ORIGINAL ARTICLE

Translumbar Retroperitoneal Endoscopy

An Alternative in the Follow-up and Management of Drained Infected Pancreatic Necrosis

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Background: The follow-up of drained infected pancreatic necrosis (IPN) is usually done with data on the patient's clinical evolution and information obtained from serial helical computed tomographic scans. Management often requires necrosectomies and periodic debridements.

Hypothesis: Translumbar retroperitoneal endoscopy is effective in the management of drained IPN.

Design: A prospective observational study.

Setting: University tertiary care hospital.

Patients: A series of 11 consecutive patients with drained IPN undergoing postoperative follow-up with translumbar retroperitoneal endoscopy.

Interventions: Initially, the IPN was drained via the posterior extraperitoneal translumbar approach; then, a superficial necrosectomy was performed during the same surgical intervention by flushing and endoscopic aspiration; and, finally, a lavage and drainage system was fitted. In the immediate postoperative period, for management of the IPN, we removed the drainage tube and inserted a flexible endoscope as far as the pancreatic area to eliminate the infected necrotic material by flushing and aspiration.

Main Outcome Measures: In these patients, we studied control of the infection of the pancreatic area, quantification variables of the necrosectomy, technique-related morbidity and mortality, and the need for subsequent operations.

Results: The 11 patients studied showed good results regarding the control and complete elimination of the infected necrosis. There was no technique-related morbidity or mortality or need for subsequent operations.

Conclusion: Translumbar retroperitoneal endoscopy allows exploration of the retroperitoneal space under direct visual guidance, facilitates lavage and aspiration, avoids subsequent surgical operations for debridement, decreases the need for repeated computed tomographic scans to evaluate the evolution of the IPN, and has no added morbidity or mortality.

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SEVERE ACUTE PANCREATITIS with pancreatic necrosis (PN) occurs in 20% of patients with pancreatitis. Secondary infection leads to local and systemic septic complications, which can cause multiple organ failure (MOF) and account for a mortality of up to 30%.[1]

Helical computed tomography (CT) with oral and intravenous contrast is used for the diagnosis of PN, and in the event of MOF or sepsis, puncture and aspiration must be performed, with culture of the material obtained. Once infected PN (IPN) is confirmed, treatment must be prompt, combining antibiotics and intensive support measures with surgical drainage.[2]

Several approaches have been described for performing drainage, among which are the open transperitoneal approach,[2] by percutaneous puncture alone[3-5] or associated with laparoscopy,[6-8] and the extraperitoneal translumbar approach.[9-16]

The evolution of the IPN is evaluated with the patient's clinical data, biochemical markers of severity, and helical CT with contrast; management usually requires periodic necrosectomies, which can be performed via various transperitoneal techniques, using percutaneous punctures with laparoscopic support or, as in our patients, with translumbar retroperitoneal endoscopy (TRE).[14]

We report a series of 11 consecutive cases of IPN drained via the posterior extraperitoneal approach and managed with TRE, and analyze the results obtained for

Table. Clinical Features and Follow-up of the Patients

Patient No./ Sex/Age, y	Cause	Ranson Score	APACHE II Score	CRP Level, mg/dL	CT Findings, Balthazar Stage	SI	Follow-up Results (Time, mo)
1/M/35	A	6	19	33	D	7	Asymptomatic (60)
2/F/63	L	4	21	40	D	9	MOF-related death
3/M/77	L	4	30	51	E	8	Asymptomatic (12)
4/F/61	L	4	17	20	E	10	MOF-related death
5/M/33	A	5	13	29	E	8	Asymptomatic (10)
6/F/55	L	7	15	32	E	8	Asymptomatic (8)
7/F/68	L	8	22	26	E	8	Asymptomatic (6)
8/M/42	L	4	19	30	E	8	Asymptomatic (5)
9/M/40	L	8	18	29	E	8	Asymptomatic (4)
10/M/71	L	6	21	42	E	8	Asymptomatic (2)
11/M/28	A	8	37	48	E	10	MOF-related death

Abbreviations: A, alcohol; APACHE, Acute Physiology and Chronic Health Evaluation; CRP, C-reactive protein; CT, computed tomography; D, fluid collection in a single location; E, fluid collection in 2 or more locations and/or the presence of gas in or adjacent to the pancreas; L, lithiasis; MOF, multiple organ failure; SI, severity index.

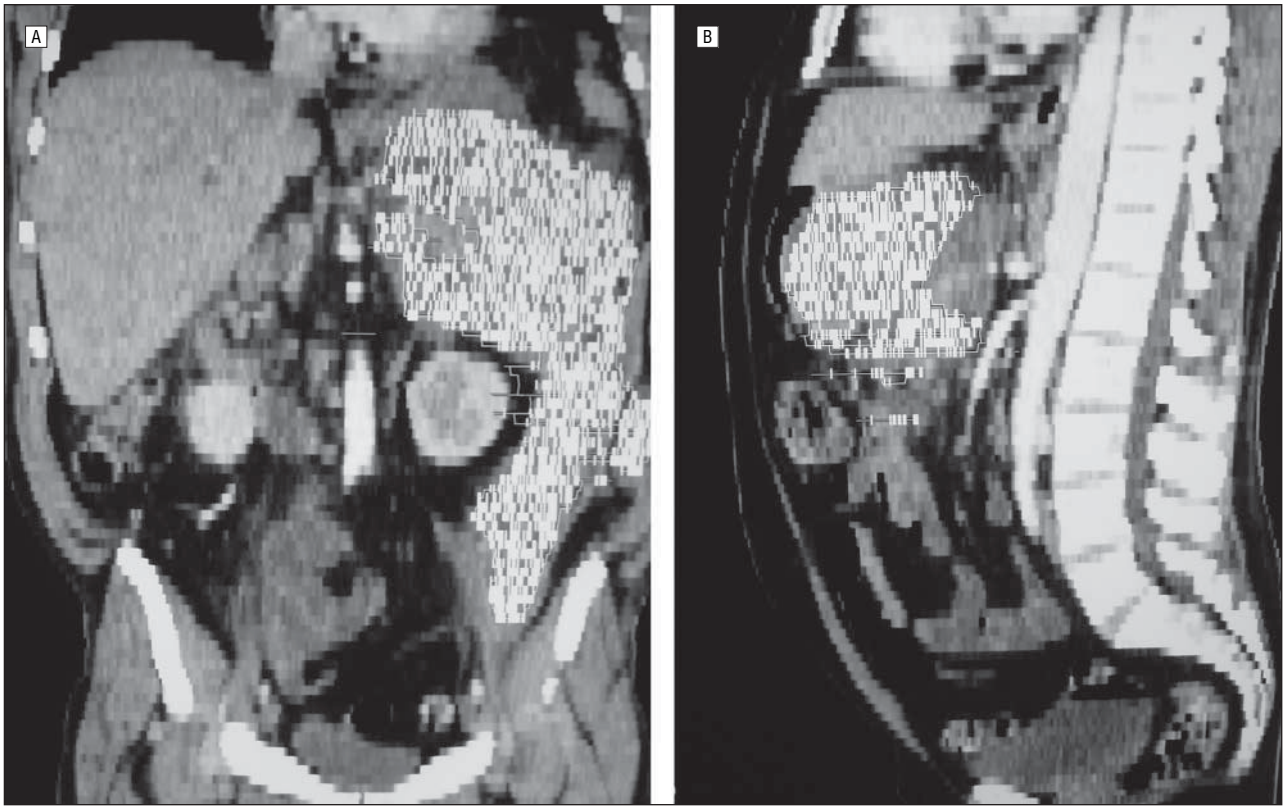

Figure. A patient with infected pancreatic necrosis. Anteroposterior (A) and profile (B) helical computed tomographic images.

control of the infection, morbidity and mortality, and need for subsequent operation.

METHODS

The mean age of the patients was 52 years (range, 28-77 years), with a female-male ratio of 4:7 and a follow-up of between 2 and 60 months. The cause was biliary in 8 patients and alcoholic in 3 patients (**Table**).

All had signs of a poor prognosis using the Ranson classification, with a mean of 5.8 points (range, 4-8 points) in the first 48 hours after hospital admission, and the APACHE (Acute Physiology and Chronic Health Evaluation) II score, with a mean of 21 points (range, 13-37 points) in the first 24 hours of their intensive care unit stay (Table). On admission, the initial C-reactive protein values averaged 34.5 mg/dL (range, 20-51 mg/dL).

Diagnosis was established with helical CT (Somatom Volume Access; Siemens, Munich, Germany) (**Figure**), puncture and aspiration, and culture of the material. The germ causing the infection was *Escherichia coli* in 3 cases, *Pseudomonas aeruginosa* in another 3, and polymicrobial flora with no predominant species in 5. Two cases were Balthazar stage D, and 9 were

stage E, with a mean overall severity index of 8 points (range, 7-10 points). To evaluate the evolution of the IPN, we studied the volume of the collections from the pancreas and spleen, with oral and intravenous contrast material in the arterial phase, by 4-mm sections every 3 mm and 3-dimensional reconstruction on coronal, sagittal, and axial planes.

The time from hospital admission and patient diagnosis to surgical drainage averaged 13 days (range, 1-28 days). The operating room time was always less than 1 hour. All patients were treated with preoperative and postoperative total parenteral nutrition. Nasojejunal enteral nutrition was used after the surgical treatment in all patients when adequate gastrointestinal tract function was present.

In all patients, the approach was left translumbar, and TRE was used in all the patients with excellent results to explore the retroperitoneum, lavage, aspire the large fragments of necrosis detached by the lavage, and control the infection; each patient had a mean of 5 sessions (range, 3-10 sessions).

Surgery was indicated in the first 24 to 48 hours after admission in 3 patients, during the first week in another 3, and between the third and fourth weeks in the remaining 5. Drainage was performed with general anesthesia via a posterior translumbar approach on the affected side using a puncture catheter as a guide; by pushing aside the posterior parietal peritoneum and the colon toward the midline, and taking the kidney as a reference, we accessed the pancreatic area through the prerenal area. After initial drainage during the same surgical intervention, we inserted a flexible endoscope (Olympus CV-100GIF 100-HL; Medical Europa SA, Barcelona, Spain), previously sterilized with solution (Perasafe; Tedec-Meiji Farma SA, Madrid, Spain) for 10 minutes. It was inserted through the incision, and a superficial necrosectomy was performed under direct visual guidance by flushing and aspiration, leaving the necrosed tissue adhering to the pancreas. This technique does not require retroperitoneal insufflation. We placed 2 tubes (Kendall Proclinics, Limited Society, Lladó, Spain), one (18 Charrière scale [the French scale]) in the upper part of the area for continuous lavage and the other (32 Charrière scale), more sloping, to collect the loose debris and necrosis from the infected area. The lumbotomy was closed in layers, through which the tubes were exteriorized.

The evolutive follow-up of the pancreatic area includes TRE, performed at the patient's bedside with the patient in the lateral decubitus position, awake but under sedation. A week later, and depending on clinical evolution and the helical CT data, the flexible endoscope is inserted under direct visual guidance and with minimum insufflation through the orifice left by the removed drainage tube and pushed up to the retroperitoneal space to explore all the tracts provided by helical CT; this enables lavage and aspiration of the debris and loose infected necrosed tissue, without aspiration of the pancreatic parenchyma or manipulation with instruments.[14] Once exploration is complete, the drainage tube is replaced. The pancreatic area can be reviewed as often as necessary until it is seen to be completely clean.

All the patients were studied by evaluation of the control of their infection process, rate of subsequent operations, technique-related mortality and morbidity, and endocrine and exocrine pancreatic function.

RESULTS

The amount of necrosed pancreatic tissue per patient, obtained after various sessions, averaged 34.7 g (range, 18-59 g). In no case was a surgical approach necessary to complete the cleaning of the retroperitoneum.

The mean intensive care unit stay was 33 days (range, 3-85 days), and the overall hospital stay was 98 days (range, 34-210 days). The mortality in the series was 27% (3/11), due to MOF; the cause was alcoholic in 3 cases, and there was no technique-related morbidity or mortality.

The follow-up of the survivors ranges from 2 to 60 months; the 8 patients with a lithiasic cause are asymptomatic and have a normal pancreatic function.

COMMENT

Patients are diagnosed as having severe acute pancreatitis when 3 or more Ranson criteria are met, 8 or more APACHE II criteria are met, there are clinical signs of MOF, and necrosis of the pancreatic parenchyma and neighboring tissues is present.[4]

Surgery is indicated in those with severe acute pancreatitis when there are signs of MOF or clinical criteria of sepsis with no response to intensive treatment and helical CT shows extensive areas of PN with confirmation of bacterial infection by puncture and bacteriological study.[2] The aims of surgical treatment are drainage of the IPN and placement of lavage and drainage tubes to avoid triggering a systemic inflammatory response syndrome, preservation of as much viable pancreatic tissue as possible, and prevention of late complications. Debridement must be performed early and properly, although there is no unanimity as to the approach and maneuvers to be used.[2]

Conventional surgical drainage via the open transperitoneal approach involves necrosectomy by flushing, the placement of drainage tubes, and subsequent operations when dictated by clinical deterioration and helical CT follow-ups. This technique has been practically abandoned because of the 24% mortality and 44% morbidity attributed to pancreatic and intestinal fistulas and bleeding phenomena on the pancreatic bed, 22% subsequent operations due to intra-abdominal sepsis, and 32% complications requiring hospital admission during the first 6 months after discharge.[2]

The unacceptably high postoperative morbidity and mortality rates following these debridements have led surgeons in search of new technical alternatives.

Direct transperitoneal percutaneous puncture under CT guidance, or used as a guide for laparoscopic assistance, is, by way of initial treatment, a safe, effective, and minimally aggressive technique and a valid alternative for the future. It is useful for draining pancreatic or peripancreatic collections in which the fluid component predominates over the debris or necrosis. The results are rather inconsistent and are usually related to the diameter of the drain, the number of drains used, the time they are maintained, and the approaches used for lavage and drainage. The few series published report a mortality of 0% to 20%, with a morbidity of 26% to 66%, generally due to intestinal and pancreatic fistulas or local bleeding and a rate of subsequent operations for surgical necrosectomy ranging from 10% to 24%. The possibility of percutaneous treatment being insufficient in those with IPN is high, with only 9% to 14% of patients avoiding surgery.[3-7,17,18]

Direct laparoscopic techniques with a transperitoneal approach to the retroperitoneum are also an alternative to be considered in the treatment of IPN. Laparoscopic pancreatic necrosectomy is feasible, although occasionally with little guarantee because the viscosity of the necrosis makes removal of the material difficult. It may have advantages over open necrosectomy techniques in that it achieves the same objectives but with lower rates of morbidity and mortality, but this is not yet a reality. Access with laparoscopic instruments causes less tissue aggression and pain and fewer laparotomy-associated hernias. The main disadvantages are the rigidity of the instruments and limitation of the operating field, the difficulty with evacuation and aspiration of necrotic material due to its viscous consistency, the formation of enterocutaneous or pancreatic fistulas, and infection of the abdominal cavity. Experience with these approaches is limited, and results are discordant. The various laparoscopic approaches to the retroperitoneum yield a morbidity of 62%, with 25% subsequent operations and no technique-related mortality.[8,19-22]

Other researchers[13,14] opt for the extraperitoneal translumbar approach, which carries less morbidity and mortality and avoids contamination of the peritoneal cavity. We use retroperitoneal access to perform a superficial endoscopic necrosectomy by flushing, thus preserving more healthy pancreatic tissue. To control evolution, we use periodically programmed retroperitoneal endoscopy, which enables us to explore the retroperitoneal space under direct visual guidance; lavage, aspirate, and extract loose IPN; and avoid multiple subsequent surgical operations and repeated CT follow-ups.

This technique was used in 11 patients and yielded a mortality of 27% due to MOF, but no technique-related morbidity or subsequent operations.

Infected PN requires early vigorous drainage, and the initial extraperitoneal translumbar approach to evacuate, debride, and lavage the pancreatic area is, in our opinion, a suitably sufficient surgical intervention. Subsequent management of the pancreatic area can be done using TRE, because it is a minimally invasive technique that explores under visual guidance, has a wide field of action because of the flexibility of the endoscope, uses a single tube for visualization and work, and can be performed at the patient's bedside. The results obtained show that TRE is a useful, efficient, therapeutic alternative to open surgery on the abdomen in the evolutive follow-up and management of the retroperitoneum in those with IPN.

We conclude that the open extraperitoneal translumbar approach has its advantages: infection of the abdominal cavity is avoided, an extensive necrosectomy is performed with flushing and endoscopic aspiration, subsequent surgical operations are avoided, the integrity of the abdominal wall is respected, and the morbidity and mortality rate and exocrine and endocrine pancreatic insufficiencies are considerably reduced.

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