

Severe acute pancreatitis: surgical management in a third-level hospital

Erick Servín-Torres,* José Arturo Velázquez-García,* Germán Delgadillo-Teyer,*
Luis Galindo-Mendoza,* Francisco Bevia-Pérez,* and Fausto Rivera-Bennet*

Abstract

Background: Severe acute pancreatitis has a reported mortality of 10-30% in specialized hospitals, representing 20% of patients diagnosed with acute pancreatitis. Indications for surgery are infected necrosis, necrosis persistent, fulminant pancreatitis or acute pancreatitis complications such as bleeding or intestinal perforation.

Methods: We studied patients diagnosed with pancreatitis from January 1, 2000 to December 31, 2007.

Results: We analyzed records of 82 patients, 63.4% were male and the most common etiology of pancreatitis was biliary in 63.4% of patients. Morbidity was 62.19%; 35.36% had pulmonary complications. In 15.85% of patients there was enterocutaneous fistula and 10.9% had bleeding. Mortality was 20.73%. In our hospital, all patients with severe acute pancreatitis are managed in the intensive care unit. Parenteral nutrition is only indicated in patients intolerant to oral feeding or with inability to place a nasojejunal tube. Use of antibiotics is based on carbapenem, and surgical indications are infected pancreatic necrosis, persistent sterile pancreatic necrosis, fulminant acute pancreatitis and abdominal hypertension, and complications such as intestinal perforation and bleeding.

Conclusions: It is recommended that patients with severe acute pancreatitis are managed by a multidisciplinary team in an intensive care unit. The role of parenteral nutrition and antibiotics should be individualized.

Key words: severe acute pancreatitis, necrosectomy.

Introduction

Acute pancreatitis is a common disease and represents ~2% of general hospital admissions, with an incidence of 10-46 cases/100,000 persons/year.¹ Clinical discrimination between nonsevere acute pancreatitis (NSAP) and severe acute pancreatitis (SAP) is very important because the mortality changes dramatically. Whereas SAP reported a mortality of 10-30% in specialized hospitals, NSAP has a mortality <1%.¹

SAP occurs in ~20% of patients diagnosed with acute pancreatitis and is defined when the patient has >3 Ranson criteria or APACHE II score ≥ 8 .²

SAP is divided into two phases. In the first phase there is a systemic inflammatory response. Treatment objectives for the first phase are supportive therapy and treatment of complications. According to international consensus, surgery does not play a role in the primary phase. During the second phase, necrosis and infection occur in 40-70% of patients.³

Indications for surgical treatment of SAP are infected pancreatic necrosis, sterile pancreatic necrosis associated with persistent necrosis or fulminant pancreatitis and complications of acute pancreatitis such as bleeding or intestinal perforation.³ Mortality of patients intervened surgically is from 20 to 80%. Different guidelines have recommended that the patient with SAP should be referred to a tertiary care center where a mortality of <30% may be reached.⁴

The surgical technique will depend on individual characteristics and experience of the medical center. It has been widely recommended that in the case of sterile necrosis, surgery should be postponed for <4 weeks.⁴ The techniques accepted worldwide are⁵ 1) necrosectomy and closure with continuous lavage, 2) necrosectomy and planned relaparotomy, 3) necrosectomy and management of open abdomen, and 4) percutaneous drainage by interventional radiology.

The primary objective of the study was to review the morbidity and mortality in patients undergoing surgery for SAP and to describe the main causes of morbidity and mortality as well as to compare the results reported in the literature.

* Servicio de Cirugía General, Hospital de Especialidades, Centro Médico Nacional La Raza, Instituto Mexicano de Seguro Social, México, D.F., Mexico

Correspondence and reprint requests to:

Erick Servín-Torres
Ignacio Esteva 107-101
Torre Ángeles Hospital Mocol, San Miguel Chapultepec
Del. Miguel Hidalgo
11850 México, D.F., Mexico
Tel: (55) 5278 2606
E-mail: erckser75@gmail.com

Received for publication: 2-9-2009

Accepted for publication: 9-30-2009

Materials and Methods

A transversal, retrospective, open and descriptive study was undertaken and approved by the local investigation committee. Included were patients who were intervened surgically with the diagnosis of pancreatitis from January 1, 2000 to December 31, 2007.

The following demographic variables were reviewed: sex and age of the patient, etiology of the pancreatitis, surgical indication and surgical technique used, as well as the causes for postoperative morbidity and mortality.

Descriptive statistical analysis was reported as average \pm SD in the demographic variables and percentages in the dependent variables: causes of morbidity and mortality.

An analysis was performed afterwards comparing the percentages obtained with the results found in the literature.

Results

Ninety two patients were intervened surgically due to SAP, nine patients were not included because they did not have a complete medical record and one patient was excluded because of voluntary discharge from the hospital. Eighty two medical records were evaluated. There were 52 male patients (63.4%). Average age of patients was 43 ± 12.4 years.

The most frequent etiology of the pancreatitis was biliary in 52 patients (63.4%), in 21 it was alcoholic (25.6%), in 8 (9.7%) persons dyslipidemia was detected and one patient was classified as idiopathic pancreatitis.

The main surgical indication was the presence of infected necrosis in 62 patients (75.6%). Diagnosis of infected necrosis was made due to the presence of peripancreatic gas in CAT scan in 50 patients and 12 patients were classified as infected necrosis because of the persistence of fever and elevation of leukocytes >72 h despite antibiotic use. In these patients surgery was carried out immediately.

The second most frequent indication was sterile necrosis in 10 (12.19%), which was diagnosed with dynamic pancreatography as soon as the patient's condition allowed for performance of this study. This group of patients was subjected to surgery generally late, after 3 weeks from symptom onset.

Fulminant pancreatitis in seven patients (8.5%) was diagnosed when, despite medical management in the ICU for >24 h, patients presented with organ failure with their general health status becoming more critical. The surgical indication in this group of patients was immediate. One patient (1.2%) was intervened because of colonic perforation. The patient was intervened due to clinical deterioration and the perforation was reported as an intraoperative finding. In two patients no indication for intervention was found; one of them developed pneumonia and the other died due to abdominal sepsis.

The three main surgical techniques used in our hospital were necrosectomy and closure with continuous lavage, necrosectomy and management of open abdomen and necrosectomy with planned re-laparotomy.

Necrosectomy and Closure with Continuous Lavage

There were 57 (69.5%) patients operated with this technique, which consists of debridement of dead tissue and placement of two drains that exit through a left side incision in the mid-axillary line and placement of a tube for irrigation in the right upper quadrant, closure of the sac with interrupted sutures of absorbable material. Verification that there is no fluid leakage into the cavity is done. The patient is cleansed with saline solution, usually 2 liters daily for the first 3 days and, depending on the characteristics of the drained solution, the amount of liquid is decreased or is maintained until "clearance" of the drainage. Generally, after 1 week to 10 days the irrigation catheters and tubes are removed.

In this group of patients, 21 (36.84%) had pneumonia, 5 (8.77%) developed colon fistulas, 3 (5.26%) developed small bowel fistula and 6 (10.52%) had postoperative bleeding requiring reoperation. Overall morbidity of the technique was 35 patients (61.4%); however, considering that two patients had more than two complications (one patient developed bleeding after colon fistula and then had pneumonia and another developed enterocutaneous fistula and pneumonia), morbidity occurred in 32 patients (56.14%).

Mortality from the technique occurred in 10 (17.54%) patients, and two patients died from more than two complications. One patient died due to bleeding from the pancreatic bed, and the remaining died as a result of infectious complications.

Necrosectomy and Management of Open Abdomen

Twenty two patients (26.8%) were operated with this technique where drains were placed in the peripancreatic bed and a polypropylene mesh was attached to skin, which is usually removed after 3 weeks. In this group of patients, seven (31.81%) patients had pneumonia as a complication, 2 (9.09%) patients developed colon fistulas and 2 (9.09%) patients had small bowel fistulas, and 3 (13.6%) patients had bleeding that required packing. Six (27.27%) patients died of infectious complications. The 16 surviving patients subsequently underwent functional wall plasty with mesh placement.

Necrosectomy with Planned Relaparotomy

This technique was used in three patients; two were operated on two occasions and one patient on four occasions. One patient developed pneumonia and one patient had enterocutaneous fistula. One patient who developed pneumonia died due to infectious complications.

General Morbidity and Mortality

Morbidity in patients undergoing surgery was found in 51 patients (62.19%), 29 (35.36%) had pneumonia, which was the most common pulmonary complication, 13 had an enterocutaneous fistula (15.85%), of which seven were found in the colon and the remaining small intestine and nine patients had postoperative bleeding requiring packing.

Nutrition in these patients has changed in recent years. Prior to 2005, in our hospital parenteral nutrition was administered to all patients with severe pancreatitis. Afterwards enteral nutrition was attempted in all patients with hemodynamic stability either through nasojejunal tube in those with inability to tolerate oral diet, or oral feeding if the patient has adequate bowel movement and their conditions permit.

Timing of cholecystectomy has also been a subject that has changed over recent years. Prior to 2006, cholecystectomy was performed 3-6 months after resolution of pancreatitis. Nowadays, cholecystectomy is performed before the patient is admitted if the patient's abdominal condition allows this.

Reported mortality was 17 patients (20.73%) and reported cause of death was septic shock secondary to infectious complications: pneumonia and abdominal sepsis. One patient died as a result of uncontrolled bleeding. Patients with the worst prognosis were those with fulminant pancreatitis and who had surgery; six of these patients died.

Discussion

Management of patients with SAP has been standardized in our hospital according to various international guidelines published since 2002.⁶ All SAP patients are managed in the intensive care unit. Parenteral nutrition is indicated only in those patients with intolerance to oral feeding and inability to place a nasojejunal catheter. When prophylactic antibiotics are indicated, a carbapenem (generally imipenem) is prescribed. Surgical indications are 1) infected pancreatic necrosis, 2) persistent sterile pancreatic necrosis, 3) acute fulminant pancreatitis and intraabdominal hypertension, and 4) complications of acute pancreatitis such as intestinal perforation and bleeding.⁷

The etiology of pancreatitis in this study agrees with that reported in the literature with predominance of biliary pancreatitis.⁸ Of the most frequent surgical indications, it should be noted that the study includes patients from the year 2000, and the most accepted management guidelines are from the year 2002. Therefore, there were patients who were operated on with no precise indication.

Regarding the surgical technique used, it is well established that the technique to be used should be that with which the surgeon is most familiar, which in our case was closed technique with continuous drainage. However, there are patients who, due

to multiple conditions such as critical status or conditions of the abdominal cavity, may benefit from other techniques such as open abdomen and relaparotomies. We do not yet have experience on interventional radiology techniques and endoscopy.

With regard to morbidity of this series, at first glance it seemed high. However, it is noteworthy that most of the other series published⁹⁻¹⁹ ignored pulmonary complications. If those are excluded, we found 26.8% of complications with fistulas being the leading cause of morbidity. Hemorrhage is the second leading cause of morbidity with 10.9% of patients (Table 1).

The presence of fistulas in these patients is caused by manipulation of inflamed tissue and often by the inability to find a suitable cleavage plane, secondary to pancreatic inflammation. Surgeon's experience in managing such patients is essential to avoid this complication, and series are still reported with percentages as high as 52% and 27%.^{12,13}

Bleeding is one of the most serious complications during necrosectomy because it is usually due to bleeding from the splenic vein or artery. Also, with regard to this complication, it is necessary to insist on surgical experience to perform the necrosectomy. A necrosectomy that is too aggressive may place the patient's life at risk.^{15,16}

Two recent studies show a very high morbidity^{18,19} but include late complications such as ventral hernias, which were not taken into account in this study.

The mortality in this study is 20.73% of patients, which is also within the accepted margins worldwide as shown in Table 2 where series with mortalities of 6-56% are reported.¹⁴ Despite technological advances in management of ICU patients, the mortality rate remains constant.

Table 1. Morbidity in patients surgically intervened as reported in various international series

Author	Fistulas		
	Pancreatic (%)	Enteric (%)	Hemorrhagic (%)
Bradley (1993) ⁹	46		7
Branum (1998) ¹⁰	72	16	
Bosscha (1998) ¹¹	25		50
Sarr (1991) ¹²	26	52	26
Tsiotos (1998) ¹³	19	27	18
Castillo (1998) ¹⁴	53	16	3
Farkas (1996) ¹⁵	13	1	2
Büchler (2000) ¹⁶	19		5
Ashley (2001) ¹⁷	34		
Connor (2005) ¹⁸	92		
Rau (2005) ¹⁹	78		
Present study			
Fistulas and bleeding	15.85		10.9
Overall morbidity	62.19		

Table 2. Mortality in patients surgically intervened as reported in various international series

Source	Design	No. patients	Mortality (%)
Mier (1997) ²⁰	Randomized controlled	25	56.0
Castillo (1998) ¹⁴	Retrospective	64	6.0
Branum (1998) ¹⁰	Retrospective	50	12.0
Farkas (1998) ¹⁵	Retrospective	203	15.0
Büchler (2000) ¹⁶	Prospective	28	21.0
Ashley (2001) ¹⁷	Retrospective	36	11.0
Beattie (2002) ²¹	Retrospective	54	43.0
Gotzinger (2003) ²²	Prospective	250	39.0
Connor (2005) ¹⁸	Prospective	88	28.0
Rau (2005) ¹⁹	Retrospective and prospective	285	25.0
Present study	Retrospective	82	20.7

The main limitation to comparing morbidity and mortality among the various series is the lack of homogeneity of patients because there are various factors that negatively or positively influence, such as the number of organs with failure, comorbidity, patient selection and referral patterns that cannot be taken into account in the analysis done.

In conclusion, despite medical/technological advances, SAP continues being a disease with high rates of morbidity and mortality. According to multiple guidelines in the literature it is recommended that the patient be managed by a multidisciplinary team in an intensive care unit. The role of parenteral nutrition and antibiotics should be carefully evaluated and not used routinely.

Surgery only plays a role in cases of acute complications (hemorrhage, intestinal perforation, or abdominal compartment syndrome) or infectious complications. In cases of sterile necrosis, it is recommended to delay surgical treatment as long as possible. Surgery should be performed by physicians experienced in the management of SAP.

The role of the surgeon continues being the cornerstone on which management of the patient with SAP should be based.

References

- Mayerle J, Simon P, Lech M. Medical treatment of acute pancreatitis. *Gastroenterol Clin North Am* 2004;33:855-869.
- Malangoni M, Martin A. Outcome of severe acute pancreatitis. *Am J Surg* 2005;189:273-277.
- Werner J, Feuerbach S, Uhl W, Büchler M. Management of acute pancreatitis: from surgery to interventional intensive care. *Gut* 2005;54:426-436.
- Johnson CD, Charnley R, Rowlands B, Carter R, Bassi C, Chalmers A, et al. UK guidelines for the management of acute pancreatitis. *Gut* 2005;54(suppl III):iii1-iii9.
- Hartwig W, Werner J, Müller C, Uhl W, Büchler M. Surgical management of severe pancreatitis including sterile necrosis. *J Hepatobiliary Pancreat Surg* 2002;9:429-435.
- Uhl W, Warshaw A, Imrie C, Bassi C, McKay CJ, Lankisch PG et al. IAP guidelines for the surgical management of acute pancreatitis. *Pancreatol* 2002;2:565-573.
- Al-Bahrani A, Abid G, Holt A, et al. Clinical relevance of intra-abdominal hypertension in patients with severe acute pancreatitis. *Pancreas* 2008;36:39-43.
- Xu T, Kai Q. Prophylactic antibiotic treatment in acute necrotizing pancreatitis: results from a meta-analysis. *Scand J Gastroenterol* 2008;43:1249-1258.
- Bradley E. A clinically based classification system for acute pancreatitis (summary of the International Symposium on Acute Pancreatitis, Atlanta, GA, September 11-13, 1992). *Arch Surg* 1993;128:586-590.
- Branum G, Galloway J, Hirschowitz W, Fendley M, Hunter J. Pancreatic necrosis: results of necrosectomy, packing, and ultimate closure over drains. *Ann Surg* 1998;227:870-875.
- Bosscha K, Hulstaert P, Hennipman A, Visser M, Gooszen H, Vanvroomhoven T, et al. Fulminant acute pancreatitis and infected necrosis: results of open management of the abdomen and "planned" reoperations. *J Am Coll Surg* 1998;187:255-262.
- Sarr MG, Nagorney DM, Mucha P Jr, Farnell MB, Johnson CD. Acute necrotizing pancreatitis: management by planned, staged pancreatic necrosectomy/debridement and delayed primary wound closure over drains. *Br J Surg* 1991;78:576-581.
- Tsiotos GG, Luque-de Leon E, Sarr MG. Long-term outcome of necrotizing pancreatitis treated by necrosectomy. *Br J Surg* 1998;85:1650-1653.
- Castillo CF, Rattner DW, Makary MA, Mostafavi A, McGrath D, Warshaw AL. Debridement and closed packing for the treatment of necrotizing pancreatitis. *Ann Surg* 1998;228:676-684.
- Farkas G, Marton J, Mandi Y, Szederkenyi E. Surgical treatment and management of infected pancreatic necrosis. *Br J Surg* 1996;83:930-933.
- Büchler MW, Gloor B, Müller CA, Friess H, Seiler CA, Uhl W. Acute necrotizing pancreatitis: treatment strategy according to the status of infection. *Ann Surg* 2000;232:619-626.
- Ashley SW, Pérez A, Pierce EA, Brooks DC, Moore FD, Whang E, et al. Necrotizing pancreatitis: contemporary analysis of 99 consecutive cases. *Ann Surg* 2001;234:572-579.
- Connor S, Alexakis N, Raraty MGT, Ghaneh P, Evans J, Hughes M, et al. Early and late complications alter pancreatic necrosectomy. *Surgery* 2005;137:499-505.
- Rau B, Bothe A, Beger HG. Surgical treatment of necrotizing pancreatitis by necrosectomy and closed lavage: changing patient characteristics and outcome in a 19-year, single-center series. *Surgery* 2005;138:28-39.
- Mier J, Luque-de León E, Castillo A, Robledo F, Blanco R. Early versus late necrosectomy in severe necrotizing pancreatitis. *Am J Surg* 1997;173:71-75.
- Beattie GC, Mason J, Swan D, Madhavan KK, Siriwardena AK. Outcome of necrosectomy in acute pancreatitis: the case for continued vigilance. *Scand J Gastroenterol* 2002;37:1449-1453.
- Gotzinger P, Wamser P, Exner R, Schwanzler E, Jakesz R, Fugger R, et al. Surgical treatment of severe acute pancreatitis: timing of operation is crucial for survival. *Surg Infect* 2003;4:205-211.