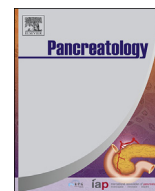




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Long-term results after endoscopic drainage of pancreatic pseudocysts: A single-center experience

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ABSTRACT

Background: Pancreatic pseudocysts (PPC) are collections of fluid encapsulated within a well-defined inflammatory wall that develop during pancreatic inflammation. Internal drainage represents the standard of care in lesions that persist and lead to symptoms and complications. Only limited data are available on long-term results and recurrence of PPC after drainage procedures. Thus, the aim of the present study was to analyse the long-term outcome after endoscopic drainage of PPC.

Material and methods: Patient data were retrospectively collected by review of clinical records of the University Medical Center Mannheim. We assessed the clinical short-term outcome (results in the first 30 days after initial drainage procedure), medium-term outcome (results 6 months after initial drainage procedure) and long-term outcome (results after stent removal). We performed statistical analysis to identify possible risk factors for recurrence of PPC.

Results: We identified 51 patients with initially successful endoscopic drainage of the PPC (n = 51/53, 96%). Among this cohort, 43 patients were available for assessment of medium-term results. In 82.9% of these 43 patients the drainage could be removed after successful treatment of the PPC. Thirty patients were available for long term follow-up with a mean observation period of 42.2 months (SD 32.8 months). Among these patients, seven (n = 7/30, 23.3%) had recurrent PPC. Approximately half of the recurrent cysts arose in different anatomical regions and most patients with recurrence had chronic pancreatitis.

Conclusion: Endoscopic drainage represents an effective treatment for PPC. Approximately one quarter of the patients developed recurrent PPC. Half of recurrent PPC developed in different pancreatic regions than the initial PPC.

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Introduction

Pancreatic pseudocysts (PPC) are collections of fluid encapsulated within a well-defined inflammatory wall that are present for more than four weeks and that contain no solid components [1]. The inflammatory process induces pancreatic parenchymal lesions, pancreatic ductal disruptions and increased ductal pressure which results in formation of PPC. The cysts are classified as acute or chronic PPC based on underlying acute or chronic pancreatitis [2].

Nearly 50% of these fluid collections resolve spontaneously

during the course of the disease [2]. Because spontaneous regression is common, an early intervention is often not required. However, if the cystic lesion persists it can lead to symptoms and complications such as pain, infection, compression of the portal or splenic vein, gastric outlet obstruction or biliary obstruction. In these cases, cystic drainage is necessary. Therapeutic options for these cysts can be classified into interventional endoscopic and surgical drainage procedures. The German guideline suggests that endoscopic management of PPC should be considered as first-line therapy [3]. Surgical methods should only be used if endoscopic interventions are technically not possible, in cases of treatment failures or in the setting of complications after an endoscopic approach [3].

Surgery results in a permanent drainage of PPC and the communicating pancreatic duct. Although this suggests a definitive treatment of PPC, it is known that recurrence does occur in long-

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term follow up [4]. Such recurrences might also occur after endoscopic drainage, where drainage of the PPC is only temporary. Several studies evaluated short-term and medium-term results after endoscopic procedures. These investigations provided evidence that endoscopic drainage is safe and associated with success rates as high as 100% in the medium term period - usually 6 months - after intervention [5–8]. However, information on the long-term follow up of patients after endoscopic drainage are extremely limited [5,7,9,10]. These investigations report recurrence rates of 12% after a mean follow-up of 17 months, and 17.9% after a mean follow-up period of 14 months [5,7].

Thus, the aims of our present study were, first, to assess long-term results after endoscopic drainage of PPC; and second, to evaluate risk factors for recurrent disease after initial successful treatment of PPC.

Material and methods

Patient characteristics

We included all consecutive patients with acute or chronic PPC that were treated in our clinic between 2004 and 2014. Patients with walled-off pancreatic necrosis (WOPN) and abscesses were excluded. Patient data were retrospectively collected by review of clinical records of the Interdisciplinary Endoscopy Unit of the University Medical Center Mannheim. Data were complemented by physicians' and surgeons' office notes. The retrospective study was reviewed and approved by the local ethics committee (Medizinische Ethikkommission Mannheim II; <http://www.umm.uni-heidelberg.de/inst/ethikkommission>).

Procedures

Cross-sectional imaging (CT or MRI) was routinely performed within four weeks before intervention to determine the size and location of the cyst, and to evaluate the anatomical region adjacent to the cyst. Endoscopic procedures were performed under conscious sedation or general anaesthesia. The drainage was carried out with endosonographic guidance (GF-UCT180, Olympus, Europe). In the majority of cases, the PPC was punctured from the stomach using a standard needle knife (HF-Needle MTW Wesel, Germany) or a Cyst-Gastro-Set (Endoflex, Voerde, Germany) as previously described [11]. Cystic entry was confirmed by aspiration of cystic fluid, followed by advancement of a guidewire into the cystic lesion. The access path was dilated with a ring knife of the Cyst-Gastro-Set or with a guide catheter of 10 F prosthesis (Boston Scientific Deutschland GmbH, Ratingen, Germany). Usually, a 10 F double pigtail stent was inserted into the cyst (Boston Scientific Deutschland GmbH, Ratingen, Germany). Patients were followed up in the outpatient clinic after 6 months, or at earlier intervals as clinically demanded. Transmural stents were generally removed 6 months after insertion. Additional drainage procedures of persistent or recurrent PPC were performed in patients with unchanged size of the cyst, complications or ongoing symptomatic complaints.

Definitions

Pancreatic pseudocysts

According to the revised Atlanta criteria [1], PPC were defined as collections of fluid that were observed after a period of more than four weeks, were encapsulated within a well-defined inflammatory wall, and contained no solid components or necrosis. According to previous publications, PPC were classified as acute or chronic cystic lesions based on underlying acute or chronic pancreatitis [12]. Walled-off pancreatic necrosis (WOPN) were defined as mature,

encapsulated collections of pancreatic and peripancreatic necrosis that presented with a well-defined inflammatory wall and were present for more than four weeks.

Symptoms of PPC

Symptoms of PPC were signs of cyst infections, abdominal pain and biliary or gastric outlet obstruction.

Treatment results

Short-term results were defined as results in the first 30 days after initial drainage procedure. *Medium-term results* were defined as the outcome after 6 months after the initial procedure. *Long-term results* were defined as results after initially successful endoscopic treatment of PPC with removal of the stent and resolution of the initial cyst.

Technical success

Technical success was defined as the successful insertion of a stent with visible outlet of pancreatic fluid or pus.

Treatment success

Treatment success was defined as complete resolution of the cyst or a distinct decrease in the size of the cyst after a drainage period of 6 months resulting in stent removal with no need for further treatment of the PPC at the period of stent removal.

Recurrent PPC

Recurrence was defined as the presence of a PPC on imaging after successful treatment of the initial cyst.

Data analysis

The following data were recorded: demographic informations (age, sex, etiology of pancreatitis); initial symptoms; laboratory values; imaging features (CT and/or MRI) including cyst size (maximal dimension), location and number of cystic lesions; details of the drainage procedure such as the access path (transgastral, transduodenal, both); technical approach (ultrasound-guided, ERCP); length of hospital stay. Communication between the pancreatic duct and pseudocyst cavity and presence of strictures of the pancreatic duct were not evaluated retrospectively.

We determined the following parameters to evaluate the short-term outcome: technical success, stent occlusion, cyst infection, abscess, bleeding, pancreatitis, necrosis, perforation, and mortality. We recorded the following data to evaluate the long-term outcome: treatment success, recurrence of PPC and survival.

We performed an univariate analysis to analyse which factors might influence recurrence of PPC. We considered all mentioned parameters for univariate analysis.

We compared patient records and imaging data of the cysts at the time of first intervention and at the period of recurrence to determine whether recurrent cysts arise in the pancreatic region of the initially observed cyst.

Statistical analysis

All clinical characteristics were grouped to build categorical variables. Continuous data were presented as mean with standard deviation (SD). Parameters that displayed missing data exceeding 10 percent were excluded from statistical analysis. Univariate examination of the relationship between assessed criteria and complications was performed with χ^2 test. We did not perform multivariate analysis in the absence of significant associations and in the setting of small numbers of patients. A test result with a p -value < 0.05 was considered as statistically significant. Statistical

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