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Review

Systematic appraisal of the management of the major vascular complications of pancreatitis

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Abstract

Background: This study is a systematic appraisal of the management of major vascular complications of pancreatitis conducted by collating individual patient-episode data from published literature.

Methods: Searches identified 79 papers of which 62 provided detailed information on the clinical course of 214 patients. Principal outcomes were modes of presentation, results of diagnostic angiography, and embolization and overall outcome.

Results: There were 160 "spontaneous" and 40 postoperative episodes of hemorrhage. Underlying pancreatic disease was chronic pancreatitis (40), pseudocyst (135), and acute pancreatitis in 39. Angiography was undertaken in 173 (81%) with embolization attempted in 115 and achieving hemostasis in 85 (75%). There were 40 (19%) deaths. Mortality was greater in patients undergoing surgery as first intervention compared with angiography first ($P = .01$, Fisher exact test).

Conclusion: This analysis of pooled data provides evidence of a central role for mesenteric angiography in the diagnosis of major vascular complications of pancreatitis and for angiographic embolization as a powerful tool for achieving hemostasis.

Keywords: Pancreatitis; Hemorrhage; Angiography

Major vascular complications of pancreatitis are infrequent but can be associated with lethal hemorrhage. They can occur across the spectrum of pancreatic inflammatory disorders, complicating acute episodes, chronic pancreatitis, and pseudocysts associated with either acute or chronic presentations. Because the frequency with which any individual clinician or clinical service will encounter patients with these problems is low, the evidence base for guiding selection of treatment, particularly in the emergency setting is limited. Furthermore, the combination of the low incidence together with the need to obtain rapid hemostasis almost inevitably precludes randomized trial evaluation of therapeutic options; thus, evidence for the management of major vascular complications in pancreatitis is likely to continue to accrue from series of single-institutional cohort data. Many of these reports describe the clinical course of individual patients and thus may be amenable to pooled analysis using predefined disease and outcome criteria. The aim of this study is to conduct a systematic appraisal of the published literature to emphasize recurrent themes and to collate available evidence to aid the practical management of the vascular complications of pancreatitis.

Methods

Literature search

A computerized search was made of the MEDLINE and EMBASE databases for the period January 1980 to January 2003 using the keywords "pancreatitis," "haemorrhage," "embolization," "pseudocyst," and "pseudoaneurysm." Secondary searches were performed using the MESH headings "endoscopy," "angiography," and "gastrointestinal haemorrhage." The OVID search engine (Version 9; Ovid Technologies, New York, NY, USA) was used. Reports were restricted to those in the English language and papers reporting human studies. Papers providing insufficient data for analysis of individual patient outcome or reporting patients without pancreatitis were excluded. Searches identi-

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fied 79 papers of which 62 provided detailed clinical information pertaining to individual patients and these constitute the study data set. Twelve reports containing summarized data but not providing individual patient information were studied separately.

Terms of reference for data extraction and categorization

Information was collected on age, gender, mode of presentation, etiology, investigations, angiographic diagnoses and interventions, surgical intervention, and final outcome. Patient data were categorized on the basis of etiology into acute pancreatitis, chronic pancreatitis, and pseudocyst. In keeping with the current Atlanta consensus conference classification [1], patients with complications from acute fluid collections occurring within 4 weeks of an attack of acute pancreatitis were classified as acute pancreatitis. The term "pseudocyst" was used only in patients with fluid collections either occurring (or persisting) more than 4 weeks after an attack of acute pancreatitis or in those individuals presenting with the pseudocyst as their index feature in the absence of an antecedent episode of acute pancreatitis. Thus, all "late" postinflammatory pseudocysts and those on a probable background of chronic pancreatitis are grouped together. Patients are classified as having chronic pancreatitis if they were defined as such by the original authors reporting their cases. Patients with known chronic pancreatitis presenting with hemorrhagic complications related to a pseudocyst are classified as "pseudocyst." When the index presentation involved hemorrhage (either gastrointestinal or intra-abdominal) in the absence of prior surgery, the term "spontaneous" hemorrhage was used in this study. For the purposes of this study, a positive angiogram was defined as angiographic demonstration of extravasation of contrast and/or the identification of a false aneurysm. Pseudoaneurysms discovered in the absence of bleeding were included. Angiographic hemostasis was recorded as successful if there was both cessation of bleeding and no recorded rebleed within 48 hours.

Study population

The 62 manuscripts yielded detailed data on the clinical course of 214 patients, and these individuals constitute the principal study population (Table 1). One hundred fifty-three (72%) were male, and the median age was 47 (5–77) years. The median number of patients enrolled per report was 1 (1–19) with 7 (11%) reports providing data on more than 10 patients. The median recruitment period for studies other than case reports was 7 (3–18) years.

Principal outcomes

Principal outcomes from examination of pooled data were modes of clinical presentation, results of diagnostic angiography, and outcome of therapeutic embolization and overall outcome.

Statistical analyses

Data are presented as median (range) unless otherwise indicated. Contingency tables are analyzed by Fisher exact test using GraphPad InStat statistics software package version 3.00 (GraphPad Software, San Diego, CA).

Results

Modes of clinical presentation

There were 160 spontaneous and 40 postoperative episodes of hemorrhage with 14 patients presenting without bleeding having angiographic diagnoses of false aneurysms (Table 1). Forty patients were categorized as chronic pancreatitis, 39 as acute pancreatitis and 135 as pseudocyst (Table 1). Pseudocysts were also the commonest mode of presentation of major vascular complications of pancreatitis in clinical case series without individualized data (Table 2). The most frequent types of clinical presentation were gastrointestinal (147 [69%]) and intra-abdominal bleeding (30 [14%]) (Table 3).

Results of surgery, diagnostic angiography, and therapeutic embolization

Categorizing results by first intervention, 149 (70%) underwent angiography first compared with 62 (30%) undergoing surgery first (Fig. 1). Of the angiography-first group, 55 (37%) subsequently underwent urgent surgery and 94 (63%) underwent angiographic embolization. In 30 (48%) of the 62 patients undergoing surgery as first intervention, primary hemostasis was not achieved. Twenty-one of these 30 individuals went on to have angiography, whereas 9 underwent re-operation.

Overall, 173 patients underwent mesenteric angiography, with 162 (94%) showing either a source of bleeding or a false aneurysm. Angiographic embolization was attempted in 115 (66%) and was successful in achieving hemostasis in 85 (74%). None of these patients required urgent surgery (16 underwent elective intervention: 6 distal pancreatectomy, 2 pancreaticoduodenectomy, 4 pseudocyst-jejunostomy, 2 endoscopic and/or percutaneous drainage of pseudocyst, 2 pancreatic necrosectomy). Primary failure of embolization occurred in 15, and a further 15 patients rebled after embolization. Fifteen of these 30 underwent urgent surgery. Nineteen (17%) patients developed complications because of embolization. The main complications were pseudoaneurysm rupture, traumatic dissection, and inadvertent embolization of adjacent nonbleeding vessels. Vessels of the celiac axis were the predominant source of bleeding (Table 4); the splenic artery was the source in 54 (31%) with