Presence and Extent of Extrapancreatic Fluid Collections Are Indicators of Severe Acute Pancreatitis

Paul G. Lankisch,*1 Karl Struckmann,2 and Dirk Lehnick3

Departments of 1Internal Medicine and 2Radiology, Municipal Clinic, Lüneburg, Germany; and 3Institute for Statistics and Econometrics, University of Göttingen, Göttingen, Germany

Summary

Background. It has been suggested that early localization of both necrosis and extrapancreatic fluid collections by contrast-enhanced computed tomography (CT) can predict the outcome in severe acute pancreatitis. These two assumptions were evaluated.

Patients and Methods. This study comprises 228 patients with a first attack of acute pancreatitis admitted to our clinic from 1987 to 1995 and for whom the prognostic value of a contrast-enhanced CT obtained within 72 h of admission was prospectively evaluated. These CTs were retrospectively re-evaluated for the localization of pancreatic necrosis and extrapancreatic fluid collections. The indication for dialysis and artificial ventilation, the development of pancreatic pseudocysts, the necessity for surgery (necrosectomy), and mortality were used as clinical parameters.

Results. There was a significant correlation between the presence of pancreatic necrosis and extrapancreatic fluid collections versus the clinical parameters. The localization of pancreatic necrosis was of no importance for the outcome of the disease, whereas the increasing amount of extrapancreatic fluid collections paralleled the severity of acute pancreatitis.

Conclusion. Pancreatic necrosis and extrapancreatic fluid collections are indicators for severe acute pancreatitis. Whereas the localization of pancreatic necrosis is not important for the outcome of the disease, the extent of extrapancreatic fluid collections is significantly correlated with a severe course.

Key Words: Acute pancreatitis; computed tomography; pancreatic necrosis; extrapancreatic fluid collections; pancreatic pseudocyst; dialysis; artificial ventilation; surgery; mortality.

Introduction

Contrast-enhanced computed tomography (CT) is the gold standard imaging technique for patients with severe pancreatitis. It easily depicts the extent of gland damage and major complications, allows guided percutaneous procedures to test whether pancreatic necrosis is infected, and frequently shows the etiology of the disease. There are two CT-based indices of severity. One is the Balthazar score based on evaluating the degree of peripancreatic inflammation and pancreatic necrosis (1,2). The initial Balthazar score (1) divided the evaluation spectrum of peripancreatic inflammation into categories A to E. Grade A represents a normal pancreas, whereas patients with grade E have two or more fluid collections and/or gas in or adjacent to the pancreas. Later, the score was combined with an evaluation of the extent of pancreatic necrosis, which was classified as <30%, 30–50%, and >50% of the gland (2). More recently, Vesentini et al. (3) have recommended...
dividing CT findings on admission into the following four groups: no necrosis and necrosis <30%, 30–50%, and >50% of the gland.

Two recent observations seem to enhance prediction value of CT scores. Kemppainen et al. (4) found that the localization of necrosis can predict the outcome for patients; necrosis of the right part of the gland being much worse than left-sided necrosis. Rotman et al. (5) demonstrated for the first time that the localization of extrapancreatic fluid collections and nonvisualization of the splenic and portal veins can be prognostic factors of complications in

Fig. 1. A 73-yr-old patient with acute pancreatitis of unknown origin. Contrast-enhanced CT: Balthazar score D (3 points), no necrosis. Exudate in the anterior pararenal space (APS).

Fig. 2. A 61-yr-old patient with acute pancreatitis of unknown origin. Contrast-enhanced CT: Balthazar score E (4 points), no necrosis. Exudate in the anterior and posterior pararenal space (APPS).
severe acute pancreatitis. Both new findings were re-evaluated in this study.

Patients and Methods

This investigation is part of a prospective study evaluating the prognostic value of a contrast-enhanced CT in acute pancreatitis involving 228 patients admitted to our clinic from 1987 to 1995 with a first attack of the disease. Patients with previous attacks of acute pancreatitis or episodes of unexplained abdominal pain, as well as patients for whom the contrast-enhanced CT showed signs of chronic pancreatitis, were excluded.

Contrast-enhanced CT (Somatom DRG, Siemens, Germany) was performed within 72 h of admission.
with 125-kV, 0.35 AS cuts of 8 mm thickness without overlapping. The scan time was 5 s; the interscan time was 8 s. One hundred fifty milliliters of solutrat 300 (Lopamidol®, Byk Gulden GmbH, Konstanz, Germany) with a delay of 25 s and flow of 1.5 mL/s for 20 s were automatically injected and then reduced to 1 mL/s. The results were scored according to Balthazar et al. (2). Localizations of pancreatic necrosis and extrapancreatic fluid collections (Figs. 1, 2, and 3A,B) were retrospectively evaluated.

The etiologies were biliary tract disease in 80 (40%) patients, alcohol abuse in 74 (32%), unknown in 47 (21%), and other in 17 (8%).

To evaluate the clinical course of the disease, the following parameters of severity were used: indication for dialysis or artificial ventilation, development of pancreatic pseudocyst(s), indication for pancreatic surgery (necrosectomy), and mortality.

For statistical evaluation, Fisher’s exact test was used to show differences concerning clinical parameters and pancreatic necrosis, the Kendall’s tau-b test was used to demonstrate the influence of extrapancreatic fluid collections on the course of the disease.

**Results**

Pancreatic necrosis was found in 45 (20%) of the 228 patients. It was localized in the right part of the gland in 19 (42%) and in the left part in 25 (56%); in 1 (2%), the whole gland was involved. The presence, but not the localization, of pancreatic necrosis was significantly associated with severity parameters of the disease and mortality (Table 1).

Extrapancreatic fluid collections were present in 91 (39%) of the 228 patients. Forty-five (50%) of these 91 patients had pancreatic necrosis. Extrapancreatic fluid collections were present only in the anterior pararenal space (APS) in 25 (28%) and in the anterior and posterior pararenal space (APPS) in 27 (30%) patients. In the remaining 39 (42%) patients, both the APPS and the splenic area were involved (Table 2).

The presence of extrapancreatic fluid collections significantly correlated with clinical severity parameters and mortality (Table 2). Furthermore, the increasing extent of extrapancreatic fluid collections significantly correlated with the clinical parameters, but not with mortality (Table 2).

**Discussion**

Necrotizing pancreatitis has a much worse prognosis than interstitial pancreatitis (6). As expected, this was confirmed in our series. However, we could not confirm that localization of pancreatic necrosis has any influence on the disease, as suggested by Kemppainen et al. (4). This group reported that patients with right-sided pancreatic necrosis showed extrapancreatic signs (peritoneal fluid, perirenal fat edema, mesenteric fat edema, pleural effusion, and bowel paralysis) more frequently, a higher incidence of respiratory insufficiency, and infectious complications. Patients with left-sided necrosis had a higher...
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Incidence of respiratory insufficiency and infectious complications; these patients also needed surgery more frequently than patients with other involvement of the gland. Finally, patients with total necrosis of the gland showed a higher incidence of pancreatic pseudocysts. However, mortality rate was not correlated with localization of the pancreatic necrosis.

There are some differences between both retrospective studies that may help to explain the different results:

- The etiology of acute pancreatitis differs. The prevalence of alcohol-related disease is typical in the Finnish study (7): 144 (89%) of 161 patients available for evaluation had alcohol-induced pancreatitis; in our study was this etiology present in only 23 (51%) of 45 patients.
- In the Finnish study, the incidence of necrotizing pancreatitis was high: 210 (55%) of 380 patients had necrotizing pancreatitis, whereas in our study, pancreatic necrosis was found in only 45 (20%) of 228 patients.

Thus, the Finnish suggestion that localization of pancreatic necrosis is a prognostic parameter for the development of complications, although not for mortality, may be valid only for severe alcohol-induced pancreatitis, but not for the other etiologies. Further studies from other countries with a different etiological spectrum of acute pancreatitis are of interest (7).

Extrapancreatic fluid collections occur in about 40% of the cases of acute pancreatitis (8). They resolve spontaneously in about 50% of the cases. However, most pancreatic abscesses develop in patients with fluid collections revealed on initial CT (9). Recently, Rotman et al. (5) showed in a multicenter study involving 228 patients that not only the presence of extrapancreatic fluid collections but also their localization is of prognostic value. The mortality rate increased in patients with extrapancreatic fluid collections within the left and right pararenal posterior space. Furthermore, the risk of abscess increased when extrapancreatic fluid collections were localized in the right pararenal posterior space.

We confirm that the presence of extrapancreatic fluid collections indicates a severe prognosis and, obviously, the localization plays a major role with involvement of the anterior and posterior pararenal spaces, including the splenic vein indicating the most severe pancreatitis.

In conclusion, the presence but not the site of localization of pancreatic necrosis, and the presence as well as the extent of extrapancreatic fluid collections are indicators for severe acute pancreatitis.
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