

REVIEW ARTICLE

Short and long-term post-operative outcomes of duodenum preserving pancreatic head resection for chronic pancreatitis affecting the head of pancreas: a systematic review and meta-analysis

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Abstract

Background: To evaluate the short and long term outcomes of duodenum preserving pancreatic head resection (DPPHR) procedures in the treatment of painful chronic pancreatitis.

Methods: A systematic literature search was performed to identify all comparative studies evaluating long and short term postoperative outcomes (pain relief, morbidity and mortality, pancreatic exocrine and endocrine function).

Results: Five published studies fulfilled the inclusion criteria including 1 randomized controlled trial comparing the Beger and Frey procedure. In total, 323 patients underwent surgical procedures for chronic pancreatitis, including Beger (n = 138) and Frey (n = 99), minimal Frey (n = 32), modified Frey (n = 25) and Berne's modification (n = 29). Two studies comparing the Beger and Frey procedure were entered into a meta-analysis and showed no difference in post-operative pain (RD = -0.06; CI -0.21 to 0.09), mortality (RD = 0.01; CI -0.03 to 0.05), morbidity (RD = 0.12; CI -0.00 to 0.24), exocrine insufficiency (RD = 0.04; CI -0.10 to 0.18) and endocrine insufficiency (RD = -0.14 CI -0.28 to 0.01).

Conclusion: All procedures are equally effective for the management of pain for chronic pancreatitis. The choice of procedure should be determined by other factors including the presence of secondary complications of pancreatitis and intra-operative findings. Registration number CRD42015019275. Centre for Reviews and Dissemination, University of York, 2009.

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Introduction

Chronic pancreatitis (CP) is a chronic inflammatory disease characterized by irreversible parenchymal fibrosis and progressive destruction of endocrine and exocrine components.¹ The treatment of CP can be divided into three categories: pain management; management of complications such as pseudocysts; and correction of pancreatic insufficiency.² Pain is the most frequent symptom and achieving adequate analgesia is often extremely difficult. Although medical treatment has been the

mainstay of therapeutic modalities,³ endoscopic and surgical management have increasingly become the mainstream in patients with intractable pain or complications. In a recent Cochrane review surgery was superior to endoscopy for pain relief in chronic pancreatitis.⁴ In one trial surgery improved quality of life and resulted in better preservation of exocrine pancreatic function.⁵ Choosing the surgical approach is rarely straightforward and is often determined by factors such as disease location (head, body, tail of the pancreas or diffuse disease)

or the suspicion of cancer. When the distal pancreas is affected and pancreatic duct dilated, longitudinal pancreaticojejunostomy (LPJ) is usually the most effective procedure. For ducts less than 5 mm the anastomosis can be difficult and resection of the distal pancreas is more appropriate.⁶ When the disease is characterized by a mass in the head of pancreas, the aim of surgery is to excise the head which is the thought to act as a pacemaker of the disease. Available surgical interventions in patients with CP affecting the head of pancreas can be divided into 2 groups: complete pancreatic head resection (PHR) procedures and duodenum preserving pancreatic head resection (DPPHR) procedures. A number of procedures in the DPPHR group have been reported as well as modifications of the original techniques (Table 1). Total pancreatectomy and islet autotransplantation (TPIAT) has also been proposed as an effective intervention for managing the complications of chronic pancreatitis.¹² However, this still needs to undergo further evaluation before it is routinely adopted.

Although complete PHR offers long-term pain control by resecting the diseased head with drainage of the duct, it is associated with considerable side effects due to resection of the duodenum, pylorus and bile duct when compared with DPPHR.^{13–15} DPPHR allows incomplete though sufficient

resection of the head of pancreas while preserving the continuity of the upper gastrointestinal tract. At the time of writing three meta-analyses have been published comparing PHR with DPPHR.^{13–15} While these have shown similar improvements in post-operative pain relief, DPPHR has been associated with improved quality of life and exocrine function.

There is no level 1 evidence comparing the different DPPHR procedures used in the management of pain for CP. The aim of this systematic review was to systematically review the literature to identify the most effective DPPHR procedure for pain relief in CP affecting the head of pancreas.

Materials and methods

A study protocol was developed before the conduct of the meta-analysis. The objective, inclusion, and exclusion criteria, outcome parameters, and methods for analysis were predefined. Reporting was in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)¹⁶ and MOOSE (Meta-analysis Of Observational Studies in Epidemiology)¹⁷ statements. The review protocol was registered with the Centre for Reviews and Dissemination, University of York, 2009. Registration number CRD42015019275.

Inclusion and exclusion criteria

Studies were assessed by 2 authors independently (Z.A.R.J. and N.T.) and any conflict was resolved by a 3rd assessor (L.R.J.) until there was consensus. To be included in the analysis, studies had to meet the following criteria: (i) be comparative randomized or non-randomized studies evaluating two or more different DPPHR procedures (ii) the study population consists of patients diagnosed with chronic pancreatitis undergoing planned elective surgery (iii) be a human study, and (iv) be written in English.

Studies were excluded from the analysis for the following reasons: (i) failure to describe the surgical methodology; (ii) the outcomes and variables of interest were not clearly reported (e.g. studies that did not record short-term results, such as mortality and morbidity, or long-term results, such as pain control and pancreatic function); (iii) non-comparative study (iv) less than 12 months follow-up for long term outcomes (v) it was impossible to extract the appropriate data from the published results; (vi) there was overlap between patient cohorts evaluated in the published literature.

Study selection

A systematic literature search of the published studies on management of CP was performed using a PubMed search covering the MEDLINE, EMBASE, Ovid, and Cochrane databases. No time limits were specified up to the date of the search. The following Medical Subject Headings were used for the search: 'chronic pancreatitis', 'surgery', 'Frey*', 'Beger*', 'duodenum-preserving pancreatic head resection', 'Izbicki*', 'Berne*'. These terms, and their combinations were also searched as text words.

Table 1 Main characteristics of DPPHR procedures and their modifications identified in the systematic review

Duodenum preserving pancreatic head resection (DPPHR) procedure	Main characteristics of procedure
Beger procedure ⁷	<ul style="list-style-type: none"> Dissection of pancreatic neck from portal vein and complete transection of neck Subtotal excision of pancreatic head and neck Reconstruction with two anastomoses (pancreaticojejunostomy) with Roux-en-Y jejunal loop
Frey procedure ⁸	<ul style="list-style-type: none"> Longitudinal drainage of pancreatic duct Local resection of pancreatic head
Modified Frey procedure ⁹	<ul style="list-style-type: none"> Mean area of resection of pancreatic head $3.0 \pm 0.4 \text{ cm}^2$
Minimal Frey procedure ⁹	<ul style="list-style-type: none"> Mean area of resection $1.8 \pm 0.3 \text{ cm}^2$
Berne's modification of Beger procedure ¹⁰	<ul style="list-style-type: none"> No dissection from portal vein Partial resection of pancreatic head to leave cavum Single anastomosis (pancreaticojejunostomy) with Roux-en-Y jejunal loop
Izbicki procedure ¹¹	<ul style="list-style-type: none"> Indicated in small duct disease V-shaped excision of ventral pancreas Longitudinal pancreaticojejunostomy to Roux-en-Y jejunal loop

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