Digestive Diseases and Sciences, Vol. 30, No. 10 (October 1985), pp. 1005–1018

REVIEW ARTICLE

Death Due to Acute Pancreatitis
A Retrospective Analysis of 405 Autopsy Cases

IAN G. RENNER, MD, FRACP, WILLIAM T. SAVAGE, III, MD, JOSE L. PANTOJA, MD, and V. JAYNE RENNER, PhD

A large retrospective autopsy study of patients was analyzed to evaluate the major etiologic and pathologic factors contributing to fatal acute pancreatitis (AP). From an autopsy population of 50,227 patients, 405 cases were identified where AP was defined as the official primary cause of death. AP was classified according to morphological and histological, but not biochemical, criteria. Patients with AP died significantly earlier than a control autopsy population of 38,259 patients. Sixty percent of the AP patients died within 7 days of admisssion. Pulmonary edema and congestion were significantly more prevalent in this group, as was the presence of hemorrhagic pancreatitis. In the remaining 40% of patients surviving longer than 7 days, infection was the major factor contributing to death. Major etiologic groups in AP were chronic alcoholism; postabdominal surgery; common duct stones; a small miscellaneous group including viral hepatitis, drug, and postpartum cases; and a large idiopathic group comprising patients with cholelithiasis, diabetes mellitus, and ischemia. The prevalence of established diabetes mellitus in the AP group was significantly higher than that observed in the autopsy control series, suggesting that this disease should be considered as an additional risk factor influencing survival in AP. Pulmonary complications, including pulmonary edema and congestion, appeared to be the most significant factor contributing to death and occurred even in those cases where the pancreatic damage appeared to be only moderate in extent. Emphasis placed on the early recognition and treatment of pulmonary edema in all cases of moderate and severe AP should contribute significantly to an increase in survival in this disease.

The overall mortality from acute pancreatitis throughout the world varies between 6 and 23% (1–7). In the more fulminant edematous and hemorrhagic forms, the mortality is much higher, with death rates ranging between 20 and 50% (8, 9). Although the prognosis for a given case depends to a large extent on the severity of acute pancreatitis, there is ample clinical evidence that nonpancreatic factors, including pulmonary complications (10–16), intractable circulatory failure (17), infection (17), and hemorrhage (18) contribute significantly to morbidity and mortality in this disease.

Reports in the literature concerning the autopsy prevalence of the above complications are few (10, 19, 20) and vary particularly with respect to pulmonary pathology. Enquist and Gliedman (10) and Lankisch et al (20) noted striking pulmonary complications in AP, whereas Storck et al reported only minimal lung involvement (19). Furthermore, the precise role of infection and its relationship to the onset of AP remain unclear.

The present study was undertaken to evaluate the major etiologic and pathologic findings in a large autopsy series of patients dying from acute pancreatitis. It is expected that increased recognition of these complications might result in improved man-

Manuscript received June 6, 1984; revised manuscript received December 4, 1984; accepted January 23, 1985.

From the University of Southern California School of Medicine, Department of Medicine, Section of Gastroenterology, Los Angeles, California.

Address for reprint requests: Dr. Ian G. Renner, Section of Gastroenterology, Department of Medicine, School of Medicine, University of Southern California, 2025 Zonal Avenue, Los Angeles, CA 90033.

0163-2116/85/1000-1005$04.50/0

agement and hopefully increased survival. It has been our clinical impression that the presence of established diabetes mellitus occurs more frequently and worsens the course of acute pancreatitis. We were, therefore, interested in evaluating this relationship in the present work.

MATERIALS AND METHODS

This study is based on a retrospective analysis of the clinical records and autopsy files of a total of 50,227 patients autopsied during the period 1949 through June 1978 at the Los Angeles County–University of Southern California Medical Center, Los Angeles, California. Pancreatic pathology was present in 3274 (6.5%) cases, and from this group 405 (0.8% of the total series) patients were identified in whom acute pancreatitis (AP) was officially recorded as the primary or precipitating cause of death. Pancreatic pathology present in the remaining 2869 cases included patients with chronic pancreatitis, pancreatic cancer, and some with acute pancreatitis in whom the disease was not considered to play a significant role in the cause of death. The latter patients were excluded from the study.

Criteria for inclusion of patients into the fatal acute pancreatitis group included clinical features of severe abdominal pain with or without shock, marked elevations of serum and urinary amylase, and autopsy findings of global pancreatic edema and widespread fat necrosis with or without hemorrhage.

In an attempt to determine if there was any observable change over two time periods in the etiologic factors associated with AP, we divided our patients into two sequential groups, those dying between 1949 and 1963 and those dying between 1963 and June 1978.

Where possible, the etiology of acute pancreatitis was determined as being due to: (1) pancreatitis associated with documented chronic alcoholism; (2) common duct stones; (3) postoperative cases; and (4) a miscellaneous group where infection, drugs, hyperlipidemia, and the postpartum state were considered to be the major etiologic factors. Additionally, a heterogenous group which we tentatively classified as "idiopathic" (in which no clearly defined etiologic association could be identified) was also included in the study.

In contrast to other published studies we did not categorize patients with cholelithiasis into a separate subgroup. We considered that classification of patients into etiologic subgroups on the basis of the most likely factor causing AP would result in a more meaningful analysis. Patients with cholelithiasis alone were included in the "idiopathic" group. Using this approach, the prevalence of cholelithiasis in all subgroups, has been compared with each other and with the control population.

Chronic alcoholism was defined as being present where the daily intake of alcohol exceeded 150 g for a period of at least five years. In many cases, a history of chronic alcohol ingestion was denied by the patient but was elicited from the family.

Classification of pancreatic pathology into acute pancreatitis alone or into acute pancreatitis superimposed on a chronic lesion was based on both morphologic and histologic assessment. The macroscopic description of the pancreas was as recorded by two independent pathologists at the time of postmortem examination. Multiple head, body, and tail sections of the pancreas were examined for the following histological abnormalities: (1) peripancreatic fat necrosis; (2) fat necrosis within the pancreatic tissue; (3) cell necrosis; (4) leukocyte infiltration into pancreatic fibrosis; (5) presence and degree of pancreatic fibrosis; (6) calcium deposition in the pancreas or peripancreatic fat; (7) major and minor duct pathology; and (8) hemorrhagic tissue necrosis.

Macroscopic and microscopic evidence of global pancreatic edema, parenchymal destruction with or without hemorrhage, together with areas of fat necrosis and acute polymorphonuclear inflammation reaction were considered to be confirmatory evidence of acute pancreatitis.

Hepatic findings including the presence of cirrhosis, portal fibrosis and fatty liver were documented.

Patients with diabetes mellitus antedating their onset of acute pancreatitis were identified. In all cases the survival time following admission to the hospital was established. Documentation of other pathologic findings pertinent to this study was made in each of the 405 cases.

The presence of positive bacterial culture and the specific organisms identified have been reported. No attempt was made to analyze biochemical data.

To provide a basis for comparison of the prevalence of various conditions in the AP group, an autopsy series consisting of 38,259 patients without pancreatic pathology, but categorized with regard to age and sex were studied. In this group the prevalence of biliary, hepatic, and pulmonary pathology and the presence of established diabetes mellitus was recorded.

Statistical analyses were performed by utilization of the chi-square and Student's t tests (21). The criteria for statistical significance was set at $P < 0.05$.

RESULTS

The mean age at death in patients with AP was 53.3 ± 15.5 years (range 18–94 years) and was significantly different ($P < 0.001$) from the age of death in the autopsy control series of 63.4 ± 15.7 years (range 20–98 years) (Table 1). The age distribution of the acute pancreatitis cases is shown in Figure 1. The male-to-female ratio in AP was 1.68 and was significantly different ($P < 0.001$) from the autopsy control series of 1.34 (Table 1). The prevalence of cholelithiasis, cholecystectomy, and diabetes mellitus was significantly greater in the AP group ($P < 0.001$) than in the autopsy control series (Table 1).

The racial composition of the pancreatitic group (Caucasians = 61.2%, Blacks = 21.5%, Mexican Americans = 15.8%, Oriental = 0.5%, American