

SURGICAL DEBATE

Pancreatic pseudocyst should be treated by surgical drainage

B Moran MCh FRCSI*

Surgical Registrar

Royal South Hants Hospital, Southampton

D A Rew MChir FRCS

Lecturer in Surgery

C D Johnson MChir FRCS

Senior Lecturer in Surgery

University Surgical Unit, Southampton General Hospital, Southampton

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This debate reviews the arguments in favour of surgical or non-surgical techniques for the management of pancreatic pseudocysts. Surgery provides definitive management and has a low risk of recurrence; pancreatic resection may be required to achieve this. Surgical treatment of pancreatic pseudocyst is safe, with little morbidity and low mortality, and surgical drainage allows biopsy of the cyst wall to exclude a cystic neoplasm of the pancreas. Percutaneous techniques have the advantage of low morbidity and mortality, with less discomfort to the patient than a surgical incision. In selected patients, a good result can be anticipated. The balance of the evidence suggests that both approaches are useful in different patients. Pseudocyst management should be tailored to each individual case.

A pancreatic pseudocyst is a collection of fluid in the region of the pancreas present for at least 1 month and enclosed by a fibrous tissue wall. Acute fluid collections are not pseudocysts. The fluid contents of a pseudocyst have a high amylase level. Two features differentiate a true cyst from a pseudocyst; a pseudocyst has no epithelial lining and almost always develops after pancreatitis. Occasionally it may arise after blunt abdominal trauma. The aetiology of pancreatic pseudocysts after acute pancreatitis is thought to involve pancreatic parenchymal damage with the development of a communication

Present appointment: Senior Registrar in Surgery, Basingstoke District Hospital

Correspondence to: C D Johnson, University Surgical Unit, F Level, Centre Block, Southampton General Hospital, Tremona Road, Southampton SO9 4XY

between the duct system of the pancreas and the pseudocyst. This relatively uncommon complication of acute pancreatitis is difficult to predict. Management may be conservative, with surgical or percutaneous intervention for pseudocysts which progress or fail to resolve. Pseudocysts complicating chronic pancreatitis have a different aetiology and prognosis and will not be considered. This debate examines the proposition that pseudocysts arising after acute pancreatitis should usually be managed by surgical drainage, on the grounds that the results of percutaneous intervention are often disappointing.

The case for the motion

The necessity for surgical management can be supported by the following arguments:

- 1 Pseudocysts which fail to resolve spontaneously require definitive management to prevent complications;
- 2 Percutaneous aspiration or drainage is followed by a high rate of recurrence;
- 3 Surgical drainage is both effective, with a low rate of recurrence, and safe. Finally, surgical drainage offers the best opportunity to exclude a mistaken diagnosis of cystic neoplasia, and to achieve timely surgical excision in such cases.

It is important to define with care the terms used to describe peripancreatic fluid collections. A prospective computerised tomography (CT) study of 128 patients with acute pancreatitis found that 48 (37%) developed

fluid collections in the pancreatic region (1). The majority of these resolved spontaneously, and should be referred to as 'peripancreatic fluid collections'. Only 21 of these 48 (44%) required operative intervention, for a pseudocyst in 14, for an abscess in four and necrosis in three. A pseudocyst is a fluid collection present for at least 1 month and encapsulated by a wall of granulation tissue and fibrosis. A further CT study documented the clinical course of 75 patients with pancreatic fluid collections (2). A total of 36 (48%) either resolved completely or remained stable and did not require intervention. There are many other studies which show that conservative treatment (that is no treatment) results in spontaneous regression of these fluid collections in approximately 50% of patients and that this can occur up to a time period of 12 weeks (3,4). This debate covers the appropriate management of the persistent pseudocyst after a period of conservative treatment.

The ideal length of the expectant policy and the rate of spontaneous regression are controversial. Bradley *et al.* (5) found that only 20% of pseudocysts regressed within 6 weeks of diagnosis. They randomly allocated the remaining 80% to either intervention or continued observation. They found that 41% of a group of 54 patients randomly allocated at 6 weeks to continue conservative treatment developed pseudocyst rupture, abscess formation or obstruction of the common bile duct, and that only 3% regressed after 6 weeks. As a result of this study (5) several groups have selected patients for intervention at 6 weeks (6-8). What is clear from all is that spontaneous regression is common before this time and early intervention is often unnecessary and may be detrimental.

The therapeutic options for non-regressing pseudocysts can be broadly classified into non-surgical and surgical drainage. Percutaneous aspiration under local anaesthesia and ultrasonographic control is the simplest procedure. However, aspiration of the contents of the pseudocyst does not address the communication with the pancreatic duct, can result in damage to other organs despite the use of ultrasonography (9), can introduce infection and can convert a simple pseudocyst into a life-threatening abscess. Not surprisingly, Imrie and Shearer (4) found that, in a series of 20 patients treated by percutaneous drainage, complete success was achieved only in six (30%).

Percutaneous catheter drainage, leaving an external drain, has some theoretical advantages in that continued drainage can be achieved. However, the technique suffers from the same complications as percutaneous aspiration (namely organ damage and a high failure rate), with the added complication of converting a sinus of the pancreatic duct into an external fistula. The best results have been achieved by a combined percutaneous and endoscopic technique which utilises the principle of surgical 'cystogastrostomy' to place a double pigtail catheter through the lumen of the stomach into the pseudocyst cavity. Using this technique in the simplest type of pseudocyst (retrogastric), Hancke and Henriksen (10) reported an 85% success rate in 30% of patients.

However, this approach does not address the problems of complex cyst cavities, residual necrotic material in the cyst cavity and bleeding.

The optimal management of a pseudocyst is surgical drainage either by a cystogastrostomy or a Roux loop cystojejunostomy. Some pseudocysts, especially those situated in the pancreatic tail may be best treated by pancreatic resection. However, the mortality and morbidity after resection are higher than after surgical drainage (4,11). Adequate internal drainage can usually be achieved and pancreatic exocrine secretions returned to their rightful place within the gastrointestinal tract, albeit through an internal fistula. The other advantages of surgery are that a full laparotomy is possible and other essential surgery such as cholecystectomy or bile duct exploration can be performed. Lastly, a biopsy of the wall of the cavity should always be sent for histological analysis to exclude the occasional case of a true cyst (either a cystadenoma or a cystadenocarcinoma). These tumours may remain unrecognised and untreated if percutaneous aspiration techniques instead of surgery are used in the treatment of 'pseudocysts' of the pancreas.

A recent review of the reported literature (4) comparing surgical drainage with percutaneous techniques demonstrates that the mortality is similar (5% of 605 patients treated by cystogastrostomy or cystojejunostomy compared with 7.4% of 516 patients treated by external drainage) while the recurrence rate is significantly less with surgery (5.5% *vs* 22.9%).

At the present time most patients with acute pancreatitis have diagnostic imaging, often repeated on several occasions in the recovery period. As a result there has been a dramatic increase in the reported incidence of 'pancreatic pseudocyst' and excellent results have been published for percutaneous drainage of fluid collections which have been referred to as 'pseudocysts'. As can be seen from prospective CT imaging, over one-third of patients with acute pancreatitis will develop fluid collections but the majority will resolve with no treatment (1). Even if a pseudocyst develops, approximately 50% will regress spontaneously (2,4). Of course, percutaneous drainage of these fluid collections or pseudocysts will give good results but the treatment is often unnecessary and may result in life-threatening complications.

Many pseudocysts of the pancreas regress spontaneously and improved diagnostic techniques have led to an increase in 'pseudotreatment' using non-surgical techniques. A pseudocyst which is symptomatic or fails to regress requires surgical drainage. This is a safe and reliable technique which has stood the test of time.

The case against the motion

All surgical approaches to pancreatic pseudocysts carry the risk of serious additional morbidity. After acute pancreatitis, patients with pseudocysts are often generally unwell with the sequelae of the acute illness, including intraperitoneal and systemic sepsis, malnourishment and pulmonary impairment. The specific problems

related to surgical management include poor healing of enteric and biliary anastomoses, external fistula formation, and failure to achieve resolution of the cyst. In contrast, percutaneous drainage is to be preferred, because it has a low morbidity and mortality, and achieves high success rates.

In the past, management of pseudocyst has been heavily influenced by the lack of alternatives to open surgery. Now that a choice of management techniques is available, rational management can exploit the advantages of less invasive methods. D'Edigio and Schein (12) reported an empirical clinical and radiological classification based on their experience of 83 cases. They distinguished three groups of patients: Group I ($n=45$): Acute, post-necrotic cyst with normal pancreatic duct anatomy, and rarely with duct-cyst communication. All these patients were cured by percutaneous drainage. Group II ($n=26$): Pathological features included post-necrotic cysts with chronic pancreatitis, abnormal pancreatic duct anatomy without strictures and frequent duct-cyst communication. Percutaneous drainage cured some patients but surgery was usually successful. Group III ($n=12$): Pathological features were chronic retention pseudocysts, strictured pancreatic duct, and duct-cyst communication was always present. In the latter group, percutaneous drainage was contraindicated and surgery was always required to address the specific ductal pathology. In general, if the duct is normal, percutaneous drainage will probably be successful, but internal drainage is usually required for cysts associated with strictures of the main pancreatic duct (13).

Alternatives to surgical drainage

Non-invasive treatment may be either curative or palliative. In the latter case, it may be used to buy time and clinical improvement pending definitive surgery. Clinical trials to establish optimum therapy are difficult to organise because of the rarity and varied presentation of pancreatic pseudocysts.

Non-intervention

Spontaneous resolution is documented, and delayed intervention for at least 6 weeks is justified if the clinical situation is stable. For example, Duclos *et al.* (14) reported that four of 33 cysts resolved with no treatment. Bradley *et al.* (5) noted a spontaneous resolution rate of 20% of cases up to 6 weeks, but much less thereafter. The rate of complications (rupture, abscess formation, biliary obstruction) increased after 6 weeks. Imrie and Shearer (4) suggested that this period could be safely extended to 12 weeks, although larger cysts (median size 10×7 cm) had a higher complication rate. One retrospective comparison of primary surgery and expectant management favoured delay in intervention as initial management (15). Of 46 patients operated on early, 26% had complications. In contrast, 68 patients were managed conservatively, with severe complications in only six (9%). Elective surgery was required in 19 of

these patients, with a low complication rate. Large cysts (>10 cm) resolved spontaneously in half the cases. The first step in management of a pancreatic pseudocyst should therefore be to decide to observe the progress of the patient, unless the cyst is symptomatic.

Percutaneous drainage

Percutaneous drainage (PCD) is the mainstay of non-surgical treatments. It can be performed under ultrasonographic or computerised tomographic control, using a variety of catheters and drains. It is relatively free of complications and can be performed under local anaesthesia at the bedside, on the intensive care unit or in the radiology department.

The recent literature suggests that approximately 70% of patients will be spared laparotomy by PCD (16). Karnel *et al.* (17) reported that 27 of 35 patients recovered without surgery; after PCD of a pseudocyst, only eight required subsequent internal drainage. Gumaste and Dave (18) reported that the recurrence rate of PCD is high after needle aspiration, but this can be reduced to less than 10% using indwelling catheters.

Pseudocysts in children are rare, but non-invasive techniques are particularly appropriate. Korman *et al.* (19) reported rapid resolution of a pseudocyst in a 6-year-old girl after PCD. Burnweit *et al.* (20) reported that only four of 13 children with cysts required surgery. Five resolved with PCD and the remainder resolved spontaneously.

Somatostatin analogues

Cysts have secretory and inflammatory components in varying degrees. Reduction of the pancreatic secretory activity is an attractive option to help heal secretory cysts. Gullo and Barbara (21) reported the successful treatment of four of seven patients with the synthetic somatostatin analogue octreotide in a small uncontrolled trial. They achieved a mean 42% reduction in cyst size and abolition of pain. Barkin *et al.* (22) reported successful treatment with octreotide in three patients who had previously suffered prolonged catheter drainage after PCD.

Endoscopic approaches

Endoscopy is a new route to cyst drainage (9,10). A gastrocystostomy may be created by direct puncture under vision (23) or a double-channel fistulotomy may be used for endoscopic drainage (24). Combined endoscopic and PCD placement manoeuvres are also feasible. These anecdotal case reports need to be supplemented by larger series. It is interesting to speculate whether modern laparoscopic techniques may have a role in pseudocyst treatment.

Difficult pseudocysts

Size alone should not be taken as an indication for internal surgical drainage, as larger cysts may be associated with greater morbidity (25). Of four patients with giant cysts, three died after internal drainage (25), and it is likely that less invasive external drainage of giant cysts might be safer than cystogastrostomy. Larger cysts may require earlier intervention because of mechanical effects, particularly gastric and duodenal outflow obstruction and in these circumstances PCD is preferable to early surgery.

Pancreatic pseudocysts have been reported in unusual sites such as the posterior mediastinum. An unusual location may be a relative contraindication to PCD, although surgery in these cases is also likely to be difficult.

Even presentation with severe haemorrhage; requiring direct control, does not necessarily require surgery. El Hamel *et al.* (26) reported severe haemorrhage in 15 patients with pseudocysts complicating chronic pancreatitis. Of five patients, two died after emergency surgery. A less hazardous alternative to surgery is angiographic transcatheter embolisation of bleeding vessels and subsequent percutaneous management of the cyst (27).

In conclusion, the statement that all pancreatic pseudocysts should be treated by surgical drainage is untenable. There is now good evidence that up to 70% of patients with pseudocysts may avoid the additional morbidity of open surgery by initial recourse to percutaneous drainage. Primary treatment for many pancreatic pseudocysts should evolve towards less invasive methods, particularly percutaneous drainage, in association with antisecretory agents such as octreotide. Management should be multidisciplinary, with early involvement of endoscopists and interventional trained radiologists. The treatment pattern in any one hospital should reflect optimum utilisation of available skills, with regular joint case conferences to co-ordinate management.

Chairman's comments

This debate illustrates the difficulty in formulating precise guidelines for management of a relatively rare complication of acute pancreatitis. The difficulty is compounded by confusion in many reports between pseudocysts which complicate acute and chronic pancreatitis, and the different prognosis which follows pseudocysts with alcoholic or biliary aetiology. In general, however, management plans based on cyst size, duration and duct anatomy can be applied to cysts of various aetiology on a pragmatic basis. Many pseudocysts can be dealt with satisfactorily by either surgical or percutaneous methods, and the mortality with both techniques is equally low. However, the recurrence rate after percutaneous drainage is much higher.

The essential is clearly to establish whether the peripancreatic fluid collection will persist or resolve spontaneously. Intervention should therefore be delayed if at all

possible for 6 weeks. Earlier intervention may be necessary if the pseudocyst is expanding or symptomatic. The decision on management at that time should take account of other features, such as the need for surgical management of gallstones or peripancreatic and pancreatic necrosis. In the absence of an indication for surgery, early intervention should be percutaneous in the first instance.

A mature pseudocyst present for 3 months is unlikely to resolve (4), and should be dealt with before the development of complications. Surgical drainage is the most satisfactory intervention, but it can be argued that, if local expertise is available, percutaneous drainage offers some patients a chance of cure without the need for surgery.

The selection of patients for percutaneous drainage, and referral for surgery of those with a high risk of recurrence after percutaneous drainage is clearly important. This depends on the anatomy of the pancreatic duct and the presence of communication with the cyst. ERCP is therefore essential in making a rational decision (12,13). CT is also essential to demonstrate the anatomical relationship of the cyst, and to determine the extent of pancreatic necrosis. CT will also demonstrate other disease which might require surgery, such as chronic pancreatitis or pancreatic cancer.

The management plan for a pseudocyst should include careful anatomical delineation of the cyst with CT, followed by ERCP to define pancreatic duct anatomy and communications. If the pancreatic duct is normal, the cyst is suitable for percutaneous drainage, but failure to fill all the duct, or any abnormality or leakage from the duct should lead to surgical management of the pseudocyst. The patient should be prepared for surgery within 24 h of ERCP to avoid conversion to an abscess by bacterial contamination of the cyst. ERCP should be covered by prophylactic antibiotics, and the decision for definitive management should be taken immediately.

In the presence of a simple cyst and normal pancreatic duct, percutaneous drainage is likely to be successful. Complicated cysts, and cysts associated with abnormal pancreatic ducts are likely to recur after percutaneous drainage and require internal surgical drainage. The surgical plan of management should include treatment of any underlying biliary or pancreatic disease.

This plan of management requires that patients should be managed in a centre where appropriate radiological, endoscopic and surgical expertise are available, and where definitive surgery can be carried out immediately after endoscopic diagnosis. Management of patients in such centres will serve to concentrate experience of this relatively rare problem in appropriate hands, and will allow the best management plan to be formulated for each individual patient.

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