Acute pancreatitis is a diffuse and profound inflammation of the pancreas, caused in 80–90% of cases either by gallstones, which obstruct the biliary tract, or by drinking too much alcohol (1). The exact manner in which alcohol damages the exocrine pancreas is still not known. It has been suggested that gallstone-induced acute pancreatitis may be generated by reflux of bile into the pancreatic duct following blockage of the duodenal papilla by a gallstone (2), by reflux from the duodenal lumen through an incompetent sphincter in the pancreas, producing extensive damage by the already activated pancreatic proteases (3) or by the premature and intracellular activation of digestive enzymes. Severe acute pancreatitis is characterised by a strong infiltration with leucocytes, and by destruction and loss of the normal pancreatic cells and the intrapancreatic vessels, which can lead to haemorrhage, generation of pseudocysts and extended fat necrosis (4).

According to the morphological changes, acute pancreatitis can be classified histologically as interstitial-oedematous or necrotising pancreatitis. Approximately 80–85% of the patients with acute pancreatitis have an acute oedematous inflammation and will undergo a mild, self-limiting clinical course. But 15–20% of the patients develop severe, life-threatening disease (mortality rate up to 60%) with intra- and extrapancreatic necrosis (5,6). In the early phase – through the release of pancreatic enzymes and vasoactive substances – these patients suffer cardiovascular, pulmonary, and renal complications (7). If they survive this critical period, they are often faced in a second phase with severe septic complications due to pancreatic or peripancreatic infection of the necrosis (8–10).

With the impressive improvements in intensive care during past years, death has become increasingly rare in the first critical phase (11). In contrast, the local and systemic septic complications that follow bacterial contamination of the necrotic material continue to cause death in severe acute pancreatitis, and are an important challenge in clinical management. Although recent studies have undoubtedly proved that, in cases of infected necrotising acute pancreatitis, surgical therapy is superior to conservative treatment, there have been many uncertainties concerning the therapeutic schedule and prophylactic antibiotic therapy (12,13).

Taking into account recent findings from microbiological data and our own surgical experience, we have developed a new algorithm to be used in patients with acute pancreatitis. The goal is to reduce the mortality in patients
with necrotising pancreatitis by using prophylactic antibiotic therapy (imipenem) and surgical intervention at the right time.

**Infection of Pancreatic Necrosis**

The development of pancreatic and peripancreatic necrosis is a critical point in the course of acute pancreatitis, and mainly determines the prognosis of the disease. The normal pancreas is generally sterile and resistant to infections because of extensive lymphatic drainage and the strong antibacterial activity of the pancreatic juice (14). But in acute pancreatitis, after the appearance of necrotic tissue, these protection mechanisms are no longer effective and the necrotic areas represent an ideal place for subsequent bacterial superinfection. Widdison et al. (15) demonstrated a positive correlation between the extent of necrosis and the rate of superinfection in necrotising pancreatitis. As already mentioned, pancreatic infection occurs in 40–70% of patients with necrotising pancreatitis and shows a time-dependent pattern of onset: it has been shown that the incidence of infected pancreatic necrosis is 24%, 36% and 71% in the first, second and third weeks following onset of acute pancreatitis, respectively (8). Animal studies have demonstrated that the most likely route of invasion by bacteria is the transmural route from the colon. This translocation is probably supported by an increased permeability of the colon wall and by the migration of bacteria-carrying macrophages. However, there may be other, less frequent, routes of infection as well: for example, haematogenous, via the circulation; by duodenobiliary reflux, via the main pancreatic duct; or from the portal vein and the liver, via the biliary duct system (16,17).

The most frequently isolated organisms in infected acute necrotizing pancreatitis arise from the intestinal flora, consisting primarily of Gram-negative bacteria, such as *Escherichia coli* and *Enterobacter*. However, in the three major studies which analysed bacterial contamination in infected pancreatic necrosis, either by performing intraoperative smears or by computed tomography (CT) guided fine needle aspiration microbiology, there was also frequently infection by Gram-positive bacteria, such as *Staphylococcus aureus*, *Streptococcus faecalis* and *Enterococcus* or anaerobes, and in some cases even fungi. It was found that 60–87% of the patients had infection with only one bacterium, whereas in 13–40% of the patients, more than one bacterium was present (8,18,19).

As it is well known that infectious complications such as sepsis and related systemic multiple organ failure are the causes of higher mortality rate, a longer hospital stay and a higher reoperation rate in patients with acute necrotising pancreatitis, which is triggered by the bacterial contamination of the necrotic tissue, it is of great importance to detect these cases as early as possible. First-phase acute necrotising pancreatitis can be differentiated from acute oedematous pancreatitis by contrast-enhanced CT and/or by the measurement of so-called necrosis markers in the serum. The accuracy rates of serum necrosis markers are 86% for C-reactive protein, 84% for polymorphonuclear granulocyte elastase, 82% for lactate dehydrogenase and 72% for a2-macroglobulin (20,21). This differentiation is important, because the danger of subsequent bacterial contamination exists only in acute necrotising pancreatitis. Unfortunately, there are no reliable clinical or laboratory parameters that can accurately diagnose whether the necrosis is infected. The best approach to assess if an infection is present is CT or ultra-