these tumours are so superficial and easily reached. In the early stages all scrotal warts and papillomata seen in mule-spinners should be removed, and local excision should be followed by microscopical examination.

When a definite ulcer is present a wide operation, consisting of removal of the growth with a healthy margin of skin and excision of the lymph-bearing areas in both groins, should be carried out. In the past many cases were treated by simple removal of the scrotal growth without excising the glands. Metastasis in the groin occurred later on in the majority of these cases and further operation was then often impossible.

It is important to treat this disease radically at the onset by removing both growth and glands at once. Our knowledge of the lymphatic system shows that it is only necessary to remove the scrotal ulcer and skin around it; deeper dissection is not required if the whole thickness of skin and dartos be excised. The glandular areas require more extensive dissection, and owing to the free anastomosis between the superficial lymphatics of both sides of the scrotum, bilateral infection of the glands is not uncommon. This is particularly likely to occur when the growth is situated on the anterior aspect of the scrotum.

The incision for the glands should extend from the spine of the pubes right out to the anterior superior spine of the ilium with a convexity downwards. The whole mass, consisting of fat, glands, and lymphatic vessels, is dissected out from above downwards in one piece, the dissection extending above Poupart's ligament. The upper three or four inches of the saphenous vein are removed also. All the glands and fatty tissue in Scarpa's triangle are thus excised and the femoral vessels stripped clean. These wounds are closed without drainage, and if the glands have not broken down should heal without any difficulty. There may for a short time be an escape of lymph from these incisions, owing to the division of the lymphatic channels, but this soon ceases. Oedema of the lower limbs after operation, due to the same cause, is sometimes troublesome, but, in the absence of infection, clears up in a few months.

Prophylactic application of x rays has been given as a routine after operation for about twelve months.

PROGNOSIS.

The prognosis after surgical treatment in mule-spinners' cancer is generally considered to be good, as in other types of skin epitheliomata.

In an investigation of the after-results following operative and x-ray treatment, Dr. John Bromley, of the x-ray department of the Manchester Royal Infirmary, has collected details relative to thirteen cases dealt with during the past two years, which he has kindly placed at my disposal.

After-Results of Operative and X-Ray Treatment of Thirteen Cases of Mule-Spinners' Cancer.

Alive and well...	...	4=31 per cent.
Have had recurrence	...	6=46 "
Dead	...	3=23 "

Such figures as these, although few in number, show conclusively the serious nature of this condition.

The cases under investigation have proved beyond doubt that deep x-ray therapy has been of little or no value as a prophylactic agent against glandular recurrence, and was of even less value in preventing local recurrence of the disease. In view of the fact that ordinary types of skin epitheliomata appear to give satisfactory results with both radium and superficial x-ray therapy, a series of cases of mule-spinners' cancer are now being treated with this type of radiation to see if the effects are better than those obtained after deep therapy. The best results were unquestionably obtained in those cases in which both the growth and the glands had been removed by the surgeon.

Finally, in considering the etiology of this disease, it appears likely that certain individuals possess a peculiar susceptibility to the irritant effects of mineral oil. Whilst this only affects a small minority of spinners—statistics showing that of the 25,000 adult males engaged in mule-spinning approximately 2.5 per 1,000 develop the disease—the problem presented merits consideration.

An important question arises as to whether a spinner who has once suffered from this form of cancer should be advised to return to his occupation in the mill on recovery. Apparently it can only be answered by examination of a series of statistics, and is at present engaging our attention. It should be made a rule that all patients shall attend for inspection, after operation, at regular intervals. In this way any recurrence of the cancer will be discovered at an early stage and curative operation will be carried out with a good chance of success.

REFERENCES.

- ¹ Southam and Wilson: *BRITISH MEDICAL JOURNAL*, November 18th, 1922.
² Morley, *Lancet*, December 2nd, 1911.

THE CLINICAL ASPECTS OF ACUTE PANCREATITIS.*

BY

HAMILTON BAILEY, F.R.C.S.ENG.,

GILLSON SCHOLAR, SOCIETY OF APOTHECARIES; SURGEON, DUDLEY ROAD HOSPITAL, BIRMINGHAM.

ACUTE pancreatitis, the most serious intra-abdominal inflammatory catastrophe, was first recognized by Dr. Fitz of Boston,¹ who communicated his observations to the New York Pathological Society in 1889. Since then other observers have added their quota, and to-day we are able to diagnose this disease in its typical forms, and to confirm the diagnosis scientifically.

FIG. 1.—Section of pancreas from a patient who died eight days after operation for acute pancreatitis. The pancreatic tissue is invaded by bacteria. A culture from the gall bladder at the time of the operation grew *Staphylococcus aureus* in profusion. (Author's case.)

The salient features by which the disease can be distinguished from other acute abdominal disasters are as follows: (1) The patient is usually fat; it would appear that obesity definitely predisposes to this disease. (2) There is a considerable accumulation of evidence to show that pancreatitis is recurrent—that is to say, that the same patient is the victim of several visitations of the disease. Dick² reports the case of a publican, aged 44, who had an attack of acute pancreatitis; it was treated expectantly, and he recovered. Two months later the patient returned with a second attack, and died twenty-four hours later. Timbrell Fisher³ describes the case of a man who had two attacks, separated by an interval of ten months. On each occasion the pancreas was drained and the man recovered.

A case under my own observation, in which I collected the past history, illustrates the recurrent nature of this disease.

The patient was a brewer's drayman. In 1907, at the age of 36, he was suddenly seized with acute abdominal pain. He recovered sufficiently to attend the medical out-patient department of the

* A paper read before the Birmingham Division of the British Medical Association.

London Hospital. A diagnosis of acute alcoholic gastritis was made. He was given medicine, and discharged a few weeks later as cured.

In 1910, after drinking a glass of water (apparently by mistake), he was suddenly seized with severe pains similar to the last. He vomited several times, and was admitted to the hospital. On examination tenderness was present over the gall bladder area. The symptoms abated, and he was discharged.

In February, 1924, he had a third severe attack while rolling barrels. Pain was so acute that the patient collapsed. The brewery at which he worked was immediately opposite the hospital, and I saw him within an hour of the onset. The patient was profoundly shocked, cyanosis was present, and abdominal rigidity entirely absent. A diagnosis of acute pancreatitis was made. After antishock treatment had been instituted the abdomen was opened. Fat necrosis was general; the pancreas was purple and oedematous; the gall bladder was distended, but no stones were present. Cholecystotomy was performed, and the lesser sac drained. The patient recovered and returned to work.

In July, 1924, he was seized with a fourth attack. He was admitted cyanosed and quite pulseless, although conscious. He stated that it was exactly the same pain, and it began in the middle of the night forty-eight hours before. He did not respond to antishock treatment, and died three hours later. The necropsy revealed advanced haemorrhagic pancreatitis.

This case is both instructive and suggestive. In the first place it admirably shows the recurrent nature of the disease, and secondly, it makes one wonder if many of the sudden but indefinite attacks of abdominal pain which pass off under expectant treatment are not pancreatic in origin.

Rigidity.

An outstanding feature, which helps to differentiate pancreatitis from other acute intra-abdominal inflammations, is the almost complete absence of rigidity of the abdominal wall. This point has received scant attention, but is emphasized by Timbrell Fisher, who states: "Rigidity is not characteristic, and may be completely absent."

Of the seven cases in which I have palpated the abdominal wall of patients suffering from acute pancreatitis abdominal rigidity has been completely absent in six instances. This comparative flaccidity is accounted for by the fact that pre-operative general peritonitis is absent. Mr. Huddy, as a result of his pathological work, has made it quite clear that the absence of general peritonitis is a remarkable feature in this disease.

Cyanosis.

Cyanosis is a fairly common accompaniment of the most acute forms of this disease; it is most marked in the cervico-facial region. The general explanation given to account for this phenomenon is that the abdominal musculature and diaphragm are held so rigidly that the respiratory movement is embarrassed and anoxaemia results. Such a hypothesis is untenable, for the abdominal muscles, far from being held in vice-like contracture, are relaxed. The cyanosis is undoubtedly due to the profundity of the toxæmia. Ogilvie has come to the conclusion that this toxæmia is due to the absorption of protein metabolites, particularly histamine, formed from the auto-digestion of the tissues, by the liberated pancreatic ferments. This is a rational explanation. Profound toxæmia will often give rise to cyanosis, as those who witnessed cases of heliotrope cyanosis in the 1918 influenza epidemic will testify. Experience teaches us that in a toxæmia the deeper the cyanosis the more surely can we hear the beating of the wings of the angel of death. Acute pancreatitis is no exception.

The Pain.

A late chief, under whom it was my privilege to work, said: "When I get a telephone call, and hear that it is an acute abdomen, and the doctor says that he has given morphine and the pain is unrelieved, I say, 'Ha, acute pancreatitis!'"

The widespread belief that the pain in acute pancreatitis is more severe than that of other abdominal catastrophes seems to have originated in a remark uttered by John B. Murphy,⁴ who in the surgical clinics of Chicago is reported to have said: "The pain of acute pancreatitis is enormously greater than that of perforated duodenal or gastric ulcer."

We have no scientific gauge with which to measure pain. But while admitting of exceptions I am inclined to agree

with the observations of Ogilvie⁵ at Guy's Hospital, who says: "It is very doubtful if the onset is as sudden or the pain as agonizing as it is in cases of perforation. . . . Cases of perforation never move from the place where the pain has felled them." All observers agree that the pain is epigastric, and passes to the back. This radiation to the back is of considerable differential significance.

Loewi's Mydriatic Test.

In the mydriatic test we have a valuable scientific confirmatory sign which, above all, is eminently practical. It requires no laboratory—an important point when dealing with a grave emergency. I have heard several surgeons speak disparagingly of the sign, but, as a rule, one finds they have not given it a fair trial.

In order to get reliable results the technique laid down by the discoverer, Otto Loewi of Vienna, must be carried out. The pupils are examined; into one conjunctival sac four drops of fresh 1 in 1,000 adrenaline solution are instilled; after five minutes four more drops are instilled, and the pupils examined again after half an hour. While adrenaline has no effect upon the pupil of a healthy individual, in acute pancreatitis a positive reaction—namely, dilatation of the pupil—is quite often obtained. (Fig. 2.)

FIG. 2.—Loewi's test, a positive reaction. Photograph taken twenty hours after an operation for acute pancreatitis.

The dilatation is not infrequently slightly eccentric, and often conspicuously oval in form.⁶ A negative pupillary reaction implies nothing, but a positive result in an acute abdominal case is highly suggestive of acute pancreatitis. The true explanation of this remarkable phenomenon is unknown, but it may be suggested that the inflamed and swollen pancreas irritates the solar plexus; the whole of the autonomic nervous system is thus rendered very sensitive, and the adrenaline detonates the ocular sympathetic.

The foregoing are the outstanding clinical features of acute pancreatitis from a differential standpoint.

Some points may also be mentioned which may be categorized as of minor importance, not because they lack interest, but because either they are rarely present or they lack the possibility of immediate application.

1. *The presence of a palpable abdominal tumour* is rarely noted; probably obesity militates against the regular detection of a pancreatic enlargement.

2. *Grey Turner's sign*⁷ is a local discoloration of the skin. It usually occurs in the loin. The patches have the appearance of the skin in late extravasation. It is only seen in cases of some two or three days' standing. The condition is clearly due to the direct action of the pancreatic juice, which escapes by way of the retroperitoneal tissues and passes by the most direct route to the surface.

3. *The diastatic index of the urine* is not uncommonly raised from the normal 15 units to 150 or more. Recently I had a case in Dudley Road Hospital in which the index stood at 200 units. This test would be most valuable if it could be performed readily at the bedside. Unfortunately, by the time the report has come from the laboratory the index has ceased to be anything but a matter of academic interest. Sir Gilbert Barling⁸ has shown that this test is not uniformly reliable—the increased index may be present in pneumococcal peritonitis.

4. *The Lipase Index of the Urine.*—Gordon Cameron, in 1923,⁹ described a test for lipase in the urine. This again is essentially a laboratory procedure.

5. *Sugar in the urine* is present in a small proportion of cases of acute pancreatitis. It is of little diagnostic significance unless we know that glycosuria was not present previously.

TREATMENT.

Certain principles of treatment are agreed upon, but there are differences of opinion as to some details. Of the necessity for operation Deaver¹⁰ says: "Instant drainage of the pancreas is the procedure indicated. Recovery from acute pancreatitis is not unknown, but it is safe to say that cases which recover by medical, that is expectant, treatment, would also recover by operative treatment, while some of those who die without operation might have been saved had they been submitted to operation."

Laparotomy being imperative, the patient should be given antishock treatment whilst preparation is being made for operation, and during the interval the result of the mydriatic test may be observed.

A liberal supply of oxygen should be administered with the anaesthetic from the commencement. I favour the mid-line incision because of the rapidity with which the abdomen can be opened and closed. The diagnosis is at once clinched by the blood-stained exudate and fat necroses. The pancreas is most readily explored by tearing the layers of peritoneum between the stomach and the transverse colon. In rare cases where there is marked ptosis of the stomach the pancreas can be conveniently exposed through the gastro-hepatic omentum. It is never justifiable to approach the organ through the transverse mesocolon, for subsequent drainage is difficult, and infection of the general peritoneal cavity almost certain. (Fig. 3.) Sir Berkeley Moynihan¹¹ has

FIG. 3.—Diagram of routes of approach to the pancreas. (1) Through the gastro-hepatic omentum. (2) Through the gastro-colic omentum. (3) Through the transverse mesocolon.

emphasized the importance of packing off the field of operation thoroughly, in order to avoid soiling the general peritoneal cavity with the infected contents of the lesser sac.

Various Operative Procedures Recommended.

Incision of the pancreas was introduced by von Mikulicz in 1903.¹² The general consensus of opinion to-day is that this procedure involves a very grave mortality. Sir Berkeley Moynihan has modified the method, and recommends that the peritoneum covering the pancreas should alone be incised; but in my limited experience, with everything in an inflamed and turgescient state, this is very difficult to carry out.

Posterior drainage was championed by Barker¹³ of University College Hospital. When the diagnosis was confirmed by laparotomy he made an incision below the right twelfth rib, and, with one finger in this incision, he burrowed his way through the extraperitoneal fat to the head of the pancreas, guided by the other hand in the abdomen. This would appear to be the best method in those cases which tend to go on to abscess formation, and in which the inflammatory process is mainly retroperitoneal.

Gall stones are present in about 50 per cent. of cases submitted to operation. Cholecystitis is probably intimately associated with pancreatitis, and consequently, if the condition of the patient permits, the diseased gall bladder should receive attention.

Cholecystotomy and Cholecystectomy.—Cholecystotomy is a very simple rapid procedure. It is very doubtful if it is of much value in draining the common duct. Nevertheless, there is much to be said in its favour as a supplementary therapeutic measure in acute pancreatitis. Following Deaver's teaching of the lymphatic origin of pancreatitis, I believed that, in those cases in which the gall bladder was definitely diseased, cholecystectomy, in addition to local treatment, would, if the patient survived the existing attack, bring about a permanent cure. Doubt has now been cast upon this belief; I have recently had a case of a mild recurrent attack in a patient in whom I had four months before extirpated the gall bladder and drained the lesser sac. The attack, however, passed off. Further proof that cholecystectomy is not a panacea is afforded by Holden and Moran,¹⁴ who cite a case of acute pancreatitis occurring seven years after the gall bladder had been removed for uncomplicated gall stones. Therefore, in a grave emergency, cholecystotomy, on account of its simplicity, should have priority.

Archibald's Operation.—Archibald of Montreal,¹⁵ as the result of much experimental work, has come to the conclusion that acute pancreatitis is largely due to a spasm of Oddi's sphincter, which surrounds the ampulla of Vater. This sphincter will resist an intraduodenal pressure of 1,000 mg. of water. His operation consists of opening the duodenum and dividing the sphincter. This procedure is still young, but has been received with enthusiasm in the new world.

Appendicostomy.—Appendicostomy has recently been recommended for the rapid instillation of large quantities of saline to collapsed patients after abdominal operations. Billington and Goodwin (1912)¹⁶ advocated this procedure, and applied it successfully in two cases of acute pancreatitis.

Post-operative Treatment.

The escaping pancreatic juices tend to digest the abdominal wall and sutures contained therein. "Burst abdomen" is not an uncommon complication, and should be especially guarded against by suitably supporting the incision. Digestion of the skin around the wound may be effectively prevented by smearing the skin with an ointment containing 2 per cent. of hydrochloric acid, which renders the ferments impotent.

Pancreatic Asthenia.—Whipple¹⁷ has drawn attention to a most interesting condition which he has named pancreatic asthenia. It occurs during the second and ninth days after operations upon the pancreas, and lasts for a varying period; seven of his forty cases followed operations for acute pancreatitis. Weakness is the chief complaint; the asthenia in some cases approaches that of Addison's disease; there is a mask-like expression, a drawing voice, muscular relaxation, and a tendency to salivation. The only treatment of permanent value is blood transfusion. It is curious to note that the request for bizarre dishes is often the first indication of a subjective improvement.

Conclusion.

The mortality of pancreatitis is still very high. Doubtless some improvement can be brought about by earlier diagnosis; but no substantial advance is likely to be made until the cause has been conclusively elucidated.

The riddle of all acute intra-abdominal inflammatory catastrophes will probably be solved when the key to the commonest is found—I refer to acute appendicitis.

REFERENCES.

- ¹ Fitz, R. H.: *Med. Record*, New York, 1889, xxxv, 197, 225, 253.
- ² Dick, R. J.: *Edinburgh Med. Journ.*, 1910, N.S., v, 217.
- ³ Fisher, T.: *Brit. Journ. Surg.*, 1923-24, xi, 179.
- ⁴ Murphy, J. B.: *Surg. Clin. Murphy*, 1915, iv, 751.
- ⁵ Ogilvie, W. H.: *Guy's Hosp. Gaz.*, 1922, xxxvi, 101.
- ⁶ Garrod, Sir A.: *Lancet*, 1920, i, 749.
- ⁷ Turner, G. G.: *Brit. Journ. Surg.*, 1919-20, vii, 394.
- ⁸ Barling, Sir G.: *BRITISH MEDICAL JOURNAL*, 1923, i, 705.
- ⁹ Cameron, G.: *Med. Journ. Australia*, 1923, ii, 408.
- ¹⁰ Deaver, J. B.: *Surg. Clin. North America*, 1921, i, 1.
- ¹¹ Moynihan, Sir B.: *Annals of Surgery*, 1925, lxxxi, 132.
- ¹² Von Mikulicz-Radecki: *Ibid.*, 1903, xxxviii, 1.
- ¹³ Barker, A. E.: *Lancet*, 1914, i, 1594, 1630.
- ¹⁴ Holden, W. B., and Moran, X. P.: *Surg. Clin. North America*, 1924, iv, 1247.
- ¹⁵ Archibald, E.: *Surg., Gynecol. and Obstet.*, 1919, xxviii, 529.
- ¹⁶ Billington, W., and Goodwin, B. G.: *Lancet*, 1912, ii, 752.
- ¹⁷ Whipple, A. O.: *Annals of Surgery*, 1923, lxxviii, 176.
- ¹⁸ Eve, Sir F.: *Lancet*, 1915, i.
- ¹⁹ Waring, H. J., and Griffiths, H. E.: *Brit. Journ. Surg.*, 1923-24, xi, 476.