Role of Early Laparotomy in Acute Pancreatitis

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Introduction

THE MEANS of establishing an accurate diagnosis of acute pancreatitis is still a matter of debate and discussion. Serum enzyme levels and particularly the serum amylase, are widely used and provide confirmation of the clinical appraisal with a considerable degree of reliability.

There are, however, two problems which may arise in a significant number of cases. First, the serum amylase can be elevated in conditions other than pancreatitis. While some of these, such as mumps or renal failure, do not usually pose a serious diagnostic problem, this elevation may also occur in other acute abdominal conditions when differentiation from acute pancreatitis is imperative if the correct treatment is to be instituted. Secondly, the serum amylase level is not always raised even in the early stages of an acute episode of pancreatitis. Hence, full reliance on this test will, at times, leave an area of doubt.

Patients diagnosed on clinical grounds, as having pancreatitis with apparent confirmation from a raised serum amylase level, but who are subsequently proved to have other conditions, are automatically excluded from any retrospective survey of pancreatitis. Yet they form a group which must be given serious consideration in any balanced discussion of this diagnostic problem.

A controversial aspect in the management of acute pancreatitis concerns the place of early laparotomy which, though usually considered under the context of the treatment, also will resolve many diagnostic problems.

Current teaching emphasizes that early surgical intervention in acute pancreatitis is positively harmful, and that it should be avoided.

This report reconsiders these matters in a large series of cases of proved acute pancreatitis, and includes a review of the risks associated with early operation. Recent personal experience with the problem of misdiagnosis in patients subsequently proved to have other conditions will be emphasized. Finally, a synthesis of these two factors is presented.

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Materials and Results

Effect of Immediate Operation. The case material upon which this report is based comprised 324 patients suffering from acute pancreatitis admitted to hospitals of Bristol, England, from 1950 to 1961, inclusive. They represented a complete and unselected series of patients from a mixed rural and urban area.[16]

The following diagnostic criteria were required for inclusion in the series. Cases were accepted only if there was clear evidence of acute pancreatitis at laparotomy or postmortem examination, or when the clinical findings were supported by a serum amylase in excess of 1,000 Somogyi units. Although other conditions may be associated with an amylase level of this magnitude, the diagnostic error becomes apparent as the illness progresses, and such

TABLE 1. *Etiological Factors*

Gallstones	180
Alcoholism	4
Mumps	2
Idiopathic	129
Unknown*	9
	324

* Full etiologic work up was not obtained in these patients.

patients were automatically excluded from this retrospective survey.

The etiology of the pancreatitis in these patients is shown in Table 1. The majority had cholelithiasis, while the number of alcoholics was small. All of the patients presented with an acute, often fulminating illness, and were therefore dissimilar to the cases with chronic relapsing pancreatitis secondary to alcoholism seen so commonly in the Charity and Veterans Administration Hospitals in the United States.

Operations were performed during the acute stage of the illness in 91 of the 324 patients, usually because some other acute abdominal condition was considered likely. In a minority of cases the patient was thought to have cholecystitis and laparotomy was undertaken because the surgeon favored immediate cholecystectomy. In all patients the pancreatitis was active and acute at the time of operation. A comparison of the results of nonoperative and operative management (Table 2) shows that the mortality was similar for both forms of treatment. Further analysis reveals four significant facts:

1. Neither mortality nor the course of illness was influenced by etiological factors in either of the two groups. The age distribution was also comparable; the mean was 67.1 years (range: 5 weeks to 94 years) for those cases treated medically and 64.9 years (range: 7 days to 85 years) in the patients undergoing operation.

TABLE 2. *Mortality in Relation to Operative and Nonoperative Management*

Treatment	Totals	Deaths	%
Operative	91	21	23.1
Nonoperative	233	55	23.6

TABLE 3. *Operations in 91 Patients with Acute Pancreatitis*

No.	Type of Operation	Deaths
58	Simple laparotomy	14
13	Cholecystostomy	4
7	Cholecystenterostomy	—
4	Cholecystectomy	1
2	Cholecystectomy with choledochostomy	—
2	Cholecystectomy with choledochoduodenostomy	1
1	Cholecystectomy with transduodenal sphincterotomy	—
1	Transduodenal sphincterotomy	—
1	Gastroenterostomy	—
2	Distal pancreatectomy	1
91		21

2. The preoperative diagnosis in these patients was most commonly either perforated duodenal ulcer, acute intestinal obstruction or acute appendicitis, though in 35 instances, laparotomy was performed specifically because the diagnosis was in doubt. Acute cholecystitis with its less impelling clinical presentation and constitutional disturbance is usually treated nonoperatively by surgeons in Britain, and operation was rarely undertaken for this diagnosis. Thus, it was the more severely ill patients who were submitted to laparotomy.

3. Of 91 patients who underwent operation, 58 had a simple laparotomy with a mortality rate of 24%. The other 33 cases had some additional procedure; there were seven deaths in this latter group giving a mortality rate of 21% (Table 3). This data indicates that *the addition of a definitive procedure did not increase the hazard of operation.*

4. Review of the postoperative data revealed that dehiscence of the wound with evisceration occurred in six cases. Excluding those patients dying less than 10 days postoperatively, the incidence for this complication was 8%. This is a recognized complication of laparotomy in pancreatitis.[14] However, the frequency in this series was at least triple that which is normally regarded as acceptable for the general incidence of this complication [18] and this finding carries an obvious and salutory warning regarding the technic of wound closure.

Apart from the risk of wound dehiscence, comparison of the course of illness in those patients treated nonoperatively, and those who underwent laparotomy was unremark-

able. It is concluded that operation during an acute episode of pancreatitis did not influence either the overall mortality or the morbidity of the illness. There was no evidence, based upon this analysis, that surgical intervention was detrimental to the patient.

Problem of Misdiagnosis. The following case histories illustrate the problem which may arise when a misdiagnosis of acute pancreatitis is made.

Case Reports

Case 1. A 70-year-old man was hospitalized 3 hours following the sudden onset of severe epigastric pain which radiated to his back, and was associated with vomiting and retching. Physical findings included minimal tenderness limited to the epigastrium; there were no masses palpable. The blood pressure was 100/60 mm. Hg, and peripheral pulses were present and equal. A clinical diagnosis of acute pancreatitis or leaking abdominal aneurysm was made. He was given intravenous fluids and following rapid administration of 2 L. of normal saline his condition was improved. Laboratory studies revealed a hemoglobin of 13.2 Gm.%, a hematocrit of 48%, a leukocyte count of 12,000, and a serum amylase of 1,000 Somogyi units. These findings appeared to confirm the diagnosis of acute pancreatitis. Subsequently, a serum calcium determination was reported as 7.2 mg./100 ml. Thus, doubt regarding the diagnosis was allayed and he was treated conservatively and sedated heavily. Five hours later a mass had developed in the left iliac fossa, and a diagnosis of ruptured abdominal aneurysm was reconsidered. Unfortunately, his condition deteriorated rapidly and he died before operation could be undertaken. Autopsy demonstrated a ruptured aortic aneurysm; gross and microscopic examination of the pancreas failed to reveal any abnormality.

Comment: This case clearly illustrates the problem under discussion. This man had a lesion which was surgically correctable. Even though the validity of the elevated amylase reading was questioned on the basis of clinical findings a second and much more dubious diagnostic parameter, the serum calcium level, led to a delay in instituting treatment. He was treated for pancreatitis but the cause of death was listed as ruptured aortic aneurysm.

Case 2. A 70-year-old woman was hospitalized for treatment of severe epigastric pain which radiated into the lower dorsal area and was associated with repeated emesis.

Examination revealed an acutely ill elderly female with a blood pressure of 90/60, a pulse of 120, a respiratory rate of 40 and a rectal temperature of 38.3° C. The abdomen was obese and distended. There was generalized tenderness which was maximum in the midepigastrium. A vague sensation of fullness was palpable in the suprapubic area beneath an old midline operative scar. A bluish discoloration was noted in both flanks. No organs or masses were palpable, and bowel sounds were hypoactive.

Laboratory studies included a hemoglobin of 16.5 Gm.%, a hematocrit of 50%, a leukocyte count of 37,400 with marked neutrophilia and a serum amylase of 700 Somogyi units.

Past history revealed that she had undergone surgical operation for a *ruptured urinary bladder* in 1963, and was hospitalized in 1964 for treatment of a subendocardial myocardial infarction. At this time splenomegaly was demonstrated and she was found to have a thrombocytopenia and neutropenia; however, a definitive diagnosis was not established for these hematologic findings.

A presumptive diagnosis of acute pancreatitis was made, and treatment included intensive fluid replacement, antibiotics, anticholenergic drugs and nasogastric suction. Over the ensuing 12-hour period, the urinary output increased to 30 to 40 ml./hr., the blood pressure stabilized at 130/80 and the hematocrit and hemoglobin values returned to normal. Over the next 12 hours her clinical condition was generally improved although abdominal tenderness persisted. A peritoneal tap revealed serosanguineous fluid with an amylase value of 500 Somogyi units/ml.

Approximately 30 hours following admission, the blood pressure again dropped to 90/60 and the pulse increased to 140. The temperature rose rapidly to 41.6° C. rectally, and she became unresponsive.

Death occurred on the 7th day following admission after an extended period of hypotension, hyperpyrexia and coma which was treated with antibiotics, steroids, careful fluid and electrolyte replacement and hypothermia. Although other acute abdominal problems were considered, her condition after the initial improvement was so precarious that operative intervention was contraindicated.

Postmortem examination revealed a strangulation obstruction secondary to adhesions, with infarction of approximately half of the small intestine. The pancreas appeared normal.

Comment: The one opportunity to achieve survival in this instance was a brief 12- to 24-hour period during which the patient's general condition improved following admission. The elevated serum amylase, evidence of hemoconcentration and serosanguinous abdominal fluid with a high amylase value strongly supported a diagnosis of acute pancreatitis. The lack of improvement in abdominal findings during this period should have signaled the need for laparotomy which represented the only hope for a successful outcome.

Case 3. A 74-year-old man was admitted with a 5-hour history of severe epigastric and mid-abdominal pain which radiated to the back. The pain was sudden in onset and associated with persistent vomiting and retching. Twelve years previously he had had an antecolic Polya gastrectomy for a duodenal ulcer. In the intervening period, he had remained well, but had experienced several isolated episodes of vomiting which had not been accompanied by pain. On examination the blood pressure was 130/80 mm. Hg, and he did not appear to be in shock. There was generalized abdominal tenderness with guarding limited to the epigastrium; bowel sounds were present. A preliminary diagnosis of acute pancreatitis was made. Laboratory studies showed a hemoglobin of 13.0 Gm.%, a hematocrit of 44%, a leukocyte count of 17,000 and a serum amylase of 3,000 Somogyi units. There was no evidence of methemalbumin in the serum.

The patient was treated with nasogastric suction, intravenous fluids and tetracycline and he improved rapidly. However, after 6 days there was a mild recurrence of pain and vomiting. Laparotomy was therefore performed the following day. Except for two small areas of fat necrosis near the head of the gland, the pancreas appeared normal. The main abnormal finding was a grossly distended and edematous afferent loop with evidence of torsion and obstruction at the gastrojejunostomy stoma. This was refashioned, and the patient's postoperative progress was uneventful. He had experienced no further abdominal symptoms when seen for follow up at 3 years.

Comment: This patient illustrates the difficulty in distinguishing acute pancreatitis from an acute afferent loop obstruction following gastric resection. This diagnosis must be seriously considered in any patient with acute abdominal symptoms and a past history of a Billroth II gastrectomy, even in the face of an elevated serum amylase.[6]

Case 4. A 48-year-old woman was hospitalized with severe epigastric pain and vomiting which began following a meal 12 hours prior to admission. She had experienced similar attacks of lesser severity over the previous 3 years.

Examination revealed an acutely ill female with a blood pressure of 100/70, a pulse of 130, a respiratory rate of 36 and a temperature of 38.3° C.; she appeared dehydrated. The abdomen was distended and diffusely tender, with maximum findings in the epigastric area. Bowel sounds were infrequent.

Laboratory studies included a hemoglobin of 14 Gm.%, a hematocrit of 48%, a leukocyte count of 16,850 with neutrophilia, and an amylase of 960 Somogyi units.

A presumptive diagnosis of acute pancreatitis was made, and she was treated with intravenous fluids, antibiotics, anticholinergics, narcotics and nasogastric suction. Over the next 4 hours her symptoms improved; however, an exquisitely tender mass was palpable in the right subcostal area.

In view of the alteration in the abdominal findings, a gangrenous form of cholecystitis was strongly suspected, and laparotomy performed. The abdomen was filled with serosanguinous fluid and the pancreas was tense with hemorrhagic fluid and grossly enlarged. The gallbladder contained small stones but was not distended; the remainder of the biliary tract could not be visualized, because of the severe inflammatory reaction in the area. Multiple soft rubber drains were placed in the subhepatic space and the abdomen was closed after irrigation with warm saline. Recovery was rapid and uneventful; the amylase returned to normal by the fifth day and she was discharged on the fifteenth postoperative day.

Six weeks later the patient was re-admitted for definitive biliary surgery. Multiple small stones were present in the gallbladder and four stones were removed from the common duct. The head of the pancreas was indurated but otherwise the gland appeared normal. T-tube drainage was discontinued after a month, and she has remained asymptomatic for 2 years.

Comment: This patient is not strictly a case of primary misdiagnosis; in fact the original opinion was confirmed at an operation from which she made an uncomplicated and rapid recovery. The history, which could be duplicated several times

over from the present series, is, however, pertinent in the present context. It is included to outline, in a specific case, a balanced and correct approach in the problem case where the diagnosis must be conclusively established. Early laparotomy allowed an accurate appraisal upon which the subsequent therapy was based. The one criticism that could be offered is that cholecystostomy might have provided an additional safety factor, had the patient experienced another attack prior to the eradication of the biliary tract disease.

Discussion

In the diagnosis of acute pancreatitis, at least in its more fulminating forms, the main conditions which require differentiation are acute cholecystitis, perforated duodenal ulcer, intestinal strangulation, mesenteric arterial occlusion and ruptured or dissecting aortic aneurysm. Not only may the clinical picture be confusing but also each of these entities may show a significant elevation of the serum amylase. Usually this remains within the range of 200 to 500 Somogyi units, but when this level is exceeded, differential diagnosis is a problem. A review of the literature by Howard [4] confirmed that readings in excess of 1,000 Somogyi units may be obtained in diseases other than pancreatitis, and the current cases emphasize this problem. The diagnostic problem which may arise in patients who have undergone a Polya partial gastrectomy, and who develop an afferent loop obstruction, has been well recorded by McGowan and Wills [6] and their observations should be more widely publicized.

It is hardly necessary to emphasize that this problem is not merely an academic point. Of the fulminating acute abdominal conditions listed above, only two, acute pancreatitis and possibly cholecystitis, can be expected to respond to nonoperative measures. Operation is indicated as a matter of urgency in all of the others. The management and final outcome of misdiagnosed cases has received scant attention. However, there are scattered reports of fatalities resulting from persistent nonoperative treatment based upon absolute reliance on an elevated serum amylase reading.[18, 11]

In the search for a solution to this dilemma, other diagnostic criteria have been advocated. Peritoneal tap has received some attention, but by the time the additional enzyme determinations have been completed, considerable delay may have occurred. Apart from this factor, a *dry tap* does not exclude the presence of pancreatitis, while several conditions, most notably perforated duodenal ulcer and strangulation obstruction, may also show elevated enzyme levels in the peritoneal fluid. This subject was reviewed by Howard [4] who concluded that "enzyme determinations on the peritoneal fluid offer the same pitfalls and limitations as do those of the serum."

Radiology provides valuable information when free air is demonstrated under the diaphragm, but its absence does not exclude a perforated peptic ulcer. Findings such as the colon *cut-off sign* and the *sentinal loop* are more clearly demonstrable when viewed retrospectively, and certainly do not constitute strong enough evidence to withhold operation in the doubtful case. It has also been suggested that an immediate barium meal may be helpful, and Schultz has claimed a high degree of diagnostic accuracy for this procedure.[12] It is difficult to imagine that this type of investigation would be tolerated by patients under consideration in this report.

The level of serum calcium may fall during the course of an attack of acute pancreatitis but this is not an immediate feature of the illness. There is a time lag before it occurs, and the test is most useful as a guide to prognosis in the severe case. Recent reports [6, 17] have suggested that this measurement may be valuable as a diagnostic aid. Our findings do not support this contention; the use of this criterion may be most misleading, as illustrated by Case 1.

These diagnostic parameters do not provide sufficiently firm criteria upon which to base the choice of therapy in the problem case. Not only may they be misleading but precious time may be lost. It would therefore seem rational to suggest that laparotomy is indicated as the best approach when the diagnosis is questionable in the patient with an acute abdominal catastrophe.

Historically, the therapy for acute pancreatitis has undergone radical change. Emergency operation with a direct attack upon the inflamed gland was recommended in the early years of the century.[8] In the 1930's, this view was revised; deTakats and MacKenzie [3] supported the concept of immediate operation, but limited the procedure to drainage of the biliary tract, or of any abscess which was encountered. Mikkelsen [7] emphasized the lack of a sound basis for a direct operative attack on the pancreas, and showed that biliary tract surgery did not confer any advantage in the early stages of the disease. Thus, a swing to a more conservative management occurred, and even diagnostic laparotomy was considered harmful, since it appeared to double the mortality in some series.[12, 15] When the abdomen harboring an acute pancreatitis was entered *by mistake,* the correct approach was to do as little as possible and *get out quickly.* Indeed current teaching was well expressed by Bowers who stated that "pancreatitis is a surgical condition only because of its similarity to other emergency surgical conditions." [2]

In contrast, Howard and Jordan [4] found that simple laparotomy did not increase the mortality in a large series of patients, provided that no heroics were undertaken. Similarly, Pollock [9] found a comparable mortality for operative and conservative treatment. The present series supports this trend. Indeed, it would seem that traditional teaching needs to be revised, for there is no evidence that early operation was in any way harmful in this group of patients, even though it was the more severely ill patients who were submitted to operation. Moreover, the addition of definitive procedures did not appear to increase the operative risk.

This report is not intended as a plea for wholesale laparotomy in the management of acute pancreatitis. Rather it is an attempt to obtain a more balanced approach to the problem of diagnosis. The routine treatment of the acute episode should be conservative *so long as the diagnosis is reasonably certain,* and provided that there are no special indications for operation. This approach will provide prompt improvement in a large majority of patients seen with this condition. There are, however, a minority of problem cases where medical measures fail to alter a progressive downhill course, or where doubt exists regarding the precise nature of the underlying disease. The burden of this communication is to stress that in this small but significant group early operative intervention may offer the only hope for success. The risk of allowing a life-endangering and surgically correctable disease to go undiagnosed and untreated is greater than that inherent in operating upon the patient with acute pancreatitis. We believe that the dangers of operative intervention in this condition have been overstressed. When fluid and electrolyte deficits are adequately corrected before operation, careful abdominal exploration carries no special risk for these patients, although particular attention must be given to the closure of the abdominal wound. *If the patient has pancreatitis, little is lost; when some other disease is revealed, much can be gained.*

Another controversial question related to operation in the active stage of acute pancreatitis concerns the action which should be taken once a diagnosis of pancreatitis is confirmed. The present study does not give a full answer to the question; however, a more detailed consideration of the available data [16] has suggested certain alternatives.

Direct manipulation of the pancreas is not indicated during the active stage of the disease because of the marked vascularity of the gland. The complications of abscess or pseudocyst formation rarely develop before the second or third week of the illness, but if either of these is evident, then simple external drainage should be instituted. Biliary tract surgery does not convey any benefit to these patients unless biliary tract disease is present. If, however, there are gallstones or an extrahepatic biliary obstruction associated with the pancreatitis, then biliary decompression either by cholecystostomy or choledochostomy is indicated.[1, 13] Cholecystectomy should be delayed until the local inflammation has resolved, for any additional manipulation may enhance the severity of the lesion. Under no circumstances is it justifiable to tamper with the region of the ampulla at this time. The complication of acute pancreatitis is one of the few indications which dictate that biliary tract surgery should be less than comprehensive at the first attempt.

Direct observation of the pancreas supplies an accurate estimate of the severity of the inflammatory process, which in turn permits a logical approach to subsequent therapy.

Summary

The role of early laparotomy in the management of acute pancreatitis is reconsidered in the light of recent clinical experience. In a series of 324 cases of acute pancreatitis, 91 patients underwent laparotomy during the active stage of the illness. There was no difference in mortality or morbidity between the operated and nonoperated groups. Further analysis revealed that the more severely ill patients were submitted to operation. Addition of definitive procedures not involving a direct attack on the inflammed pancreas, did not increase the hazard of operation. In view of these findings it is suggested that the traditional conservative view should be modified to allow a more positive approach, especially when the diagnosis of pancreatitis is in doubt, or if clinical improvement does not occur promptly with vigorous medical treatment.

The dangers of misdiagnosis and of persisting with *conservative* management in patients with conditions other than pancreatitis are greater than those inherent in a properly conducted diagnostic laparotomy.

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