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Diagnostic Dilemma of Sudden Deaths Due to Acute Hemorrhagic Pancreatitis

ABSTRACT: Sudden death due to acute pancreatitis has been rarely determined. A review of 3305 autopsies performed between 1991 and 2001 at the Council of Forensic Medicine found 12 cases (0.36%) with sudden death due to acute hemorrhagic pancreatitis without symptoms. A history of chronic alcohol ingestion was obtained from family in four cases (33%), and no stones were found in the bile ducts or in the gall bladders. During the autopsies, hemorrhage and edema were localized on the head of the pancreas in three cases and the whole pancreas in nine cases. The most common extrapancreatic pathology was found in the lung including pulmonary edema, alveolar hemorrhage, pleural effusion, and pulmonary congestion. There was no correlation between pulmonary and pancreatic damage. It is suggested that the forensic pathologists who are dealing with sudden unexpected death must not ignore the examination of pancreatic and extrapancreatic regions to avoid missing acute pancreatitis.

KEYWORDS: forensic science, sudden death, acute pancreatitis, lung pathology

The spectrum of acute pancreatitis ranges from mild inflammation to severe hemorrhagic and necrotizing pancreatitis complicated by respiratory, renal, or hepatic failure, and even death.

In recent years, many advances have been made in the diagnosis and treatment of acute pancreatitis that have led to a significant reduction in mortality. However, severe pancreatitis occurs in 20–30% of all patients with acute pancreatitis, and mortality rates ranging between 20% and 50% (1–3). Death from acute pancreatitis within the first week after admission is usually a consequence of either hypovolemic shock or multiple organ dysfunction (4). Late mortality in patients with severe acute pancreatitis results from septic complications. Cases of sudden death due to acute pancreatitis have rarely been reported (5,6).

In the present study, we describe and discuss the autopsy results in sudden death cases due to acute hemorrhagic pancreatitis. We also discuss potential mechanisms of death that we thought would be helpful to consider by forensic pathologists who are dealing with sudden unexpected death.

Materials and Methods

We performed a retrospective review of the medicolegal autopsy records of cases who underwent autopsy during the 1991–2001 periods at the Council of Forensic Medicine (Ankara Department). Of the 3305 adults undergoing autopsy during the study period, 12 (0.36%) died suddenly due to acute hemorrhagic pancreatitis. Deaths due to symptomatic acute pancreatitis were excluded from study.

A complete forensic autopsy was performed in every case. Autopsies were performed about 12 h after death. During the autopsies, the abdomen, thorax, and cerebral spaces were opened and gross findings from all the organs were noted. Multiple head, body, and tail sections of the pancreas were obtained. Tissue

specimens were removed from the pancreas, liver, lung, heart, kidney, and brain for histological examination. Specimens were fixed in 10% formalin and embedded in paraffin. Sections were stained with hematoxylin and eosin for histological studies.

Results

There were nine males and three females and the age at death ranged from 15 to 51 years (average: 32 years). Seven cases were found dead at home, four cases were found dead in the street, and one case died in hospital with unexplained shock and coma. A history of chronic alcohol ingestion was obtained from the family in four cases (33%). No case had a systemic chronic disease such as diabetes mellitus. Two cases had vomiting, one case had headache, and one case had mild chest pain. No external injury was found on the body. The heart and kidneys were normal on macroscopic and histological examination in all cases.

Acute hemorrhagic pancreatitis was found in all specimens studied. Hemorrhage and edema were localized in the head of the pancreas in three cases and throughout the whole pancreas in nine cases (Table 1). Fatty necrosis was found in the head of the pancreas in three cases and in the whole pancreas in nine cases. Hemorrhage was limited only in pancreatic and peripancreatic regions, and there was no blood in the abdominal cavity, except for the serosal surface of the stomach in one case and the intestinal lumen in another case. No stones were found in the bile ducts or in the gall bladder. There was no thrombosis in splenic or portal veins.

The most common extrapancreatic pathology was found in the lung, which included pulmonary edema in all cases, alveolar hemorrhage in five cases, pleural effusion in three cases, and pulmonary congestion in two cases. Macroscopic examination of the brain showed edema in seven cases, petechial hemorrhage in three cases, and minimal subarachnoid hemorrhage in a single patient in the parietal lobe.

Microscopic examination showed peripancreatic and pancreatic fatty necrosis, hemorrhage, dilatation of the blood vessels, and neutrophilic infiltration in pancreatic interstitial stroma in all cases. Pulmonary edema and hemorrhage were seen to a variable extent in all cases. Findings in other organs included fatty change

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Received 11 Mar. 2006; and in revised form 6 June 2006; accepted 1 July 2006; published 8 Dec. 2006.

TABLE 1—Clinicopathological characteristics of cases.

Case	Age	Sex	Symptoms	Alcohol Abuse	Postmortem Findings	
					Hemorrhagic and Edematous Parts of Pancreas	Pulmonary Findings
1	51	M	Chest pain	—	Head	Edema, pleural effusion, pulmonary congestion
2	15	M	—	—	Entire pancreas	Edema
3	32	M	—	+	Entire pancreas	Edema
4	28	F	—	—	Entire pancreas	Edema, alveolar hemorrhage
5	27	M	—	+	Head	Edema, alveolar hemorrhage
6	39	M	—	—	Entire pancreas	Edema, alveolar hemorrhage
7	31	M	—	—	Head	Edema, alveolar hemorrhage
8	49	M	Vomiting	—	Entire pancreas	Edema, pleural effusion
9	26	F	Vomiting	—	Entire pancreas	Edema
10	20	F	—	—	Entire pancreas	Alveolar hemorrhage
11	42	M	Headache	+	Entire pancreas	Edema, pulmonary congestion
12	28	M	—	+	Entire pancreas	Edema, pleural effusion

in the liver (four cases) and minor hemorrhage in the stomach mucosa (two cases). Major cardiac and renal changes were not observed on histological examination. There were no abnormalities on toxicological evaluation.

Discussion

Acute pancreatitis is an acute inflammatory process of the pancreas that may involve the peripancreatic tissue and various organ systems. Most patients develop a mild form of acute pancreatitis and survive the illness. However, about 20–30% of individuals develop severe disease, and despite considerable improvements in treatment, mortality continues to be up to 20% (4). According to three studies, pancreatitis was diagnosed only at necropsy in 30.2–52% of patients (7–9).

Early deaths caused by severe acute pancreatitis are due to multisystem organ failure with no apparent bacterial infection. Inflammatory mediators and cytokines originating from the inflamed pancreas may lead to damage to vital organs by variable mechanisms like vascular injury, stasis, or enhanced intravascular coagulation (10). These deaths are usually manifested by irreversible pulmonary edema (adult respiratory distress syndrome) and acute renal failure. Late deaths result from local or systemic infection caused by bacteria translocated from the gut (1).

There are relatively few reports of sudden death without symptoms due to acute hemorrhagic pancreatitis (6,11). Toffler and Spiro (6) reported nine cases who were admitted to the hospital with shock or coma, and acute hemorrhagic necrotizing pancreatitis was recognized only at autopsy. Similar autopsy cases were reported by Donhauser and Bigelow (11). Di Maio and Di Maio (12) described autopsies of individuals dying of natural disease, and found that 0.2% of their cases showed acute pancreatitis. In the present study, 12 sudden deaths were recorded in 3305 medicolegal autopsies (0.36%).

The occurrence of pulmonary complications is a frequent early feature of acute pancreatitis. Some authors have reported that most of the early deaths in acute pancreatitis are related to respiratory failure (13,14). Pastor et al. (10) reported that 50% of early deaths are associated with severe lung injury. Renner et al. (2) reported that pulmonary edema and congestion were significantly different in cases dying within 7 days of admission compared with patients surviving longer than 7 days. Furthermore, they found a higher prevalence of hemorrhagic pancreatitis in patients dying within the first 7 days (70.4% vs. 53.7%). Many of the reported early pancreatic deaths were clinical studies and

few autopsy studies were reported. The prevalence of pulmonary complications in autopsy studies ranged from 20% to 100% (2,10,15). Reported autopsy findings included pleural effusion (25–35%), pulmonary edema (49–81%), bronchopneumonia (20–25%), atelectasis (25%), and pulmonary emboli (2,13,16). In experimental studies, pulmonary edema develops within 12–24 h after induction of pancreatitis. Pastor et al. (10) found that arterial hypoxemia was not correlated with the severity of acute pancreatitis. Some authors emphasized that patients dying from pulmonary complications had mild or moderate pancreatic damage in autopsy studies (2). Gu (17) reported that pancreatic pathologic changes were not proportional to the mortality rate of acute pancreatitis especially in sudden deaths, and suggested that a systemic lethal factor was released in the early stage in cases of sudden deaths in acute pancreatitis.

Conclusion

All cases in our series had hemorrhage, edema, and fatty necrosis in the pancreatic region, and edema, alveolar hemorrhage, and pleural effusion in the lung. We could not find any major hepatic, cardiac, or renal macroscopic or histologic changes in cases of sudden death. Both cholelithiasis and alcohol are the main etiologic factors in acute pancreatitis, but only four of our cases had a history of chronic alcohol ingestion in our series and there were no other etiologic factors.

Finally, many cases of acute pancreatitis have classical symptoms and findings, but few cases cause sudden unexpected death without symptoms. Forensic pathologists who deal with sudden unexpected death should not disregard the examination of the pancreatic region and must consider pancreatitis-related complications such as pulmonary damage.

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