, usually the result of the abrupt transition from a quiescent to an acute phase in a disorder of long standing.
2. An acute emergency can, therefore, be prevented by a timely recognition of the value and the significance of the early symptoms, so often ignored or misunderstood, of the chronic malady in which it is the final development.
3. The occurrence of a sudden attack of intolerable agony in the abdomen, associated with tense rigidity of all the abdominal muscles, indicates that there is an acute lesion which needs immediate surgical attention. These two signs, and these alone, are an urgent warrant, and compulsion to us to treat the case at once by operation.
4. A differential diagnosis is generally possible if strict attention be paid to the details of the anamnesis, and if the firm abdominal wall be searched for a tender area of supreme resistance.
5. Shock is not a symptom of perforation, for in the early hours after this disaster has occurred the pulse is very little altered in volume or in rate.
6. In all cases of abdominal pain, especially in children, the use of aperients should be avoided.

REFERENCE.

¹ *Archives of Pediatrics*, September, 1909.

THE CHEMICAL COMPOSITION AND MODE OF FORMATION OF RENAL CALCULI, AND THE METABOLISM OF CALCIUM IN GOUT AND ALLIED CONDITIONS.

ABSTRACT OF A HUNTERIAN LECTURE

DELIVERED AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND, FEBRUARY, 1911.

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AN examination of the literature on the chemical composition of renal calculi, with a view to collation of knowledge as to the comparative frequency of occurrence and amount present of different constituents, reveals an amazing wealth of discordant statement, on which has been built a multitude of theories as to etiology and treatment.

The reason for this condition of affairs appears to be a discarding, in many instances, of all chemical analysis on account of an erroneous notion that the chemical nature of a calculus can be judged from its physical appearances—a process very much resembling that of judging a book by its cover. Secondly, in that minority of cases in which renal calculi have been subjected to chemical examination it has often been deemed sufficient to demonstrate the presence of constituents by qualitative tests. Cases where the complete quantitative chemical composition has been worked out carefully are few.

There is no doubt that a calculus has often been described as consisting of urates simply because it has given the murexide reaction for uric acid, when probably it contained 10 per cent. or less of calcium urate.

In the chapter on urinary lithiasis and renal and ureteral calculi in Osler and McCrae's *System of Medicine*¹ the statement is made that "the physical characteristics of calculi vary greatly, and are somewhat indicative of their constitution. On these, rather than on chemical analyses, have been based many statements as to the nature of renal calculi." Now, as we shall see later, the physical characters give us no clue of any value to the composition of calculi, and hence the many statements as to the chemical composition, based on these physical properties are worthless.

Again, Sir Henry Morris² states:

It would seem, from the cases of renal calculi removed during life, which I collected and tabulated from all available British and American sources between 1883 and 1893 inclusive, that other surgeons, like myself, have been unwilling to have the trophies of their surgical operations broken up for chemical