

# Is There Still an Indication for Pancreatic Duct Drainage in Chronic Pancreatitis?



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Although pain is the dominating problem in patients with chronic pancreatitis it cannot be grasped with any grade of scientific precision. Still it is the degree and duration of pain relief which determines if a given treatment will be successful or not. If a therapeutic measure is based on established pathophysiological mechanisms the chances of success, of course, will increase. Surgical treatment for pain in chronic pancreatitis is either aiming at resection of inflammatory pancreatic tissue, reduction of duct-tissue pressure or a combination of these two tentative causative mechanisms. The aim of this paper was to discuss the evidence for a relationship between pancreatic duct/tissue hypertension and pain and its possible impact on the choice of operation for pain in chronic pancreatitis.

## Evidence for a possible connection between duct-tissue hypertension and pain

It is universally agreed that pain in chronic pancreatitis is of multifactorial origin (1). Increased duct-tissue hypertension is a common explanation and recently the concept of so called 'pancreatitis-associated neuritis' was introduced (2). The latter implies a comparative increase in the number of sensory nerves in inflammatory tissue, round cell infiltration and a striking disintegration of the perineurium, allowing an unimpeded influx of pain mediators and active pancreatic enzymes. It seems reasonable to assume that the two mechanisms could work together if the increased tissue pressure facilitates the influx of pain transmitters through the damaged perineurium.

Even if surgical duct drainage procedures were introduced during the 1950s (3-6) the first indications of increased ductal pressure in painful chronic pancreatitis were not reported on until 1982 (7). Since then, however, conclusive support for this theory has appeared in the

## Abstract

*Pain in chronic pancreatitis is supposed to be multifactorial in origin. Pancreatic duct/tissue hypertension is today proved in patients with chronic pancreatitis and pain. Duct drainage reportedly normalizes pancreatic duct/tissue pressure and reduces pain in 70 % of the patients. Also, duct drainage by endoscopy may relieve pain. Surgical duct decompression is parenchyma-preserving and even suggested to prevent further progress of exocrine insufficiency. Recent experience indicates that such operations are pain-relieving not only in patients with dilated ducts but also in those with small duct disease.*  
Key words: Chronic pancreatitis, duct drainage.

## Riassunto

### NELLA PANCREATITE CRONICA IL DRENAGGIO DUTTALE E ANCORA CONSIGLIABILE

*Il dolore nella pancreatite cronica è riconosciuto essere di origine multifattoriale. L'ipertensione intrapancreatica e del dotto pancreatico è stata dimostrata in pazienti con pancreatite cronica e dolore. Il drenaggio duttale sembra normalizzare la pressione intrapancreatica ed intraduttale riducendo il dolore nel 70% dei pazienti. Anche il drenaggio endoscopico del dotto pancreatico appare in grado di risolvere il dolore. La decompressione chirurgica del dotto mantiene l'integrità del parenchima ed inoltre è suggerita per la prevenzione della probabile successiva insufficienza esocrina pancreaticata. L'esperienza recente indica queste opzioni terapeutiche migliorano la sintomatologia dolorosa non solo nei pazienti che presentano una marcata dilatazione duttale, ma anche in quelli con piccola malattia del dotto.*  
Parole chiave: Pancreatite cronica, drenaggio duttale.

literature. The initial 1982 study by Bradley et al (7) compared intraoperative pressure measurements in patients with painful pancreatitis with endoscopic studies in individuals without evidence of pancreatic disease. A significantly increased duct pressure was found in pancreatitis. Sato and associates (8) reported a mean ductal perfusion pressure of 38 cm H<sub>2</sub>O and residual pressure of 22 cm H<sub>2</sub>O in pancreatitis the corresponding figures in controls being 15 and 8 cm H<sub>2</sub>O, respectively. Similarly, Madsen and Winkler (9) found high ductal

pressure as measured in pancreatic patients undergoing surgery. Okazaki et al (10) using endoscopic technique observed higher duct pressure in chronic pancreatitis (42 mmHg) than in controls (16 mmHg) and demonstrated higher values in patients with pain than in those without. Danish researchers have introduced a technique for measurement of pancreatic tissue fluid pressure to be used both intraoperatively and percutaneously, the latter guided by ultrasonography. Patients with pancreatitis had in their series higher pressures than subjects without known pancreatic disease (11). After surgical duct drainage in pancreatitis patients the tissue fluid pressure fell to normal values already as measured during the laparotomy. At follow-up studies by the percutaneous technique after 6 months painfree patients had normal pancreatic tissue pressure whereas those with renewed pain had regained hypertension (12). Jalleh et al (13) using the same technique for intraoperative pressure measurements, confirmed the presence of increased tissue pressure in patients with chronic pancreatitis and pain. They also pondered on a compartment syndrome-like mechanism as a possible contributing factor for pain considering the reduced tissue compliance due to the parenchymal fibrosis which prevents the gland from expanding to accommodate the increased volume created during secretory activity. The group of Reber has provided experimental evidence supporting the idea that the pancreas in chronic pancreatitis behaves like a closed compartment (14). They demonstrated that ductal and tissue hypertension was associated with reduced blood flow and that duct decompression restored the circulation to normal values. Thus, they concluded that ischemia may play a role in the pathophysiology and pain generation in chronic pancreatitis (14).

Against the above backdrop it seems evident that pancreatic duct-tissue pressure is increased in chronic pancreatitis. This appears to be the case regardless of the etiology and whether or not the main pancreatic duct is dilated (14). The connection between gland hypertension and pain has been investigated both in patients and experimentally and the results suggest such a connection as one cause of pancreatic pain. There are, furthermore, indirect evidence based on the achievement of pain relief by other treatments aiming at reduction of duct-tissue hypertension, such as endoscopic drainage and oral pancreatic enzymes (15, 16). Considering what is said above there is an increasing piling-up of theoretical support for duct drainage as a sensible approach in chronic pancreatitis.

### Assessment of the patient with pain due to chronic pancreatitis

Pancreatic pain is primarily associated with the dynamics of the disorder rather than being a static situation. Except duct-tissue hypertension discussed above other dynamic

events which tentatively may cause pain are e.g. inflammatory episodes, acute necrosis, scar formation and expanding pseudocysts. As soon as the scar formation is completed and the pseudocyst stable etc there is not necessary any pain left. This would explain the poor correlation between pancreatic pain and morphology, be it by imaging, gross inspection or histology. Therefore, the history of the patient is the most important platform when a decision is made to treat pain in chronic pancreatitis surgically. Still a proper diagnostic work-up is mandatory as imaging of the gland and the duct system by computerized tomography (CT), magnetic resonance cholangiopancreatography (MRCP) or endoscopic retrograde cholangiopancreatography (ERCP) are necessary to guide the surgeon in selecting the operative method.

### Operations for duct drainage

Cattell (17) was the first who applied himself to surgical duct drainage when he in 1947 anastomosed the jejunum to the pancreatic duct in a patient with pain due to pancreatic cancer. After resection of a small portion of the tail Du Val (3) and Zollinger et al (19) in 1954 reported the technique for retrograde or caudal drainage of the pancreatic duct. Puestow et al (5) in 1958 advocated a wider opening of the duct anteriorly as they often found multiple strictures (chain-of-lakes). The tail and body of the gland with the opened-up duct was stuffed into a Roux-loop. In 1960, Partington and Rochelle (6) described the lateral side-to-side pancreaticojejunostomy saving the spleen and all gland tissue. This allowed the duct to be unroofed for a longer distance. Frey and Smith (18) introduced another modification implying coring out of the anterior part of the pancreatic head in addition to the unroofing of the duct in the body and tail. This approach facilitates an adequate drainage of the main duct also in the head and the duct of the uncinate process which otherwise is difficult to achieve due to the posterior location of these ducts.

Beger (19) recently reported his huge experience with the duodenum-preserving pancreatic head resection (DPPHR) which required additional pancreaticojejunostomy in 46 of 504 patients (9 %) to obtain adequate drainage of the body and tail.

Some authors (20) have practised pancreaticogastrostomy in fairly small patient series. This technique is, however, not suited for longer unroofing of the pancreatic duct. The surgical techniques have, as illustrated above, since the 1950s been continuously developed to achieve an increasingly improved drainage of the pancreatic duct system. Still stenoses and obstructions in secondary and tertiary duct branches are not amendable to surgical drainage. This may be one explanation of treatment failure, another one being that the cause of pain is not duct-tissue hypertension but rather one of those

Tab. I – EFFECT OF PANCREATICOJEJUNOSTOMY ON ABDOMINAL PAIN IN PATIENTS WITH CHRONIC PANCREATITIS

Authors	No. of patients	Pain relief (%) Complete or partial	Duration of follow-up period	Hospital mortality (%)
Prinz and Greenlee (21), 1981	86	72	8 yr	4
Taylor et al (22), 1981	20	50	5 yr	0
Hart et al (23), 1983	75	63	4 yr	4
Brinton et al (24), 1984	39	85	2-15 yr	–
Morrow et al (25), 1984	46	80	7 yr	0
Holmberg et al (26), 1985	51	72	8 yr	0
Sato et al (8), 1986	43	100	6 mo	0
Bradley (27), 1987	46	66	7 yr	0
Wilson et al (28), 1992	20	76	5 yr	0
Adams et al (29), 1994	62	80	6 yr	0

alternative causes discussed above. As is true for pancreatic resection also surgical duct drainage procedures need to be performed by experienced pancreatic surgeons to guarantee a good outcome. Overall, modern techniques of surgical duct drainage, if properly done, have a great potential to relieve pain in selected patients with chronic pancreatitis.

### Results of duct decompression

In patients with chronic pancreatitis a side-to-side pancreaticojejunostomy is associated with a longlasting pain relief in 60% to 80% with minimal perioperative mortality (Tab. I). This is comparable to what is reported for pancreaticoduodenectomy (30). However, in their big series undergoing DPPHR Beger et al (19) found 91% to be pain-free after in average 6 years. Lateral pancreaticojejunostomy was as mentioned above done in addition to the DPPHR in 9% of these patients. Practising their extended pancreaticojejunostomy Frey and Amikura (31) followed 47 patients for an average of 37 months and found complete or partial pain relief in 87 %. Thus, it seems as if these new techniques (19, 31) confer somewhat better pain relieving effects. However, these achievements need to be supported by more studies from other centers. Still, the lateral pancreaticojejunostomy is followed by good longterm outcome besides being fully parenchyma-preserving and associated with very low morbidity and mortality rates.

### Current indications of duct decompression

Ductal dilatation has been considered a strict requirement for duct drainage operations in chronic pancreatitis. However, it has been clearly demonstrated that patients without ductal dilatation can have incapacitating pain and the frequency of dilatation is the same in patients with and without pain (32, 33). In addition, there is no

association between ductal pressure and the degree of ductal abnormality at ERCP and ductal hypertension is demonstrated also in patients with 'small duct disease' (10, 34). Therefore, duct decompression today is recommended not only in patients with dilated duct (> 8 mm) but also in those with a duct diameter of 5 mm or more (35) as favourable results have been reported also in this subgroup of patients (28, 36).

An advantage of pancreaticojejunostomy is that it preserves as much exocrine and endocrine function as possible by being parenchyma-saving. It has also been claimed that the operation protects the gland to further progressive functional deterioration (13, 37).

In summary, there is still an indication for duct drainage in painful chronic pancreatitis irrespective of duct diameter but the operation can be expected to be successful only if the cause of pain is duct-tissue hypertension. Being parenchyma-saving it preserves pancreatic function and may even prevent further functional impairment. The operation is associated with very low hospital mortality and postoperative complication rates.

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