Transpapillary drainage of walled-off pancreatic necrosis – a single center experience

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Abstract

Introduction: *Walled-off pancreatic necrosis (WOPN) often coexists with disruption of the main pancreatic duct that manifests as a leak of contrast medium into the necrotic collection during endoscopic retrograde pancreatography.*
Aim: *To assess the efficacy and safety of treatment of patients with symptomatic WOPN and disruption of the main pancreatic duct, who underwent endoscopic transpapillary drainage as the only access to the necrosis cavity.*
Material and methods: *In 22 patients with symptomatic WOPN, active endoscopic transpapillary drainage was performed. During endoscopic retrograde pancreatography (ERP), partial disruption of the main pancreatic duct was observed in 14 patients and complete disruption in 8 patients. After the active drainage was finished, a transpapillary pancreatic stent was inserted into the main pancreatic duct, which was later exchanged after 6, 12 and 24 months or when no extravasation of contrast from the pancreatic duct was observed. The results of treatment and complications were compared retrospectively.*
Results: *The mean duration of active drainage was 22 (range: 7–94) days. Complications of endotherapy occurred in 3/22 patients. The mean time of the main pancreatic duct stenting was 304 (range: 85–519) days. Success of endoscopic treatment of WOPN and pancreatic duct disruption was achieved in 20/22 patients. During a 1-year follow-up, recurrence of the collection was noted in 4/20 patients. Long-term success was achieved in 16/22 patients.*
Conclusions: *In patients with WOPN who cannot undergo transmural drainage when there is a communication between the necrotic collection and the main pancreatic duct, transpapillary access may be an effective and safe method of treatment.*

Key words: *endoscopic drainage/debridement, transpapillary drainage/debridement, disconnected pancreatic duct syndrome, walled-off pancreatic necrosis, acute pancreatitis.*

Introduction

Walled-off pancreatic necrosis (WOPN) is diagnosed in about 15% of patients with a severe bout of acute pancreatitis [1], and it often coexists with disruption of the main pancreatic duct (PD) that manifests as a leak of contrast medium into the necrotic collection during endoscopic retrograde pancreatography (ERP) [2]. Partial PD disruption is an extravasation of contrast medium from the ductal system with opacification of the PD upstream to the site of disruption [3]. Complete PD disruption is a leak of contrast medium from the PD with no visualization of the PD upstream to the leak [4].

In recent years an improvement of treatment results in the early phase of acute pancreatitis allows therapy of acute necrotizing pancreatitis consequences to be delayed until the necrosis is encapsulated and liquefied to form WOPN [5]. During the last two decades there has been constant develop-

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ment of minimally invasive techniques of treatment of acute necrotizing pancreatitis consequences [6–11]. Minimal invasive methods of WOPN treatment enable transperitoneal, retroperitoneal, transmural or transpapillary access to the necrosis [7, 8]. Moreover, such methods result in better outcomes as well as in higher safety in comparison to classical surgical treatment [12, 13]. The dilation of an access to necrosis by use of a few techniques at the same time makes the drainage conditions better ("step-up approach") [6, 9]. Endoscopic treatment of WOPN is based on transpapillary or transmural (through the stomach or duodenal wall) drainage, or a combination of both access methods.

In our study we present the results of treatment of 22 patients with symptomatic WOPN and PD disruption who underwent endoscopic transpapillary drainage as the only access route to necrosis cavity. The results of treatment and the complication rate were compared retrospectively.

Aim

The aim was to assess the efficacy and safety of treatment in patients with symptomatic WOPN and disruption of the main pancreatic duct, who underwent endoscopic transpapillary drainage as the only access to the necrosis cavity.

Material and methods

Between 2001 and 2013 in our center 176 patients (125 men, 51 women, mean age: 52.28 years) with symptomatic WOPN underwent endoscopic treatment. The patients were qualified for endoscopic drainage on the basis of clinical symptoms connected with the presence of necrotic collection and the result of abdominal contrast-enhanced computed tomography (CECT). Between 2001 and 2011 endoscopic procedures were performed using Pentax ED 2485K and Pentax ED3440T duodenoscopes, and between 2011 and 2013 with Pentax ED3490TK and Pentax EG3870UTK. Transmural drainage was performed in 149 patients. In 148/176 (84.09%) patients the main pancreatic duct was opacified during ERP. In the case of the remaining 28 patients attempts of PD deep cannulation were ineffective due to the presence of necrotic collection in the pancreatic head. Twenty-seven patients did not undergo transmural drainage because of the distance between the gastrointestinal wall and the collection's wall exceeding 1 cm. In this group of patients those with extravasation of contrast from the PD to WOPN observed during ERP were qualified for transpapillary drainage (Photos 1 A–E). In the case of 22 patients transpapillary drainage was the only access to the necrotic collection (Table I) and in 5 transpapillary drainage was combined with percutaneous drainage. In a group of patients who underwent transpapillary drainage, sphincterotomy was performed (Olympus FlowCut KD-301Q0725 sphincterotome) during ERP. Then after mechanical dilation of the PD with a bougie dilator 7 Fr, 8.5 Fr or 10 Fr (Wilson-Cook) in 19/22 patients a transpapillary nasal drain (7 Fr or 8.5 Fr Balton or Wilson-Cook) and pancreatic stent (5–10 Fr Geenen or Zimmon Pancreatic Stent, Wilson-Cook and Medical Inc.) were inserted (Photos 2 A–C), and in 3/22 patients only a transpapillary nasal drain was used. In 18/22 patients the distal tip of the nasal drain was placed in the collection's lumen and in 4/22 patients the drain was bridging the PD disruption. A sample of the collection's contents was taken for microbiological examination and amylase activity assessment. The diagnosis of WOPN was based on morphology of aspired fluid – dark brown color with visible fragments of necrotic tissues (debris). The necrotic collection was irrigated through a nasocystic drain with saline solution (60–200 ml) every 2 h during the first 48 h and every 4 h in the subsequent days. All patients received antibiotics (ciprofloxacin or ceftriaxone with metronidazole) before the procedure. Routinely antibiotic therapy was continued for 2 weeks. In the case of clinical symptoms indicating infection of the collection antibiotic treatment was prolonged or microbial culture with antibiogram of fluid from the collection was repeated. The size of the WOPN was evaluated every 7 days on the basis of abdominal ultrasonography (USG) in the majority of patients. Abdominal CECT was performed to confirm complete regression of the collection. Active drainage was stopped when clinical symptoms disappeared and the collection size was < 3 cm (initial success).

After the termination of active drainage, a pancreatic stent was placed in the PD, which was later exchanged after 6, 12 and 24 months or when no extravasation of contrast from the PD was observed. Long-term success was defined as a lack of clinical symptoms, lack of contrast extravasation from the PD and size of the collection < 3 cm in abdominal

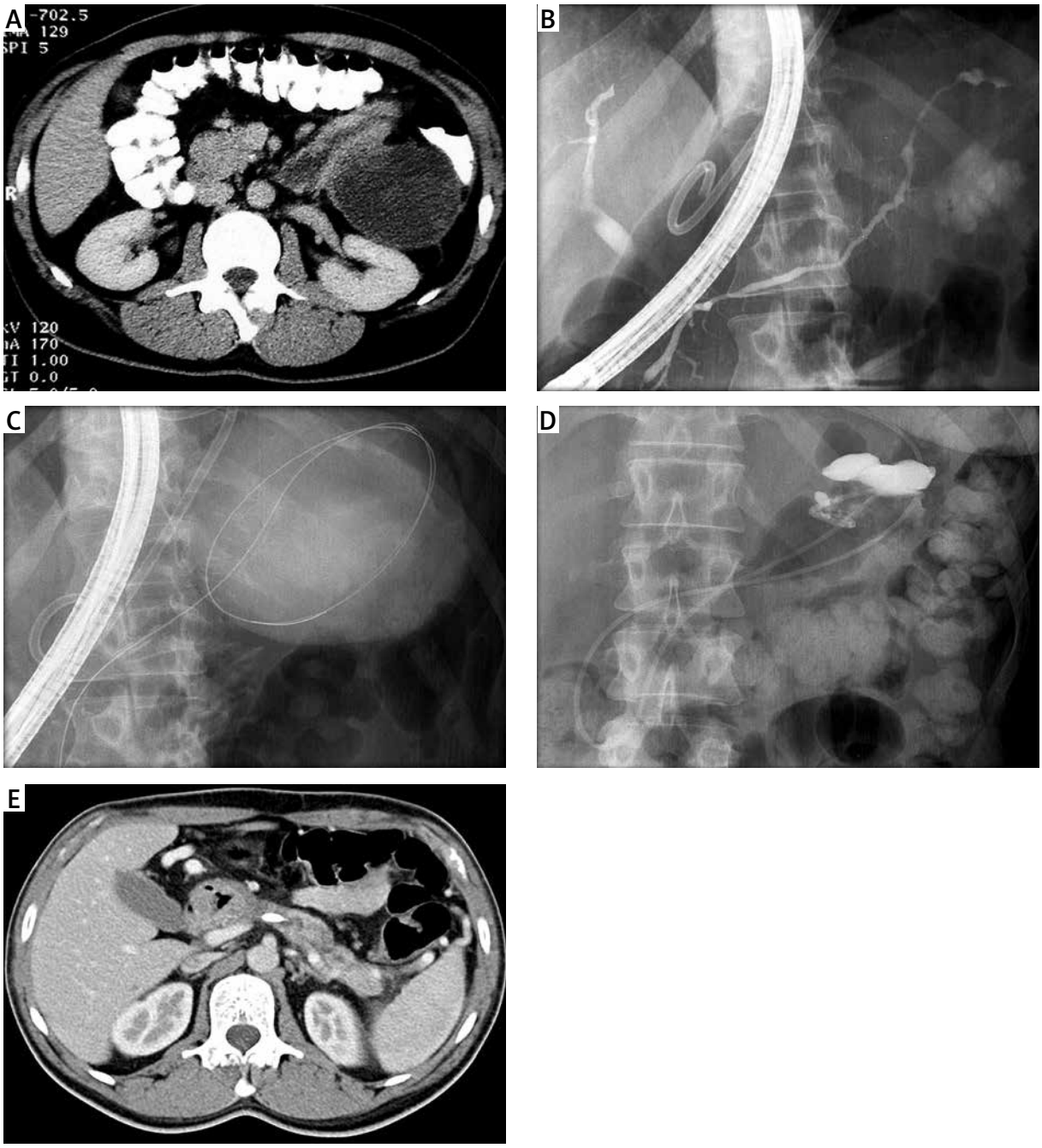

Photo 1. A – Abdominal contrast-enhanced computed tomography (CECT) of a 40-year-old woman performed 20 weeks after an acute bout of pancreatitis. Walled-off pancreatic necrosis (WOPN) is visible in the pancreatic tail. **B** – Endoscopic retrograde pancreatography (ERP) reveals contrast leak to the necrosis collection in the region of the pancreatic tail. In the stomach a "double pigtail" stent, which was removed from the bile ducts, is visible. **C** – A guide-wire introduced into the main pancreatic duct loops in the cavity of the necrosis collection. **D** – A nasal drain was inserted into the main pancreatic duct. Its distal tip is placed in the collection's cavity. **E** – Abdominal contrast-enhanced computed tomography performed 12 months after the end of active drainage. In the main pancreatic duct a transpapillary pancreatic stent is visible

Table I. Characteristics of the patients (n = 22) with walled-off pancreatic necrosis (WOPN) who underwent endotherapy

Parameter	Result
Age, mean (range) [years]	50.68 (33–84)
Gender, men, *n* (%)	15 (68.2)
Time since acute bout of pancreatitis, mean (range) [weeks]	16 (5–50)
Etiology, *n* (%):	
Alcoholic	15 (68.2)
Non-alcoholic	7 (31.8)
WOPN size, mean (range) [cm]	8.03 (5.5–17.3)
WOPN type:	
Central necrosis (pancreatic)	13
Mixed necrosis (pancreatic and peripancreatic)	9
Percent of necrosis:	
25–50%	10
50–75%	9
> 75%	3
Localization of pancreatic fluid collection, *n*:	
Pancreatic head	1
Pancreatic body	1
Pancreatic tail	15
Whole pancreas	5
Main symptoms connected with WOPN, *n*:	
Abdominal pain	20
Jaundice	5
Gastrointestinal obstruction	2
Weight loss	7

CECT during a 1-year follow-up from the end of active drainage.

Results

Twenty-two patients (7 women and 15 men, mean age 50.68 years) with symptomatic WOPN underwent endoscopic transpapillary drainage. Therapeutic success was achieved in 20/22 patients. In 2/22 patients clinical symptoms connected with WOPN disappeared, but the size of the collection in imaging studies exceeded 3 cm (Figure 1).

In all patients ERP was performed. Partial PD disruption was observed in 14 patients and complete PD disruption in 8 patients. In 6/8 patients with complete PD disruption disconnected pancreatic duct syndrome (DPDS) was diagnosed on the basis of abdominal CECT.

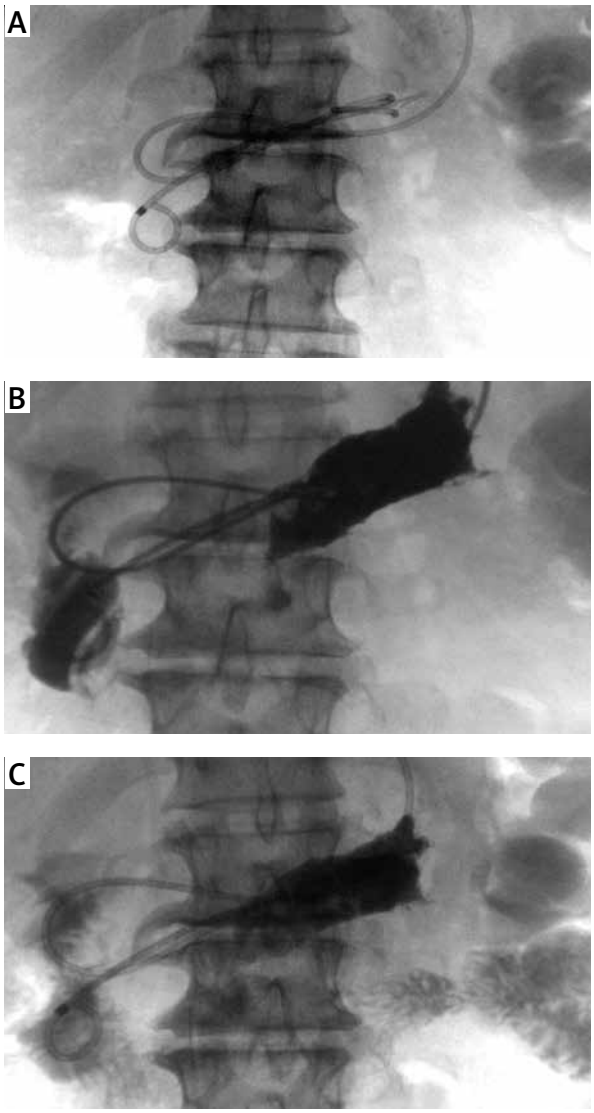

Photo 2. A – A 64-year-old woman with central walled-off pancreatic necrosis (WOPN). A nasal drain and a pancreatic stent that were introduced transpapillarly into the main pancreatic duct are visible. The distal tip of the drain and stent are in the collection's cavity. **B**, **C** – Contrast medium injected via nasal drain fills the necrosis collection's cavity and then flows freely to the duodenum

The mean number of endoscopic procedures in 1 patient was 3.4 (range: 2–9). Active drainage was conducted for a mean time of 22 days (range: 7–94 days).

Complications of endotherapy in the form of gastrointestinal bleeding occurred in 3/22 patients. All the patients were treated conservatively with red blood cell transfusions.

After the end of active drainage all patients had a stent placed in the PD. In 12/22 patients the stent was bridging the site of PD leakage. In 10/22 patients the distal tip of the stent was proximal to the site of PD disruption. The mean time of stenting was 304 (range: 85–519) days.

In 12/14 patients with partial PD disruption that was bridged with a stent, the PD was normal after the end of therapy. In the remaining 2/14 patients who had the distal tip of the stent proximal to the site of PD leakage, there was also no contrast extravasation observed during the consecutive ERP examinations. In a group of 8 patients with complete PD disruption who had the distal tip of the stent proximal to the site of PD leakage, after the end of therapy 1 had the whole PD opacified, 5 had a fragment of the PD opacified without extravasation of contrast medium from the ductal system, and 2 had persistent PD leakage.

During a 1-year follow-up 4/20 patients had a recurrence of the collection. In all those 4 patients imaging studies performed before the beginning of drainage revealed disconnected pancreatic duct syndrome (DPDS). Two patients with recurrent pancreatic fluid collection (PFC) underwent endoscopic transmural drainage. The other 2 were treated surgically.

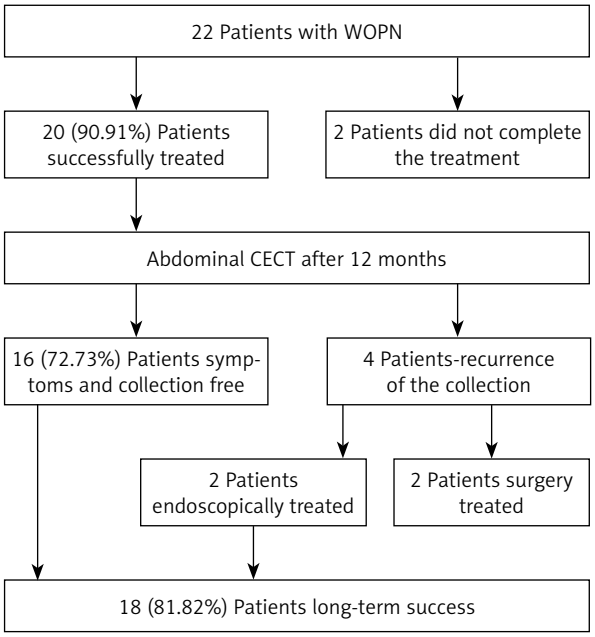

Figure 1. The scheme presents the results of treatment in patients with walled-off pancreatic necrosis (WOPN) who underwent transpapillary endoscopic drainage

Discussion

During the last 30 years there have been many studies published that concerned the effectiveness of endoscopic transpapillary drainage of pancreatic pseudocysts [10, 14, 15]. Reports regarding the use of transpapillary drainage as the only access to pancreatic necrosis are rare in the literature. When Baron *et al.* [16] published the results of endoscopic therapy of WOPN, they reported that transpapillary drainage as the only access to necrosis was used in 1 of 11 patients and in a study by Papachristou *et al.* [17] it was used only in 1 of 53 patients. Much more often transpapillary drainage is used in combination with transmural and percutaneous drainage as an element of multiple access to the necrosis cavity ("step-up approach") [2].

Transpapillary drainage can be an effective method of treatment when there are no conditions to perform transmural drainage and the pancreatic fluid collection (PFC) communicates with the PD, especially when the size of the PFC does not exceed 6 cm [18]. Bhasin *et al.* stated that also in the case of pseudocysts larger than 6 cm in diameter localized in the pancreatic tail, transpapillary drainage can be an effective method of therapy that does not increase the risk of PFC infection [19]. In some patients with pseudocyst and PD disruption passive transpapillary drainage (PD stenting) can lead to a complete cure [20]. In our study the lack of conditions to perform transmural drainage (the distance between the gastroduodenal wall and the necrotic collection exceeding 1 cm) and communication of the necrotic collection with the PD were the basis for qualification for transpapillary drainage. The mean size of the necrotic collection was 8 cm. In the majority of patients it was localized in the pancreatic tail and the distal tip of the nasal drain bridging the PD disruption was placed in the collection's lumen. However, because of necrotic tissues in the collection ("solid debris") the results of endoscopic drainage are worse for WOPN than for pseudocysts, which makes comparison of the two groups of patients difficult. Baron *et al.* achieved therapeutic success with endoscopic drainage in 92% of patients with pseudocysts and 72% of patients with WOPN [21].

Endotherapy is an effective method of treatment for PD disruptions [4, 20]. Varadarajulu *et al.* found that endotherapy is more effective in the case of partial PD disruption (45/60 patients – 75%) in comparison to complete PD disruption (6/23 patients – 26%), especially when the stent is bridging the disruption site [4]. Similar results were obtained in a study by Shrode *et al.* [20]. In our work we managed to bridge the PD disruption in all patients with partial disruption and achieve long-term therapeutic success after the end of active drainage. In a group of patients with complete PD disruption therapeutic success was achieved in 6/8 (75%) patients.

In the first description of treatment of patients with DPDS, Deviere *et al.* stated that endotherapy is both effective and safe [22]. Lawrence *et al.* presented the results of endotherapy of 30 patients with PFC and DPDS, who had a high rate of PFC recurrence in the region of PD disruption (11/22 patients – 50%) despite the initial therapeutic success observed in 22/29 (76%) patients [23]. In our study disconnected pancreas (disconnected gland syndrome) was diagnosed in 6 patients with complete PD disruption. Initial therapeutic success was observed in 5/6 (83%) patients, but during a one-year follow-up PFC recurrence was observed in 4/5 (80%) patients.

Conclusions

The results of our study indicate that in patients with WOPN communicating with the PD, who cannot undergo transmural drainage, transpapillary drainage can be an effective and safe method of treatment, especially if the PFC is localized in the region of the pancreatic tail. Endoscopic therapy is more effective in patients with partial PD disruption in comparison to patients who have complete PD disruption. In our work the diagnosis of DPDS was associated with a high risk of PFC recurrence.

Conflict of interest

The authors declare no conflict of interest.

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