Commentary

Contemporary management of infected necrosis complicating severe acute pancreatitis

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Abstract

Pancreatic necrosis complicating severe acute pancreatitis is a challenging scenario in contemporary critical care practice; it requires multidisciplinary care in a setting where there is a relatively limited evidence base to support decision making. This commentary provides a concise overview of current management of patients with infected necrosis, focusing on detection, the role of pharmacologic intervention, and the timing and nature of surgical interventions. Fine-needle aspiration of necrosis remains the mainstay for establishment of infection. Pharmacological intervention includes antibiotic therapy as an adjunct to surgical debridement/drainage and, more recently, drotrecogin alfa. Specific concerns remain regarding the suitability of drotrecogin alfa in this setting. Early surgical intervention is unhelpful; surgery is indicated when there is strong evidence for infection of necrotic tissue, with the current trend being toward 'less drastic' surgical interventions.

Introduction

Pancreatic necrosis complicating severe acute pancreatitis is a challenging scenario in contemporary critical care practice. Patients are often relatively young (the median age was 55 years [range 19–74 years] in a recent cohort report [1]) and postrecovery quality of life should be good [2], and so there is much to strive for. However, length of stay can be prolonged, and the evidence guiding treatment is limited and contradictory in nature. Crucially, care for these patients involves close multidisciplinary cooperation because the margin for therapeutic error in decision making in relation to the timing and nature of intervention is small.

It is generally accepted that death from acute pancreatitis has a bimodal temporal distribution; early deaths are related to multiple organ failure [3] and may in particular affect elderly patients, in whom decisions on thresholds for intervention may influence treatment and outcome. Death from infected necrosis or the sequelae of peri-pancreatic sepsis is responsible for most late mortality [4]. Management of this group of patients is complex, but there has been a recent increase in the scope of available therapeutic options.

Recent developments can be categorized into those directed at diagnosing infected necrosis, new pharmacological interventions and recent surgical trends.

Diagnosis of infected necrosis

The path finding study conducted by Beger and coworkers [5] showed that the proportion of patients with pancreatic necrosis with evidence of bacterial colonization increased as the disease progressed. Infection of peripancreatic necrosis is relatively uncommon during the first 10 days of illness, and accordingly there is little to be gained by attempts at radiologically guided aspiration of fluid at this stage. Fine-needle aspiration of peripancreatic necrosis to look for evidence of infection comes into play between days 10 and 14 of the illness and, if negative, aspirates should be repeated at regular intervals thereafter. The area to be targeted requires specific attention to detail. In the study conducted by Beger and coworkers [5], fine-needle aspiration was directed at peripancreatic necrosis rather than at intra-abdominal fluid collections. If patients have both, then they should be separately sampled and labelled as such.

Newer methods used for detection of infected necrosis include measurements of biochemical markers such as calcitonin precursors [6]. Procalcitonin is the 116 amino acid precursor of calcitonin; it is released from neuroendocrine cells and detected in high concentrations in serum during severe bacterial or fungal infections [6]. Elevated levels of procalcitonin correlate with disease severity, and there is some evidence of an association between procalcitonin levels and infection of necrosis. Use of genetic analytical techniques to quantify circulating bacteria derived gene products in plasma is interesting but not an established method [7].

Diagnosis of pancreatic infection requires vigilance. Patients receiving critical care are at high risk for developing infected necrosis and require serial imaging and aspiration of

necrosis. It should be borne in mind that radiological (computed tomographic) findings such as the presence of gas can indicate infection. It should also be remembered that a clinical diagnosis of infected necrosis based on fever, leucocytosis and other markers of sepsis without substantive proof of infection of necrosis can frequently be incorrect, and in turn may lead to potentially unnecessary surgery [1].

Pharmacological intervention in infected necrosis

There remains no specific pharmacological treatment for infected necrosis, and the mainstay of treatment is drainage or debridement. Antibiotic therapy has a role to play as an adjunct to debridement/drainage. More recently, based on the results of the PROWESS (Recombinant human protein C Worldwide Evaluation in Severe Sepsis) trial [8], drotrecogin alfa (recombinant human activated protein C) has been used in patients with sepsis. In an experimental model of acute pancreatitis, administration of drotrecogin alfa resulted in improvement in markers of tissue injury and inflammation [9]. However, there are specific concerns relating to the risk for haemorrhage. More pragmatically, when criteria for use of drotrecogin alfa are met in a patient with pancreatitis, it could be argued that the thrust of treatment should be to find and treat any intra-abdominal focus of infection [10-12].

Timing and nature of surgical intervention

Although these issues remain controversial, some consensus regarding the timing of surgical intervention is emerging. Early surgery for pancreatic necrosis is unprofitable because areas of necrosis will not yet have 'demarcated' and the risk for haemorrhage is high [13]. In practice, early laparotomy in severe acute pancreatitis can be justified in those individuals in whom there is concern about coexisting pathological processes, such as colonic ischaemia. Thus, a practical management plan emerges; early pancreas-directed intervention is unprofitable, and surgery has a role to play only when it is needed to rule out coexisting disease.

At the risk of adding complexity to this algorithm, we must consider the current trend toward measurement of intra-abdominal compartment pressure. An observational study of 293 patients with severe acute pancreatitis [14] demonstrated that early onset of organ dysfunction (within 72 hours of onset of symptoms) was associated with intra-abdominal hypertension (defined as intra-abdominal pressure >15 mmHg) in 78% of patients. This led to speculation about whether there is a role for early surgical intervention in the form of a 'decompressing' laparotomy for raised intra-abdominal pressure [15,16]. A practical compromise is required here. 'Decompressing' laparotomy in patients without prior surgery carries a high risk for postoperative evisceration, intra-abdominal infection and colonization of previously sterile pancreatic necrosis, and cannot be generally recommended. Similarly, insertion of abdominal drains seems illogical. Intra-abdominal hypertension is due to fluid sequestration as a result of capillary endothelial injury, and thus there will be interstitial fluid in addition to free intra-peritoneal fluid. Simple drainage of fluid collections is unlikely to be of benefit. However, in selected cases, in particular where diaphragmatic splinting may compromise ventilation, an argument can be made for decompression.

What of the nature of intervention? Our group demonstrated that 'traditional' surgical open necrosectomy, involving a long bisubcostal incision, extensive intra-abdominal mobilization and multiple drains, was a major surgical undertaking and associated with a worsening in organ failure scores during the immediate postoperative period [1]. In light of this, there has been a movement toward less drastic surgery. The Glasgow group pioneered minimally invasive necrosectomy [17] – following a radiologically placed guide wire (under general anaesthesia) with a urological scope to effect debridement under irrigation. Various permutations of this procedure have been reported, and there is as yet no consensus on descriptive terminology or technique.

Again, a pragmatic policy is required. Infected necrosis in which there is a predominance of solid and semisolid tissue in the peripancreatic area requires surgical debridement. The available evidence suggests that 'less drastic' surgery (i.e. a mildine laparotomy, debridement, drainage and placement of a feeding jejunostomy) is a safe and adequate option [18]. To maintain a balanced perspective, it must be acknowledged that the minimally invasive procedures may be equally effective, but these are critically dependent on the expertise of the operator. Equally importantly, in those patients with pancreatic necrosis with a predominantly liquid collection, a pancreatic abscess can often be managed by radiological drainage (which adheres to the principles outlined above) and thus avoid surgery. In all cases repeated intervention may be indicated, and the minimum requirement for contemporary care is the availability of radiological, critical care and pancreatic surgical expertise.

Conclusion

Contemporary critical care management of the patient with pancreatic necrosis complicating acute pancreatitis is an area of relatively rapid change. Newer methods for detecting infection, new pharmacological interventions and more sophisticated surgery are all changing the face of care for this complex disease. These developments should not obscure the importance of the underlying principle that patients with infected necrosis require debridement/drainage of their intra-abdominal focus of sepsis.

Competing interests

The author(s) declare that they have no competing interests.

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