DIFFICULTIES IN THE MANAGEMENT OF APPENDICITIS

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Some of the earliest references to the appendix occur, appropriately, in the Egyptian 'Book of the Dead,' and there is some evidence to suggest that the cause of death in some Egyptian mummies may have been appendicitis. Since then the management of acute appendicitis has continued to present difficulties, a record of which can be traced through Aretaeus of Cappadocia,² Berengario da Carpi,³ Claudius Amyand,¹ who first removed the appendix in 1736, Mélier,⁴ Morton⁵ and Treves,⁷ to the Registrar-General's figure of 667 deaths in England and Wales from appendicitis in 1957.⁶

An attack of acute appendicitis usually conforms to the accepted pattern of symptoms and signs. Nevertheless the disease is notoriously treacherous in that, in a small proportion of cases, it can mimic almost any acute abdominal condition, whilst in addition, a grossly inflamed, even gangrenous, appendix can present with very mild symptoms entirely unworthy of the severity of the underlying pathology. Whilst the mortality from the condition has been lowered greatly in the last two decades, the Registrar-General's figures make it apparent that the disease still warrants careful attention, and in this paper some of the difficulties encountered in its management are discussed.

Difficulties in Diagnosis

Most of the false pictures presented by the atypical appendix are associated with unusual positions of the organ. In 65 per cent. of cases the appendix is to a greater or lesser extent retrocaecal in position, whilst in 31 per cent. its tip 'is directed downwards on the psoas major muscle and according to its length may hang over the brim of the pelvis'.⁹ More rarely it lies above or below the ileum, or may extend over to the left iliac fossa, or upwards to the gall bladder. When an acutely inflamed appendix lies in close proximity to another organ, the latter is involved in direct spread of the infection, so that the signs of this secondary inflammation may cloud the clinical

picture and at times overshadow those of the appendicular pathology.

In the pelvis, abdominal signs may be minimal, and if the appendix lies against the rectum it may mimic an acute enteritis. In women salpingitis or torsion of an ovarian cyst may be simulated, or the tender mass may resemble a tubo-ovarian abscess. A ruptured ectopic gestation is usually fairly easy to differentiate, but the unruptured tubal pregnancy or tubal abortion are more difficult. Follicular bleeding from the ovary, 'mittelschmerz,' may cause confusion.

Pelvic examination is by no means easy in these patients, owing to their pain and tenderness. If there is any doubt, infinitely more information can be gained by an examination under an anaesthetic, with a catheter in the bladder, in the theatre, in the lithotomy position, before making the final decision about laparotomy.

In the retrocaecal position, the appendix may lie on the pelvis of the kidney, mimicking a calculus, or pyelitis, even to the extent of producing leucocytes and coliform bacilli in the urine. The low grade, resolving appendicitis presenting with a mass in the right iliac fossa, may be extremely difficult to differentiate from a carcinoma of the caecum, or a perforation of the latter may resemble acute appendicitis.

If the integrity of the kidney is in doubt the patient may be taken to the theatre and cystoscopy performed with the intravenous injection of indigocarmine. If the dye is excreted on both sides at the same time, the chance of a renal lesion is remote, and the abdomen can be opened, if necessary, without further delay.

In the left iliac fossa, the appendix, acutely inflamed at its tip, may lie on the sigmoid and closely mimic an attack of diverticulitis.

In the upper abdomen, the appendix may adhere to the gall bladder and simulate acute cholecystitis, especially in the fat patient.

The intense visceral pain of an acutely distended appendix may suggest a perforated peptic ulcer.

Conversely, fluid trickling down Moynihan's gutter to the right iliac fossa may suggest appendicitis.

The retro-ileal appendix tends to give rise to frequent vomiting, with rather less abdominal tenderness than usual, and may resemble intestinal obstruction. A mass in this position may also suggest the presence of Crohn's disease.

Inflammation of Meckel's diverticulum, torsion of the omentum or an appendix epiploica, or the common non-specific mesenteric adenitis are other causes of difficulty.

There is no easy method of recognizing these deceptive presentations of the acutely inflamed appendix, but the first step in avoiding error is to bear in mind that they exist, and to reflect on the possibility of any acute abdominal condition being an atypical appendix. If the abdomen needs opening the problem is less important, but where conservative treatment is decided upon the possibility of an atypical appendix must be squarely faced.

Difficulties in Examining the Patient

With a difficult or nervous patient, a great deal of information can be obtained before palpating the abdomen. The exposed abdomen should be observed for a minute or two, giving the patient time to settle down and the surgeon time to observe and contemplate the history. The patient is then asked to cough. If there is no pain he is asked to sit up and then lie back on the bed quickly. If there is pain on either movement he is asked to point to the spot using his forefinger only. Pain here is positive proof of local peritonitis and the site indicated suggests the site of the organ responsible.

Before examining the abdomen proper, a hand passed quickly over each groin, just to the medial side of the femoral artery, may exclude a small femoral hernia in the obese patient, and is time very well spent.

Difficulties in Assessing the Severity of the Inflammation

Every surgeon has had the experience of opening an abdomen for what appeared to be a very mild appendicitis, and finding a nearly gangrenous appendix on the point of rupture. The converse also hold true. The severity of the symptoms may not be a true guide to degree of inflammation, nor may the physical signs. The temperature is fallacious, usually being low. However, a high temperature, with rigors, does suggest the possibility of portal pyaemia, often associated with a retro-ileal appendix. The pulse rate is rather more reliable, but by no means an infallible guide.

In children and in the elderly these difficulties

are so marked that immediate exploration is indicated in all doubtful cases, a further reason being the poor localization of the infection in these patients, who tend to develop a rapidly spreading peritonitis very easily.

The Problem of Conservative Treatment

It is generally agreed that the patient with acute appendicitis seen within the first 48 hours is best treated by immediate appendicectomy, and that those patients seen after five days or more, with a mass in the right iliac fossa are best treated by the Ochsner-Sherren method. In between these groups lie the problem patients.

The presence of spreading peritonitis is the most important indication for operation. A rising pulse rate, and increasing vomiting are late signs, but absence of bowel sounds is of great significance. Even more so is the presence of sounds, when it can be said with confidence that the patient has not got spreading peritonitis.

The presence of a mass usually indicates satisfactory localization but is not easy to feel in the tender, guarded abdomen. Before operation the abdomen should always be felt under the anaesthetic, and if a mass is found it may well be advisable to send the patient back to the ward.

It is sometimes very helpful to return to the patient an hour or so after the initial examination, when slight alterations in his condition, or perhaps more mature consideration, often seem to give the lead to the best course to follow.

Pregnancy

The appendix is displaced upwards and laterally, so that local signs tend to be found in the flank. Vomiting of pregnancy may cause confusion and pyelitis may not only be mistaken for appendicitis, but may co-exist with it.

In the first six months the incidence of appendicitis is the same as in the non-pregnant woman, and abortion following operation is infrequent. In the last three months appendicitis is rare, but abortion very commonly follows it.

In general, the appendicitis should be treated on its merits, ignoring the pregnancy. In late pregnancy Caesarian section should be avoided. Appendicitis is rare in the puerperium.

The Difficult Appendicectomy

Appendicectomy holds a traditional rôle as the initiator of a surgical career, but it can provide many unanticipated difficulties.

The Incision

Good exposure is the first essential, and a difficult operation can often be made relatively easy thereby.

The *McBurney incision* is the commonest approach to the appendix at the present time. If difficulties are encountered it can be enlarged upwards and backwards by incision of the internal oblique and transversus muscles at right angles to their fibres, or medially by incision into the rectus sheath and medial retraction of the muscle after Weir's method. It can also be extended towards the pelvis by a vertical extension downwards at the lateral border of the rectus sheath, although the eleventh nerve may be in hazard and must be avoided.

The *Right Paramedian incision* is indicated where the diagnosis is in doubt. It is very helpful to stand on the patient's left side when mobilizing the appendix through this incision as it then comes more naturally towards the operator. Exposure may still be difficult. On the rare occasions when disaster threatens, perfect exposure can always be obtained by a transverse incision at right angles to the paramedian, converting it into a T. Clearly this is an extreme step, but there are occasions when the patient is fortunate in having the opportunity to develop an incisional hernia.

The *Rutherford Morison incision* is often the one of choice for the excessively fat patient with a retrocaecal appendix.

Locating the Appendix

At times the appendix is surprisingly difficult to find. Once the caecum is found, the appendix can always be traced by following down the taenia until they meet. The elusive appendix is usually high rather than low, and may be under the liver if the rotation of the gut is incomplete. A high incision is therefore better than a low one.

The appendix may also be completely embedded in the caecal wall, and at times closely mimics a carcinoma there.

Drainage or Removal?

At times the decision is difficult. With spreading peritonitis the appendix must always be removed, while the presence of an abscess contra-indicates appendicectomy. In between lie those appendices with partial localization of the infection and varying amounts of pus round them. There is no place here for a trial dissection. Either the area must be left undisturbed, or the appendix must be removed. It requires a good deal more moral courage to deliberately avoid appendicectomy than embark on it.

Drainage must be efficient, using a large, soft tube, free from constriction as it passes through the abdominal wall.

Mobilization

In the difficult case the first step should be to

secure really good exposure, with adequate lighting and good retraction. The appendix is mobilized by gentle gauze or finger dissection in the right plane, the feel of which is characteristic. Gentle traction on the appendix is always desirable and the peritoneum and adhesions have a happy tendency to stretch so that after a time accessibility increases imperceptibly. Duval's forceps, or Marrant Baker's forceps applied round the appendix itself are the only tissue forceps gentle enough to be used.

There is usually a free, generalized ooze of blood when mobilizing the adherent appendix, but this always responds well to packing and the field usually dries up very quickly, probably due to the local production of thrombokinase by the inflamed tissues.

If the appendix is perforated it is worth searching for an escaping faecolith, which, if left, is likely to result in a residual or pelvic abscess.

The *retrocaecal appendix* is notoriously difficult to mobilize. In the difficult case the operator should stand on the patient's left side and reflect the whole caecum over towards the midline by incising the peritoneum along its lateral border, followed by gentle gauze dissection. The posterior aspect, with the embedded appendix in it, is then easily seen and dealt with. The ureter, duodenum and testicular or ovarian vessels may be damaged here by sharp dissection, but if gauze is used they remain safe.

The *pelvic appendix* may place the iliac vessels in jeopardy. The similarity of the tense distended appendix to the iliac artery was pointed out by Treves,⁸ and after reading his story few surgeons will fail to pause, with a finger on the appendix, to see if it pulsates. The Trendelenberg position aids exposure, but only at a price which the anaesthetist may consider too high. It is worth recalling that its use was first popularized by the Spanish Inquisition. At the present time, after a period of widespread use in surgery, the strain which it places on the patient is once more becoming generally recognized.

If the surgeon gets into difficulties during mobilization there are two rules which the author has found helpful. The first is to place a swab on the field and to turn and rinse one's hands thoroughly. By giving a moment's mental relaxation the difficulty is often overcome fairly easily afterwards. The second is that if trouble persists, the field should be packed and the incision enlarged. This gives any bleeding vessels time to seal off and provides better exposure, which is usually the key to the whole situation.

The Meso-appendix

A good cuff of mesentery should always be left

which, in practice, means tying the ligature well down, and cutting close against the appendix, especially at the caecal end. The ligature should always be inspected after tying. In a fat patient, even a fairly tight ligature will be so cushioned that arterial bleeding can still take place through it.

The Difficult Stump

Oedema and induration may make the use of the usual purse-string suture impossible. A thick plain catgut ligature will usually close the stump if tied with discretion, and this can be covered with omentum or the fold of Treves, secured with a stitch. If a large hole is torn in the caecum, this can always be closed with a continuous simple through-and-through suture, taking large bites.

The Appendix Bed

Most difficult cases require drainage, preferably through a separate incision. A wound with a drain through it is comparable to a building with a lift shaft and a fire in the basement.

Post-operative bleeding is almost always due to a slipped ligature and slow oozing is almost unknown. The temptation to leave absorbable gauze in the appendix bed should therefore be resisted, as it only constitutes an invitation to residual infection.

Closure

The difficult appendicectomy provides the ideal circumstances for leaving behind a swab. Both surgeon and sister are mentally fatigued and glad the operation is over. Many swabs have been used and the bowel may have been packed off more than once. The incision does not allow access to the whole abdomen and the pit of the pelvis lies nearby.

Absorbable sutures are less likely to encourage

wound sepsis, and loose, rather than tight sutures may save necrosis and tissue infection.

Post-Operative Difficulties

Some post-operative complications can be prevented or minimized by prophylaxis.

Paralytic ileus, probably the most lethal complication of all, may be induced by unnecessary excursions into the pelvis and general abdominal cavity which spread infection from the site of the appendix. One-sixth of a grain of morphia, given six-hourly by the clock to rest both bowel and patient, together with limited fluids only by mouth for 48 hours, may prevent its development.

Residual infections and pelvic and subphrenic abscess may be reduced in frequency by giving the first dose of a wide spectrum antibiotic intramuscularly before operation, when the patient is first seen.

Physiotherapy and early ambulation within a few hours of the operation may prevent many chest complications.

The key to most of the post-operative difficulties lies in their intelligent anticipation and early treatment.

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