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CONFERENCE REPORT

# Medical Complications of Pancreatic Resections

**Ezio Gaia, Paola Salacone**

Gastroenterology Unit, San Luigi Gonzaga Hospital. Orbassano (TO), Italy

**Summary**

The sequelae of pancreas surgery are determined by the type of procedure, the extent of the parenchymal resection and the underlying disorder. In ductal carcinoma, the outcome is heavily influenced by the disease itself. Mortality rates are lower in centers which perform the most operations.
In chronic pancreatitis, surgical management is essentially therapeutic for complications and palliative for the disease whose progress is closely correlated with the sequelae.
Elective surgery does not appear to increase the risk of diabetes whereas distal pancreatectomy is an independent risk factor. Parenchymal resection aggravates nutritional deficiencies, such as low selenium, linoleic acid, LDL and apolipoprotein B levels, and thus increases the risk of atherogenesis. Abstinence from alcohol is an indispensable step towards the disappearance of postoperative pain.

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The sequelae of pancreas surgery are determined by the type of procedure (resective or derivative), the extent of the parenchymal resection, and the underlying disorder. The literature is rich in data regarding the outcome of resection in the management of neoplastic lesions. In ductal carcinoma, the outcome is heavily influenced by the disease itself. Morbidity associated with resection of the pancreatic head is relatively high (up to 60%), and there is no statistically significant difference between classic partial and pylorus-preserving pancreaticoduodenectomy [1].
Numerous studies have reported a promising increase in 5-year survival when ductal carcinoma surgery is followed by radio-therapy and chemotherapy [2, 3, 4]. It has also been shown that mortality rates are lower in centers which perform the most operations [5]. In this connection, of course, it must be borne in mind that specialized centers employ more sophisticated means of diagnosis. They are also furnished with appropriate intensive care units and usually have access to more abundant resources.
Chronic pancreatitis is a benign disorder. Progressive, persistent destruction of the pancreas may remain silent for years until the onset of serious insufficiency or it may appear in the form of irregular and painful acute episodes or complications. The prime indications for surgery are uncontrolled pain or complications (e.g., pseudocysts). Elimination of the cause of the disease (alcohol, obstruction, autoimmunity) improves or abolishes recrudescences, but does not result in a cure. As has already been stated, in fact, chronic pancreatitis progresses to the point of insufficiency, which means that surgical management is essentially therapeutic for complications and palliative for the disease.
Genes involved in trypsinogen instability are thought to be responsible for pancreatitis [6, 7, 8, 9, 10]. Enhanced trypsinogen activation in the exocrine cells may increase their

apoptosis and turnover, and hence cause exocrine insufficiency and parenchymal fibrosis (painless pancreatitis), or massive activation followed by recrudescence and necrosis. The genetic substrate of other, more numerous situations has not been determined and environmental factors, such as alcohol and a high-fat diet, are the only known causes.

In a family described in a personal study [11], a cationic trypsinogen mutation in exon 2 (V39A) was responsible for serious, clinically silent pancreatitis which led to insufficiency and required resective/derivative surgery due to the appearance of a tumor or severe complications.

Surgery is indicated in cases of chronic pancreatitis for the resolution of complications (especially intractable pain) or when differentiation of tumors is uncertain.

Morbidity following resection of the pancreatic head combined with longitudinal pancreaticojejunostomy (Frey procedure) and duodenum-preserving head resection (Beger procedure) is 39% (compared with 48% for other resections), with a 20% revision rate in both cases [12, 13, 14].

Long-term mortality is 32% after both the Frey and the Beger procedures [15]. Falconi *et al*., however, achieved better results with no mortality and significant reduction of pain in a series of 40 patients operated on according to Frey [16].

Abstinence from alcohol is an indispensable step towards the disappearance of postoperative pain [14]. The quality of life of patients with pancreatitis is significantly worse than that of the controls, mainly due to pain [17]. Reason would suggest that reduction of the parenchyma or better drainage of the ducts would be sufficient to reduce recrudescence. This has not yet been established in controlled long-term trials.

The sequelae of surgery may aggravate the clinical course (Table 1). The incidence of diabetes after resection is closely correlated with the surgical procedure: 25-40% after Whipple; 8-15% after Frey; about 60% five years after distal pancreatectomy due to the greater concentration of islet cells in the tail. Elective surgery does not appear to increase the risk of diabetes, whereas distal pancreatectomy is an independent risk factor. Long-term postoperative mortality increases if alcohol is not eliminated [15]. Alcohol and diabetic decompensation are the main factors responsible for high long-term postoperative mortality [18].

Exocrine insufficiency is directly correlated with the type of pancreatitis and serious insufficiency is directly correlated with the disappearance of pain ("burn out") [19]. The incidence of exocrine deficiency ranges from 35% to 74% in function of the type of resection [13]. These clinical considerations must be borne in mind when weighing up the efficacy of surgery as a remedy for pain in chronic pancreatitis.

Resection also aggravates secondary nutritional deficiencies, such as low selenium, linoleic acid, LDL and apolipoprotein B levels, and thus increases the risk of atherogenesis. Cardiovascular complications are frequent in chronic pancreatitis and are further aggravated by glycemic decompensation [20, 21].

The enhanced risk of both extrapancreatic [22] and pancreatic [23] neoplasias is an important factor in the long-term management of patients with chronic pancreatitis.

In hereditary forms due to cationic trypsinogen gene mutations, its frequency is 50% at age 50 and 70% at age 65 and older [24].

In conclusion, the sequelae of surgery are closely correlated with the progress of chronic pancreatitis. They primarily take the form of exocrine insufficiency, nutritional deficiencies, diabetes and its complications,

**Table 1.** Medical complications of chronic pancreatitis.

- Exocrine insufficiency
- Diabetes
- Autonomic neuropathy
- Intestinal malabsorption
- Intestinal bacterial pollution
- Atherosclerosis
- Bone changes
- Pancreatic carcinoma
- Extrapancreatic carcinoma
- Psychosis

altered lipid metabolism with an increased risk of atherogenesis, and both extrapancreatic and pancreatic carcinoma.

**Keywords** Diabetes Mellitus; Exocrine Pancreatic Insufficiency; Pancreas /surgery; Pancreatitis, Chronic; Postoperative Complications

**Conflict of interest** The authors have no potential conflicts of interest

**Correspondence**
Ezio Gaia
Gastroenterology Unit
A.S.O. San Luigi Gonzaga
Regione Gonzole 10
10043 Orbassano (TO)
Italy
Phone: +39-011.902.6600
Fax: +39-011.902.6256
E-mail: eziogaia@gmail.com

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