



Review

What indication, morbidity and mortality for central pancreatectomy in oncological surgery? A systematic review



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ABSTRACT

Conventional pancreatic resections for pancreatic neck and body diseases include pancreaticoduodenectomy, distal pancreatectomy with or without splenectomy, and total pancreatectomy. Recent studies have reported encouraging results of non-traditional pancreatic resections, including central pancreatectomy (CP), for central pancreatic disease. This surgical approach offers the potentials of low postoperative morbidity and preservation of metabolic functions. This study performs a systematic review on CP. A comprehensive literature search was conducted, for the period 1992–2015, on three worldwide databases: PubMed, Scopus, ISI-Web of Knowledge. We focused on indications, morbidity and mortality of this surgical procedure. The review shows that CP is particularly suitable for small-medium size diseases localized into the pancreatic body. This procedure is associated with an increased postoperative morbidity but an excellent postoperative pancreatic function. CP is a safe and effective procedure when performed following the right indications.

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1. Introduction

Conventional pancreatic resections for pancreatic neck and body diseases include pancreaticoduodenectomy (PD), distal pancreatectomy (DP) with/without splenectomy, or total pancreatectomy, depending on the tumor location. These procedures carry a mortality risk of less than 1% and a mean morbidity rate of 39.9% (range 0%–72%), lower in experienced hands [1,2]. Although such procedures are mandatory for malignant diseases, they seem excessive for benign or borderline conditions, especially in young subjects. Non-traditional pancreatic resections, like pancreatic

enucleation, aim to reduce perioperative morbidity and to ensure good metabolic functions in long-term outcome [3,4]. Central pancreatectomy (CP) is a parenchyma-sparing procedure proposed for lesions of the pancreatic neck and body with the aim to benefit from exocrine and endocrine advantages resulting from glandular preservation. Currently there are still no clear indications for this surgical procedure as well as its morbidity and mortality has not been well defined. The aim of this report is to perform a systematic review of the literature to evaluate these aspects.

2. Methods

A comprehensive literature search was conducted by searching the electronic databases PubMed, Scopus and ISI-Web of Knowledge. We selected these databases, amongst others, because they provide an extensive number of studies related to central pancreatectomy (CP), in our country as well as worldwide. These databases were analyzed from the date of publication of the first well-described report on CP in 1992 [5] to the time of writing (April 2015). The search was carried out using the following keywords:

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'segmental resection of the pancreas', 'central pancreatectomy', 'middle pancreatectomy' and 'pancreas middle segment resection'. (Table 1)

A total of 13343 articles were identified (Table 1). As the three databases have common records, 8424 were excluded to avoid double counting. In order to make the review manageable, we filtered the remaining 4919 articles by focusing only on studies analyzing multiple cases, with just an exception [39], and reviews, excluding: 1) texts that dealt with clinical symptoms, radio-morphology, immunological aspects of diseases, medical treatment, pathophysiologic aspects of the tumor, etc.; 2) comparative studies and meta-analysis due to the difficulty/impossibility to extract the data of our interest; 3) texts focused on laparoscopic and robotic-assisted surgery as too selective in indications and generally inherent technical aspects. (Fig. 1) This filtering process allowed to reduce the number of articles to 137. The data items extracted were: surgical indications, mortality and morbidity rates with particular attention to postoperative data (endocrine pancreatic insufficiency, exocrine insufficiency, pancreatic fistula). Further filtering was carried out on the basis of data items, including texts that dealt with surgical indications, mortality and morbidity rates. The final number of articles taken into consideration is 39 (see Fig. 1).

3. Results and discussion

Since the second half of the 20th century Central Pancreatectomy has been developed as a treatment not only for traumatic pancreatic disruption and chronic pancreatitis but also as a procedure for selected cases of pancreatic neoplasms. This technique was first described in 1957 by Guillemin and Bessot to treat a patient with chronic pancreatitis [6]. In 1959, Letton and Wilson used the procedure to manage two patients who had traumatic damage of the pancreas [7]. Subsequently several other authors have documented its use supporting its safety for benign and low-grade malignant lesions that cannot be enucleated [8–11].

When compared with conventional surgical pancreatic procedures, CP seems to be better in terms of sparing pancreatic parenchyma, preserving the spleen and maintaining the integrity of the upper GI tract. However, at the present, indications are not clear and its surgical morbidity/mortality is not well defined.

3.1. Indications

Our review shows that CP could be indicated for pancreatic trauma, chronic pancreatitis and selected neoplastic processes including benign or low/local malignant potential tumor (including solitary metastases) located in the neck or adjacent body of the gland. The tumor should be small (less than 5 cm in diameter, although rare cases have reported [39] the excision of larger tumors), not needing extensive lymphadenectomy, untreatable with enucleoresection for cancer or technical aspects (as the risk of fistula resulting from accidental damage of the main pancreatic duct)

Table 1

All retrieved references searching in three worldwide databases.

Keywords	Database		
	PubMed	Scopus	ISI
Central pancreatectomy	304	354	337
Segmental resection of the pancreas	142	290	224
Middle pancreatectomy	3711	3765	3928
Pancreas middle segment resection	55	131	102
Title search results	4212	4540	4591
	13343		

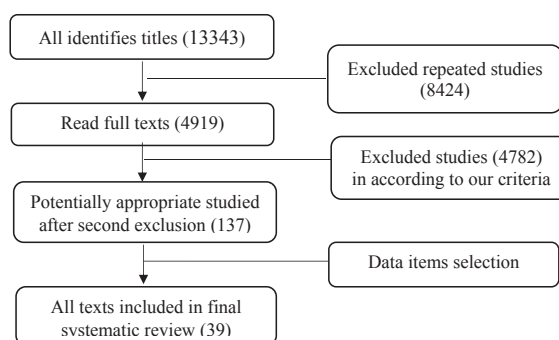


Fig. 1. Articles identified and analyzed during the review process.

and there must be a distal pancreatic stump adequate for construction of the pancreaticojejunostomy [8,33]. In literature CP was performed with good oncological and functional results for serous or mucinous cystadenomas, solid pseudopapillary tumors and neuroendocrine tumors. Sauvanet et al. [12] noted an increased risk of complications, including disease recurrence and postoperative diabetes, in patients undergoing CP for intraductal papillary mucinous neoplasm (IPMN). This tumor may not represent an appropriate indication for CP. DiNorcia et al. [13] observed that mid-gland IPMN can be treated with CP, but it is essential to confirm negative margins and noninvasive disease both intraoperatively and on final pathology. Patients whose final pathology reveals IPMN with high-grade dysplasia must undergo surveillance for disease recurrence [13].

Preoperative imaging studies can assist in determining the tumor characteristics and potential suitability for CP. CT and/or RMN scan are mandatory to evaluate the size and characteristics of the lesion. Intraoperatively, the benign nature of the lesion should be confirmed based on direct inspection and frozen section examination of the respected specimen. Preoperative biopsy is not definitive and is not recommended for this or any other potentially curable pancreatic lesion [5].

3.2. Morbidity – postoperative endocrine function

The main benefit of CP compared to conventional pancreatic resections is its better postoperative endocrine function [1,2,8–10]. This has been attributed to 1) sparing of pancreatic parenchyma and preservation of the normal anatomic relationships between the pancreatic head, duodenum, and biliary tract, and 2) maintenance of normal neuro-hormonal regulation of insulin activity. Preserving pancreas' length may save function, particularly in the pancreatic body and tail where islet cells are more densely distributed. The majority of authors do not report the occurrence of de-novo diabetes after CP [2,5,8–15,17,21,22,25,26,28,31,32–40] and just few series have similar results between CP and DP [13,27,30,34]. This seems due to the extent of exeresis performed, to the incidence of other complications (pancreatic fistulas), and to the patient's subjective predisposition (family history, chronic use of drugs, etc.). (Table 2)

3.3. Morbidity - postoperative exocrine function

The assessment of pancreatic exocrine function is more difficult because there is no consistent objective measure. Most studies use clinical criteria such as complaints of diarrhea and weight loss to determine the presence of exocrine insufficiency [1,9,12,14]. Rotman et al. [5] studied eight patients at a mean of 36 months after CP and found one patient with elevated fecal fat excretion. Sperti et al.

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