

Pancreatic and Intestinal Fistulas

Pancreatic fistulas (PFs) and intestinal fistulas (IFs) are troublesome, occasionally significant, and not uncommon sequelae of necrotizing pancreatitis (NP). They account for increased morbidity and sometimes mortality, and prolonged hospital stay, and they are costly both financially and with regard to resources.

Incidence varies between 5% and over 50% among published series, but there is a definite decreasing trend recently across the literature. The wide variation in incidence reflects not only different levels of expertise among the authors, but also the striking lack of a universally accepted and applied definition of PF specifically in the context of NP. Although recently a consensus definition and staging of *postoperative* PF was published [1], there has been no similar unifying attempt in the setting of NP, as is our topic. The decreased incidence of PF/IF in the recent literature, in addition to improved surgical expertise, certainly reflects in part the recent change in the overall management strategy of NP, as will be discussed below.

Higher imaging precision has led to more accurate diagnoses by the delineation of fine, but crucial anatomic details of both PF and IF. In addition, advanced technology and refined operative and interventional or minimally invasive techniques have contributed to an improved outcome in these patients.

In this chapter we will discuss the pathogenesis and management of PF and IF separately, but prior to this, it is essential to briefly outline a very significant change in the management scheme of NP that has taken place during the last decade, which has crucial implications in both the incidence and the treatment of PF and IF.

Modern Management of NP and its Implications

Since it has been recognized that the early peak of mortality in the biphasic mortality pattern of NP is due to the overwhelming systemic inflammatory response syndrome (SIRS; not sepsis), whereas the later second peak is due to sepsis, two major components of modern management have emerged: (1) very aggressive hemodynamic, ventilatory, metabolic, and nutritional support and avoiding operative treatment in the early phase, and (2) delayed operative treatment (where necessary) for as long as possible. This approach, which has been substantiated by cornerstone clinical studies [2,3] and is now the preferred management strategy in patients with NP [4], has led to optimized hemodynamics early after NP, much fewer reoperations for debridement (usually just one), essentially no gauze packing, and placement of fewer drains. As will be discussed in detail below, these factors have substantially decreased the incidence of NP/IF.

Pathogenesis

Although the pathogenesis of PF/IF is multifactorial, the most common factor in their development is the presence of pancreatic parenchymal necrosis, as this results in the disruption of small or large pancreatic ducts with subsequent extravasation of exocrine secretions into the retroperitoneum [5]. Operative necrosectomy and local drainage allow for external egress of these extravasated secretions and the potential for a *pancreaticocutaneous fistula*. The concurrent pancreatic and peripancreatic inflammatory process may also lead to stenosis of the pancreatic ducts, which represents a substantial element for the chronicity of fistulas. The importance of pancreatic parenchymal necrosis as the main risk factor in the pathogenesis of PF is stressed by the finding in one study that all patients who developed pancreaticocu-