A British Medical Association Lecture

ON

THE EARLY DIAGNOSIS OF ACUTE ABDOMINAL AFFECTIONS.*

BY

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To the physician belong acute thoracic affections, to the surgeon belong acute abdominal affections, to the general practitioner, in their early stages, belong both, and with him lies the responsibility of diagnosis, and decision as to the line of prompt treatment.

Acute abdominal affections are generally surgical emergencies, but not always and necessarily conditions requiring operative measures, though to be viewed from the first with the possibility of surgical treatment always in mind. Hence it is that an early, rapid and decisive diagnosis is of the utmost importance for the saving of human life.

An old teacher of mine, the late Dr. Samuel Gee, was insistent that in order to diagnose aright it was needful for the physician—and the surgeon, and still more the general practitioner—to be acquainted with the several conditions which could be present in any given case, for without such knowledge accurate diagnosis was impossible.

Acute abdominal conditions vary much, and it is essential for diagnosis to have a clear mental picture of each one which may be present. It is convenient, therefore, to tabulate the most frequent, with their percentage frequency, as follows:

1. Acute appendicitis...	...	...	70.7 per cent.
2. Intestinal obstructions	...	...	18.1 "
3. Perforations	...	...	7.2 "
4. Cholecystitis	...	...	2.4 "
5. Torsion of pedicles...	...	...	1.1 "
6. Acute pancreatitis	...	...	0.5 "
		100	"

In addition to the above conditions there are two other groups which have to be borne in mind—namely, the colics and poisonings.

In the adult female three other conditions have to be thought of—namely, rupture of ectopic gestation, acute salpingitis, and acute inflammation of the uterus, such as follows septic infection in criminal abortion.

Lastly, acute basal pleurisy or pneumonia, or even the pain prior to the vesicular eruption in "shingles," may simulate an "acute abdomen."

There are certain features which are common to every case of "acute abdomen." Two of these stand out pre-eminently—namely, "acuteness," and, if one may be allowed to coin the word, "abdominalism."

Acuteness is evidenced by sudden onset and rapid development of signs and symptoms.

Abdominalism is evidenced by the fact that the abdomen is obviously the site of the lesion.

Every one of the conditions tabulated above has a sudden origin and commencement and its progress is rapid, so that within a few hours the patient passes into a serious state.

The fact that the abdomen is the seat of the mischief is apparent very soon to the experienced observer. The patient may present the "abdominal facies"; he looks "anxious," and his anxiety is due to the intenseness of his abdominal symptoms. The pulse steadily increases in rate, but its rapidity is due to the distant irritation present in the abdomen, and bears no real relation to the patient's temperature. The patient vomits because the stomach is reflexly or directly disturbed. The temperature rises because of inflammation, or falls because of collapse. But all these general signs and symptoms are dependent upon and overshadowed by the actual abdominal changes.

Abdominal pain, and generally tenderness, is present in nearly every case, varying in intensity in relation to the individual and the lesion. The position of the pain may be an indication as to the viscus which is at fault. It is to be remembered, however, that pain also may be referred—for instance, appendicitis in its early stages frequently gives rise to uneasiness or pain at or near the umbilicus,

and too much reliance must not be placed on pain at "McBurney's point."

Tenderness is a valuable sign, particularly if obtained when the patient's attention is distracted. I often try and get the patient himself to detect the tenderness by asking him to "prod" his abdominal wall with his finger, commencing well away from the point where I suspect the lesion, and watching his face as he approaches the region beneath which lies the offending viscus.

Rigidity of the muscles of the ventral abdominal wall is a most valuable sign, and rigidity localized to a particular area often indicates that the mischief lies deep to the wall in that spot.

To reiterate, the characteristic signs and symptoms of an "acute abdomen" are: Sudden onset, abdominal symptoms, anxious expression, rising pulse rate, often an attack of vomiting, sometimes repeated, temperature out of relation to pulse rate, abdominal pain, often tenderness and rigidity of the muscles of the ventral abdominal wall. When a patient presents all these signs and symptoms together, the case is one which may be classed as a surgical emergency.

Each of the conditions which are the causes of an "acute abdomen" has certain peculiarities of its own, and therefore has to be reviewed separately.

1. *Acute Appendicitis.*

There can be no doubt that the actual number of cases of acute appendicitis is on the increase, and over 70 per cent. of acute abdominal disease is due to this lesion. Further, every case is a serious danger. Thirdly, each case should be diagnosed and treated early. Lastly, the mortality from acute appendicitis is still far too high, chiefly because of delay in diagnosis and treatment.

A typical case of appendicitis as a rule presents but little difficulty in early diagnosis. There is a sudden onset, pain in the abdomen, frequently near the umbilicus, not at "McBurney's point," an attack of vomiting, a steady rise in pulse rate up to, perhaps, 120 or more in a child, temperature also rising, but not in proper relation to pulse rate, tenderness over the lower right half of the abdomen, with marked rigidity of the lower segment of the right rectus. If the case is allowed to progress until there is perforation of the wall of the appendix or gangrene of part or whole of the structure, the signs and symptoms become progressively more severe, owing chiefly to the involvement of the peritoneum and a toxæmia.

A word or two as to the examination of the patient. He feels ill, and is anxious about himself, often suspecting appendicitis, and imbued with the horrors he has heard concerning the disease. Therefore the utmost tact and care in examination is needed. Never approach the abdomen with cold hands. Always palpate the sound, left, side first. This gives confidence to the patient, and a standard with which to compare the right side. Never omit to make a rectal examination, but again this must be done with the utmost gentleness.

Having come to the conclusion by examination that the appendix must be suspect, it is desirable to determine if possible where it lies. Most commonly it is placed on the inner side of the caecum and upwards when tenderness is great at "McBurney's point," otherwise over the brim of the pelvis, when micturition may be disturbed, and rectal examination detects tenderness on the right side of the pelvis; or it is running "north" behind the caecum and ascending colon, and bimanual palpation often gives a clue to its presence here. Wherever the appendix may lie, once diagnose it as inflamed, the sooner it is removed the better. To wait for perforation and the formation of a localized abscess is to lose precious time, though perhaps not a precious life. To allow perforation or gangrene to occur, and general peritonitis to follow, is almost criminal. Better to explore even when in doubt than to wait until almost all hope of saving life is past. The tragedies which occur from "wait and see" rather than "look and see" are indeed pathetic.

To recapitulate, 70 per cent. of acute abdomens are due to appendicitis. A sudden onset, severe pain often near the umbilicus, one attack of vomiting, a rising pulse rate, out of proportion to the rise in temperature, and rigidity of the lower half of the right rectus, are sufficient to diagnose appendicitis in its early stage and to call for operation at once.

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2. Intestinal Obstructions.

Exclude strangulated hernia at any of the ordinary hernial sites. Obturator hernia is difficult to diagnose; but then it is a rare condition. Internal strangulation and intussusception are the two commoner forms of intestinal obstruction within the abdomen. In both the onset is sudden, pain is marked, and vomiting occurs. In internal strangulation the vomiting is repeated, becomes more urgent, and nothing except removal of the strangulation will relieve it.

In intussusception the vomiting is not so urgent. In strangulation there is "absolute constipation," no passage either of flatus or faeces. In intussusception there is the typical evacuation of blood-stained mucus. In both distension may be an early and prominent sign. In strangulation the pulse rate rises and the temperature falls; in intussusception the same may occur. In intestinal obstruction due to a volvulus a tumour may be felt, generally in the left iliac fossa. In intussusception a tumour may be felt through the abdominal wall, and usually near the umbilicus.

The causes of intestinal obstruction are many, the signs and symptoms of the lesion are similar and as a rule quite characteristic, and the treatment may be summed up in the one word—Operation.

To delay is dangerous and may be fatal; to explore early will not only confirm diagnosis but will generally promote the cure of the patient.

3. Perforations.

Perhaps nothing gives rise to an "acute abdomen" than the perforation of a hollow viscus. The stomach, the duodenum, the appendix, and the gall bladder may all give way, and their contents pass into the peritoneal cavity, producing the most alarming signs and symptoms.

To take a typical case of the perforation of a duodenal ulcer in a male. He is at work when a sudden agonizing pain seizes him in the upper half of the abdomen. He is doubled up, and gasps for breath, because his diaphragm will not descend. He assumes the horizontal position and vomits. When now examined he appears most anxious, his pulse is small and rapid, there is still much pain in his abdomen, the whole of the ventral abdominal wall is rigid, and particularly the upper half of the right rectus. Even upon the foregoing signs and symptoms the practitioner is quite warranted in diagnosing a perforation, and preparations should be made for an immediate operation. Again, it is much better to explore than to wait for advanced signs, such as loss of liver dullness, evidence of free fluid in the abdomen, and signs of peritonitis.

4. Cholecystitis.

There is often a history of attacks pointing to gall stones, sometimes with a previous jaundice. As a rule the onset of symptoms due to an acute inflammation of the gall bladder is rapid: some pain in the right hypochondrium, pain referred in some cases to the right scapular region, vomiting, a steady rise of pulse-rate, with a rise of temperature which may be rapid with a rigor, and muscular rigidity in the upper half of the right rectus. A tumour may be palpated near the right ninth costal cartilage where it joins the eighth. This tumour moves downwards with inspiration, and its dullness is continuous with the hepatic dullness. If all these points are present a sure diagnosis can be made, and that early, and a prompt operation will save life.

5. Torsion of Pedicles.

Various structures within the abdomen may possess pedicles. If the pedicle of any tumour or organ becomes twisted there is immediately interference with the circulation of blood in the attached structure.

The following are some of the intra-abdominal torsions which may occur:

- (1) Ovarian cyst.
- (2) Subperitoneal uterine fibroids.
- (3) "Floating" kidney.
- (4) Wandering spleen.

Of these, the twisting of the pedicle of an ovarian cyst is far the most common. If this happens suddenly, a condition which may aptly be called an "acute abdomen" follows.

The history is not infrequently that of a young or middle-aged woman, who has noticed little if anything wrong with her abdomen previously; while alighting from a bus she is suddenly seized with severe pain in the lower part of the abdomen, associated with vomiting and all the signs of shock. The pulse rate increases, but its force is feeble. Examination of the abdomen reveals a swelling, tender on pressure and dull on percussion. Bimanual pelvic examination confirms the presence of an ovarian cyst, and the symptoms show that its pedicle is twisted. A somewhat similar condition may occur as the result of a twist of the pedicle of a subperitoneal fibroid of the uterus, but the symptoms are not nearly so acute.

A "floating" kidney is a kidney which has a congenital mesonephron, and the organ can float in the abdominal cavity like any other organ possessing such a peritoneal investment. Sometimes its pedicle may be twisted, and very acute symptoms result therefrom. A "movable" kidney is one which moves up and down in its bed behind the peritoneum. If its mobility is sufficient its pedicle may become kinked, and a "renal crisis" may occur. This comes on suddenly with acute abdominal pain referred to the lumbar region of the affected side. The patient vomits, and the pulse rate rises, and although the temperature may be a little high, the pulse is higher than the temperature would warrant. The enlarged kidney may be felt as a tender lump, and very little urine is passed. A spleen is very rarely so mobile as to allow of a twist of its pedicle.

6. Acute Pancreatitis.

It is the so-called haemorrhagic variety of inflammation of the pancreas which gives rise to symptoms of an "acute abdomen." The lesion is due to a rapid infection of the pancreatic tissue via the duct, or possibly through the blood, by a streptococcus. The onset of the symptoms is sudden, so sudden that the patient is *hors de combat* in a few minutes. This is probably due to the loss of blood into the pancreatic tissues producing a profound shock similar to a blow on the "pit of the stomach." There is abdominal pain, referred to the epigastrium at first, and soon to the back in the lumbar region. Vomiting occurs, but is not persistent. The pulse rate quickens and the volume of the pulse is less. The temperature may fall while the pulse goes up, but later there is a rise of temperature. A very characteristic sign occurs even in the early stages, and it is one which serves to distinguish this cause of an "acute abdomen" from all the others. The patient's face and extremities are distinctly cyanosed, and there may be some dyspnoea. Further, there may be a slight icteric tinge of the conjunctivae. Loewe's adrenaline test may be of help, but all this type of test serves to delay abdominal exploration, which not only confirms the almost certain diagnosis of the lesion, but also is the only means of saving the patient's life.

Colics.

We have now reviewed the common causes of really acute abdominal conditions, but it has to be confessed that there are certain other conditions which, while they may give the patient very severe distress, nevertheless do not place his life in danger. I refer to what may be termed "the colics"—intestinal, renal, or biliary.

We have all seen patients suffering agonies from each of these spasmodic contractions of unstriated muscle, but very few of us have ever seen death occur primarily on account of any one of them. Intestinal colic is very common, and unless very severe it does not produce a condition which really simulates an "acute abdomen." There is one sign which is of great importance, and that is that pressure upon the abdominal wall tends to relieve the patient's pain. Of none of the lesions producing an "acute abdomen" can the same be said. It is so characteristic that pressure causes pain in the serious condition, and does not do so, but actually relieves it, in simple colic, that if there is tenderness on pressure associated with any other symptoms of an "acute abdomen" it is better to diagnose the presence of a lesion which is a menace to life.

Poisoning.

Poisonings occur and simulate an "acute abdomen." There is generally, however, a definite history of the intake or absorption of an irritant substance which helps the diagnosis.

Gynaecological Conditions.

I need only refer again to the three conditions: rupture of an ectopic gestation, acute salpingitis, and acute septic metritis, and to say that when the patient is an adult female one must always bear them in mind.

In conclusion, gentlemen, it is a matter of congratulation that while the causes of an "acute abdomen" are not apparently on the wane, the gravity of the condition is becoming more and more recognized, and its early diagnosis, which is a matter of supreme value, arrived at in a much larger number of instances. We must look forward to the day when all "acute abdomens" will be recognized within the first few hours of their sudden onset, and surgical treatment carried out with the least possible delay.

A NOTE ON INJURIES TO THE FEMALE URETER.

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KELLY AND BURNAM¹ state that injury to the ureter is the most common complication of pelvic surgery, whilst Burney² has collected sixty-two such cases, of which sixteen were bilateral; probably the bulk of such accidents are either overlooked or not reported. The course of this duct and its surgical relationships make it peculiarly liable to injury in women. Certain anatomical points are worthy of notice:

1. The female ureter enters the pelvis behind the infundibulo-pelvic fold and its contained vessels, and may readily be injured during ligation of the ovarian artery, particularly if the fold is put on the stretch and the needle passed close to the pelvic wall.

2. Curving forwards below the pelvic brim the ureter lies above the suspensory ligament of pelvic fascia (Paterson³) in close contact with the posterior leaf of peritoneum—an important and constant surgical landmark even in fat subjects.

3. At the base of the broad ligament the duct is crossed in front by the uterine vessels, and not uncommonly has an additional artery behind it (an accessory uterine or vaginal branch).

4. The ureter perforates the parametrium at a distance of about three-quarters of an inch from the cervix, where it is enclosed in a fibrous tunnel (the so-called ureteric canal), and surrounded by veins derived from the vaginal and vesical plexuses.

5. The terminal part has variable relationships, as shown by Hellier,⁴ but it may be said to lie on the roof of the lateral vaginal fornix.

The possibility of injury is always present when ligating the ovarian and uterine vessels, and when dividing the attachments of the broad ligaments, cervix, vagina, and bladder. This risk is reduced to a minimum in ordinary cases if the operator (1) works entirely within the course of the duct; (2) avoids the pelvic wall when tying the infundibulo-pelvic fold and ovarian vessels; (3) divides the broad ligament close to the cervix; and (4) pushes the bladder well down before opening the vagina.

In Wertheim's operation, however, full exposure of both ureters is essential, and such dissection may be the easiest way to avoid injury in other cases, particularly where burrowing fibroids and intraligamentary cysts have led to anatomical dislocation, and perhaps distension from pressure. At all times free bleeding may occur to obscure the relationships and increase the likelihood of the ureter being mistaken for a vessel or band of peritoneum. Identity must be established by one or more of the following tests:

1. Kelly's vermicular contraction test—that is, waves of peristalsis produced by stroking the ureter—pathognomonic when seen.

2. Absence of pulsation.

3. Consistency and thickness of wall; the ureter is much thicker and harder than a vein and thicker and softer than an artery.

4. Familiarity with surgical landmarks, especially attachment to the posterior leaf of peritoneum (described above); no blood vessel hugs the peritoneum in this way.

Results of such injuries may be summarized as follows:

Bilateral.

- (a) Double section; leakage with general infection and death.
- (b) Double ligation, with anuria; fatal if unrelieved. Treatment consists in either releasing or implanting one or both

ureters, or in draining the kidneys by nephrostomy. Two typical cases may be quoted of double ureteric ligation. Caulk and Fischer⁵ record a case operated on successfully after eight days' suppression in which double nephrostomy was performed. It is interesting to note that fifty-nine days later complete canalization of the ligated ureters had taken place, and all the urine was being passed via the bladder. Cuthbert Lockyer⁶ mentions a similar case in which he implanted one ureter into the bladder and removed the opposite kidney with complete recovery.

(c) In those cases, undoubtedly rare, in which only one kidney or normal kidneys and only one ureter are present, a single injury is functionally a double one.

Unilateral.

(a) Section, with leakage; acute infection.

(b) Partial section, with subsequent leakage and fistula formation.

(c) Ligation, atrophy of kidney with or without symptoms of renal insufficiency (acute or chronic uraemia).

(d) Ligation, reflex suppression with complete anuria.

The ideal treatment (as in bilateral cases) is immediate repair or implantation, but usually such manipulations are difficult and increase shock by prolonging the operation; they may also be followed by secondary contracture and obstruction at the site of repair unless there is a complete absence of tension.

Simple ligation of both ends of the cut ureter has been practised deliberately by many surgeons, generally without harmful sequelae if the remaining kidney is healthy. Atrophy of the affected kidney is preceded by distension but no true hydronephrosis develops; pain in the loin and tenderness on palpation with tachycardia are the commonest symptoms, often so trivial as to be overlooked by surgeon and patient. If the remaining kidney is unhealthy and unable to take on additional work uraemic symptoms appear. Rarely complete anuria may follow from reflex suppression, as the following case illustrates:

Mrs. D., a widow, aged 51, was admitted to Shaw Street Hospital for Women, March 20th, 1920, with a history of eighteen months' excessive bleeding at the periods and slight recent leucorrhoeal discharge. She also complained of shortness of breath on exertion and some loss of flesh.

The cervix uteri was thickened and contained a nodule that bled readily on examination; it was therefore decided to remove the uterus by Wertheim's method for early carcinoma. This was carried out on March 22nd. The left ureter was cut at the pelvic brim when ligating the ovarian vessels. Implantation being considered impracticable, both ends were tied off and covered with peritoneum. Otherwise the operation presented no unusual features, and the patient's general condition immediately afterwards was quite satisfactory. The following is an extract from the notes of the case:

March 23rd (day after operation): Patient restless; slept little; a good deal of pain and a little vomiting. Temperature 99.4°; pulse 92; 3 ounces of urine passed during night. March 24th: Less pain; no vomiting; has passed flatus and is retaining salines. Temperature 100.8°; pulse 104; 9 ounces of urine passed yesterday, and 12 ounces this morning. March 25th: Suppression of urine since 7 p.m. last night; bladder empty; hot packs ordered with salines and fomentations to the loins; pilocarpine 1/10 grain, pulv. jalapae co. 30 grains. 6 p.m.: Bladder still empty; patient sweating freely; theocin 5 grains two-hourly. March 26th: Suppression continues; oedema of face, ankles, and hands; irregular breathing during the night; patient quite clear mentally; complains of severe headache; slight diarrhoea; no vomiting; no muscular twitchings; moderate cyanosis. Temperature 100.8°; pulse 120.

I saw her when anuria had persisted for forty-one hours; there had been no response to conservative measures; the cyanosis was marked and the general condition alarming; fortunately there was no doubt as to the patency of the right ureter; I therefore decided to decapsulate the right kidney. This was done under light ether anaesthesia. The kidney was quickly delivered and found to be deeply congested, dark blue in colour and hard in consistency, but otherwise showed no sign of disease. After incision of the capsule the edges were quickly separated by bulging renal substance, demonstrating an obviously increased intrarenal tension. The capsule was stripped up and excised and the wound closed with one layer of sutures—the whole operation lasting fifteen minutes. Three hours later 3½ oz. of urine were removed by catheter; 62 oz. were passed in the following eighteen hours and altogether 4½ pints in the forty-eight hours succeeding operation.

Convalescence was uneventful, and in spite of a mild attack of cystitis and parotitis the patient left hospital on April 27th, 1920, looking and feeling well. She had no symptoms of renal insufficiency and MacLean's test gave a urea excretion of 2 per cent. Polyuria was absent; the specific gravity was maintained above 1015, whilst the average amount of urine passed daily for thirty days was 28 oz., an amount stated by Foxwell⁷ to be normal for a healthy woman. In view of these findings it was not considered necessary to estimate the urea blood content or to use colorimetric methods. At the present date (twenty months later) she remains quite well.