Original article

Value of splenic preservation during distal pancreatectomy for chronic pancreatitis

S. Govil and C. W. Imrie

Lister Department of Surgery, Glasgow Royal Infirmary, 16 Alexandra Parade, Glasgow G31 2ER, UK
Correspondence to: Professor C. W. Imrie

Background: **Pain relief after distal pancreatectomy for chronic pancreatitis is reportedly satisfactory in 50–80 per cent of patients. This study attempted to determine clinical and radiological features that might select patients likely to benefit from distal pancreatectomy, and whether splenic preservation influenced the outcome.**

Methods: **Thirty-eight patients with chronic pancreatitis, who underwent distal pancreatectomy between 1982 and 1998, were reviewed retrospectively. The outcome of surgery was correlated with the aetiology of pancreatitis and radiological appearance on endoscopic retrograde cholangiopancreatography and computed tomography.**

Results: **Good results were achieved in 23 of 36 patients for whom follow-up (median 48 months) was available, including all 11 with obstructive pancreatitis. The spleen was preserved in 22 patients. Twelve patients became diabetic after surgery: three of 20 in whom the spleen was preserved and nine of 16 who underwent splenectomy.**

Conclusion: **Non-alcoholic patients with a normal pancreas proximal to a dominant ductal stricture had a consistently good outcome from surgery. Spleen-preserving distal pancreatectomy, although technically demanding, can be performed safely with results equivalent to those of distal pancreatectomy with splenectomy or autotransplantation. Splenic preservation, apart from preventing postsplenectomy sepsis, might also delay the onset of diabetes.**

Paper accepted 20 March 1999 British Journal of Surgery 1999, **86,** 895–898

Introduction

Patients with painful chronic pancreatitis whose main pancreatic ducts are of insufficient calibre to permit longitudinal pancreaticojejunostomy are candidates for resection of the proximal or distal pancreas, depending on the site of the disease[1–3]. Despite the ability of endoscopic retrograde cholangiopancreatography (ERCP) and computed tomography (CT) to identify the 5–15 per cent of patients in whom disease is limited to the body and tail of the pancreas, the results of distal pancreatectomy in terms of pain relief have fallen short of the 80–90 per cent efficacy achieved by longitudinal pancreaticojejunostomy[4]. Pain relief has been reported to be good in 50–80 per cent of patients in published series after 50–60 per cent distal pancreatectomy[4], although some reports suggest that the degree of pain relief may deteriorate with time[5,6]. Postoperative diabetes has been reported in 30–69 per cent of patients and deterioration in exocrine function in 30 per cent[4]. The potential for postsplenectomy sepsis adds an additional risk[7].

Stricter patient selection may achieve improvements in the results of this operation. All patients who underwent distal pancreatectomy for chronic pancreatitis at Glasgow Royal Infirmary from 1982 to 1998 were reviewed to determine whether features on ERCP or radiological imaging could be identified that might predict more favourable outcome. The role of splenic preservation during distal pancreatectomy was also assessed.

Patients and methods

The medical records of 236 patients with chronic pancreatitis treated between January 1982 and January 1998 were reviewed. Patients were considered to have chronic obstructive pancreatitis if they fulfilled the following criteria: (1) dominant stricture in the main pancreatic duct; (2) normal main pancreatic duct and side branches proximal to the stricture on ERCP, and normal pancreatic

parenchyma on CT and at surgery; and (3) no history of alcohol abuse. These criteria were defined and described in the Marseilles Classification of Pancreatitis meeting in 1984[1].

Thirty-eight patients had undergone distal pancreatectomy to relieve severe abdominal pain, after ERCP and CT/ultrasonography determined that disease was largely confined to the distal pancreas. The limit of resection was determined by the extent of the disease but rarely extended to the right of the superior mesenteric vein. It usually included about 40 per cent of the volume of the pancreas. After 1989 the spleen was preserved whenever possible. The pancreas was transected at the proposed site of resection between stay sutures. It was then dissected off the splenic vessels using a combination of fine mosquito forceps and diathermy in a right to left direction towards the splenic hilum, oversewing the branches of the splenic artery and vein with fine vascular sutures. In some patients with very indurated pancreatic parenchyma a thin rim of tissue was left on the splenic vessels to safeguard them. In these patients the pancreatic branches of the splenic artery and vein were oversewn less precisely as they exited this rim of tissue. The transected main pancreatic duct was sutured with non-absorbable Tycron (Ethicon, Edinburgh, UK) or polypropylene, and the stump of the pancreas was oversewn. Patients in whom splenic preservation was not possible underwent a classical distal pancreatectomy. In some of these, three to five slices of splenic tissue, approximately $30 \times 30 \times 3$ mm in size, were autotransplanted into the omentum.

ERCP and CT/ultrasonography reports were examined. Patients were graded at last follow-up on a score of 1–3 for intensity of pain, need for narcotic analgesia and hospital admissions (*Table 1*). An overall score of 3 or 4 was classified as a good result, 5 or 6 as a fair result, and 7, 8 or 9 as a poor result.

Table 1 Method used to score outcome of pancreatectomy for chronic pancreatitis

	Score
Pain	
No pain	1
Infrequent pain not interfering with normal activity	2
Frequent pain limiting normal activity	3
Need for narcotic analgesics	
None	1
Occasional	2
Regular	3
Need for hospital admission	
None	1
Occasional (up to one per year)	2
Multiple	3

Results

Among 38 patients undergoing distal pancreatectomy there were 29 men and nine women, with a mean age of 40 (range 19–68) years. The aetiology of chronic pancreatitis was alcoholic in 23 patients, hereditary in three, idiopathic in one and postobstructive pancreatitis in 11 patients. Sixteen patients had a pseudocyst. They underwent distal pancreatectomy rather than cystoenterostomy because the pseudocysts were associated with obstructive pancreatitis (four patients), or the patient had predominantly distal pancreatitis with cysts that were recurrent (six), intrasplenic or perisplenic (two), or considered too small to contribute to symptoms (four).

ERCP was successful in 35 patients. The investigation failed in three because of technical problems of pancreas divisum (one) or previous Roux-en-Y gastrectomy. CT or ultrasonography was performed on all patients.

Spleen preservation was attempted in 26 patients and was successful in 22 (*Table 2*). The single postoperative death occurred in a severely malnourished alcoholic patient referred with pancreatic ascites and a serum albumin level of 13 g/l. After operation he developed septicaemia but no focal pathology could be identified on CT. Post-mortem examination revealed the presence of an undiscovered subdiaphragmatic abscess around the spleen.

There were three late deaths: one at 5 months after surgery from complications of diabetes, one unrelated death at 17 months and one death from overwhelming post-splenectomy sepsis 61 months after surgery in a diabetic patient who had an autotransplant at the original operation.

Neither Howell–Jolly bodies nor target cells were demonstrated in the postoperative peripheral blood smear of any of the seven patients who underwent splenic autotransplantation.

One patient was lost to follow-up, but the remaining 36 who were discharged from hospital were followed for a median of 48 months. Twenty-three had a good result following distal pancreatectomy which included all 11 patients with postobstructive pancreatitis; four had fair and nine poor results. Outcome was not influenced by the type of operation performed. A comparison between outcome of surgery and aetiology, as well as morphological features documented before operation, is shown in *Table 3*.

Twelve of 36 surviving patients became diabetic at a median of 6 months (mean 22 months; range 1 day to 84 months) after surgery. Seven of these 12 patients were diagnosed as diabetic within 6 months of surgery. All but one underwent splenectomy. Diabetes worsened significantly in one of four patients who were diabetic before operation. The incidence of diabetes was less after spleen-preserving distal pancreatectomy (13·6 per cent) than a

Table 2 Operative details and complications after distal pancreatectomy for chronic pancreatitis

	Distal pancreatectomy and splenic preservation ($n=22$)	Distal pancreatectomy and splenectomy ($n=9$)	Distal pancreatectomy and splenic autotransplantation ($n=7$)
Operative death	1	0	0
Morbidity			
Fluid collection	3	1†	1
Deep vein thrombosis	0	0	1
Transient ischaemic attack	0	1†	0
Pneumonia	0	1†	0
Postoperative diabetes	3	5	4
Results			
Good	14	5	4
Fair	2	0	2
Poor	4	4	1
Lost to follow-up	1	0	0
Follow-up (months)*	34 (7–98)	78 (7–142)	61 (8–108)

*Values are median (range). †All complications occurred in a single patient

Table 3 Factors predicting outcome after distal pancreatectomy for chronic pancreatitis

	Good result ($n=23$)	Fair or poor result ($n=13$)
Aetiology		
Obstructive	11	0
Alcoholic	11	10
Hereditary	1	2
Idiopathic	0	1
Normal proximal duct	17 of 21*	5 of 12†
Pseudocysts	12	4
Duct occlusion	9 of 21*	4 of 12†
Duct stenosis	7 of 21*	5 of 12†
Fistula	2 of 21*	0 of 12†
Diffuse chronic pancreatitis maximal in the tail	2 of 21*	4 of 12†

*Endoscopic retrograde cholangiopancreatography (ERCP) was unsuccessful in two patients; †ERCP was unsuccessful in one patient

traditional operation (57·1 per cent) despite the proportion of patients with postobstructive pancreatitis being similar in each group.

Discussion

Modern imaging techniques help define the extent of pancreatic disease and ductal abnormality in patients with chronic pancreatitis. This study indicated that, despite apparent limitation of pancreatitis to the body and tail of the gland on imaging, patients with alcoholic or hereditary chronic pancreatitis were more likely to have persistent pain after distal resection, suggesting a more diffuse pancreatic involvement at the outset. In contrast, all 11 patients with postobstructive pancreatitis were found to have a good outcome after distal pancreatectomy.

Although the presence of a pseudocyst in the tail of the pancreas increased the likelihood of a good outcome after distal pancreatectomy, this response was not as reliable as suggested by Rattner *et al.*[8]. They reported good results from surgery in all seven patients with pseudocysts in their series of 20 who underwent distal pancreatectomy. Both their study and the present one contain limited numbers of patients.

Patients with diffuse pancreatitis fared poorly compared with those with focal chronic pancreatitis confined to the tail in this as well as other series[9]. An added side-to-side pancreaticojejunostomy to a dilated proximal pancreatic duct probably contributed to an improved outcome after distal resection in one patient with diffuse disease and distal duct occlusion. Such patients will probably benefit from a duodenum-preserving pancreatic head resection as advocated by Beger *et al.*[10], particularly in the presence of a bulky pancreatic head.

Splenic preservation has been advocated by a number of others[11–13]. Warshaw[11] has described a technique of distal pancreatectomy in which splenic vessels are ligated both at the level of transection of the pancreas and again at the splenic hilum, leaving the spleen to survive on blood flow through the vasa brevia. He performed this successfully in all 13 patients with chronic pancreatitis in a series of 25 distal pancreatectomies, although one patient with splenomegaly subsequently developed a splenic abscess. Long-term splenic viability is uncertain with this approach. Others have described techniques whereby the pancreas is dissected off the splenic vessels completely[12,13]. This can be

difficult in many patients with chronic pancreatitis and pseudocysts, in whom pancreatic tissue is often densely adherent to the splenic vein.

Splenic autotransplantation is no substitute for splenic preservation. Patients with viable transplanted splenic tissue capable of red cell scavenging function may still die from overwhelming sepsis, as demonstrated in this and other series[14]. When splenectomy is unavoidable, autotransplantation is reported to restore a degree of immune function[15] and it should therefore be recommended. Patients should still be immunized against *Pneumococcus*, *Haemophilus influenzae* b and *Neisseria meningitidis*, as well as receiving long-term antibiotics[14].

Diabetes developed within 6 months of surgery in seven patients and was exacerbated in one of four who were diabetic beforehand. The incidence of diabetes in patients who underwent splenic preservation was less than that among those in whom traditional distal pancreatectomy was performed even though the proportion of patients with obstructive pancreatitis was similar in both groups. These observations may be premature as numbers were small.

Spleen-preserving distal pancreatectomy, although technically demanding, can be performed safely and has the advantage of reducing the risk of overwhelming postsplenectomy infection. Final proof of the value of this approach awaits a larger study.

References

1 Singer MV, Gyr K, Sarles H. Revised classification of pancreatitis: report of the Second International Symposium on the Classification of Pancreatitis in Marseilles, France, March 28–30, 1984. *Gastroenterology* 1985; **89:** 683–5.

2 Williamson RC, Cooper MJ. Resection in chronic pancreatitis. *Br J Surg* 1987; **74:** 807–12.

3 Frey CF, Suzuki M, Isaji S, Zhu Y. Pancreatic resection for chronic pancreatitis. *Surg Clin North Am* 1989; **69:** 499–528.

4 Cuilleret J, Guillemin G. Surgical management of chronic pancreatitis on the continent of Europe. *World J Surg* 1990; **14:** 11–18.

5 Taylor RH, Bagley FH, Braasch JW, Warren KW. Ductal drainage or resection for chronic pancreatitis. *Am J Surg* 1981; **141:** 28–33.

6 Rossi R, Soeldner J, Braasch JW, Heiss FW, Shea JA, Watkins E Jr *et al.* Long-term results of pancreatic resection and segmental autotransplantation for chronic pancreatitis. *Am J Surg* 1990; **159:** 51–8.

7 Cooper MJ, Williamson RCN. Splenectomy: indications, hazards and alternatives. *Br J Surg* 1984; **71:** 173–80.

8 Rattner DW, Fernandez-del Castillo C, Warshaw AL. Pitfalls of distal pancreatectomy for relief of pain in chronic pancreatitis. *Am J Surg* 1996; **171:** 142–6.

9 Sawyer R, Frey CF. Is there still a role for distal pancreatectomy in surgery for chronic pancreatitis? *Am J Surg* 1994; **168:** 6–9.

10 Beger HG, Buchler M, Bittner R, Oettinger W, Roscher R. Duodenum-preserving resection of the head of the pancreas in severe chronic pancreatitis. Early and late results. *Ann Surg* 1989; **209:** 273–8.

11 Warshaw AL. Conservation of the spleen with distal pancreatectomy. *Arch Surg* 1988; **123:** 550–3.

12 Aldridge MC, Williamson RCN. Distal pancreatectomy with and without splenectomy. *Br J Surg* 1991; **78:** 976–9.

13 Kimura W, Inoue T, Futakawa N, Shinkai H, Han I, Muto T. Spleen-preserving distal pancreatectomy with conservation of the splenic artery and vein. *Surgery* 1996; **120:** 885–90.

14 Moore GE, Stevens RE, Moore EE, Aragon GE. Failure of splenic implants to protect against fatal postsplenectomy infection. *Am J Surg* 1983; **146:** 413–14.

15 Buntain WL, Gould HR. Splenic trauma in children and techniques of splenic salvage. *World J Surg* 1985; **9:** 398–409.

