



**UNIVERSITY OF MEDICINE AND PHARMACY CRAIOVA
DOCTORAL SCHOOL**

Doctoral thesis

**PANCREATIC PSEUDOCYST
DIAGNOSIS AND TREATMENT**

Summary

**Scientific coordinator
Prof. Ion Georgescu, M.D. Ph. D**

**PhD fellow
Sarmis Marian Săndulescu**

**Craiova
2013**

CONTENTS

GENERAL PART

1 . Definition	5
2 . History	9
3 . Surgical anatomy of the pancreas	11
4 . Pathology of pancreatic pseudocyst	21
5 . Epidemiology	24
6 . Pathophysiology of pancreatic pseudocyst	26
7 . Classification of pancreatic pseudocyst	29
8 . The diagnosis of pancreatic pseudocyst	32
9 . Evolution	40
10 . Complications of pancreatic pseudocyst	42
11 . Pancreatic pseudocyst treatment.....	45

THE SPECIAL PART

12 .Objectives . Materials and methods	61
13 .Etiology	68
14 . Diagnosis.....	78
15 . Pancreas pseudocyst classification.....	99
16 . Evolution and complications	102
17 . Treatment	106
18 . Results	121
19 . Discussion	124
20 . Conclusions	137
21 . References	139

Acute pancreatitis is one of the major acute abdominal emergencies, with an increasing incidence in the active population aged between 20 to 70 years old and burdened by a high rate of morbidity and mortality, mainly driven by its complications.

Pancreatic pseudocyst is one of the most frequent complications of acute and chronic pancreatitis, whose diagnosis and treatment has benefited lately from the contribution of new imaging techniques, which changed its therapeutic approach.

The problem of acute pancreatitis and pancreatic pseudocyst represented for 1st Department of Surgery Craiova a permanent and continuous interest for over 40 years, allowing on the one hand to achieve important therapeutic results in case of severe acute pancreatitis and, furthermore, this expertise in a series of reference papers, presented at various national and international scientific meetings and published in journals. Thus, we sought to use the experience of our department in a paper to be a more objective assessment of the possibilities to improve the prognosis, treatment and outcomes of pancreatic pseudocyst, based on the existing data in the literature and with the contribution of new imaging techniques for diagnosis and treatment of pancreatic pseudocyst.

The objectives are:

- identification of the risk factors in the development of pancreatic pseudocyst, based on the etiology and severity of acute pancreatitis;
- to establish a diagnostic algorithm for pancreatic pseudocyst (PP);
- to assess the role of medical imaging in the diagnosis and monitoring development of PP;
- development of a therapeutic protocol in order to choose the most appropriate therapeutic modalities for each case.

I conducted a both prospective and retrospective study on 46 patients diagnosed with pancreatic pseudocyst, treated in our department, from the Emergency County Hospital of Craiova, for six years (January 2006 to December 2011). These patients were selected from a total of 284 patients hospitalized and diagnosed at the same time with acute pancreatitis, accounting for a 16.19 % cases of PP. Ultrasound and Endoscopic ultrasound were performed in the Gastroenterology Department.

Patient selection was based on the inclusion and exclusion criteria . The inclusion criteria were:

- pancreatic fluid collection that occurs in the development of acute pancreatitis after 3 weeks from its debut;

- pancreatic fluid collection well-defined, diagnosed using CT or ultrasound;
- history of recent acute pancreatitis.

Were excluded from the study patients with:

- pancreatic fluid in the first 3 weeks from the onset of acute pancreatitis;
- diffuse pancreatic collections without ultrasound or CT image of own wall;
- pancreatic collections occurring in the evolution of chronic pancreatitis without an acute episode;
- pancreatic collections containing predominantly solid.

We found major conceptual changes in pancreatic pseudocysts therapeutic attitude in the face of new data on spontaneous resorption of them. If a few years ago the treatment was exclusively surgical, in the past 20 years we assisted to a change in the therapeutic approach to increase the share of endoscopic drainage, becoming first-line therapy, surgery, assuming the cases that do not lend themselves to minimally invasive treatment.

Pancreatic pseudocyst is a collection of fluid rich in amylase and pancreatic enzymes, delimited by a fibrous wall without epithelial tissue, but which communicate directly or indirectly with pancreatic ductal system. This communication with pancreatic ductal system cannot be demonstrated in all cases, even after ERCP because of canalicular protein plugs or ductal stenosis.

Pseudocyst formation and persistence implies a permanent communication with the pancreatic ductal system, whether it can or cannot be demonstrated by imaging procedures so that spontaneous resorption of the pseudocyst seems impossible as long as the communication continues. But in some cases it is this persistent communication that explains the evolution by resorption of PP through its drainage system ductal pancreatic.

The conservative treatment was enough for spontaneous resolution in 26 cases (56,52%), without complications.

The drainage was necessary for 20 patients (43.48 %) with pancreatic pseudocysts, over 6 cm in diameter, occurring after 4-12 weeks from the onset of severe acute pancreatitis. It can be done surgically, endoscopic or using invasive radiology procedures.

The choice depends on the type and timing of therapeutic intervention especially pancreatic pseudocyst symptoms and its complications, which are considered the main arguments in therapeutic decision, rather than the size of pancreatic pseudocyst the main decision factor .

Surgery, once the method of choice in the treatment of pancreatic pseudocysts with the advent of other alternative therapeutic options, has greatly restricted its indications and contraindications, only for complicated pseudocysts or failures of endoscopic drainage. Classical surgery, practiced by us in 8 cases, has three treatment options: internal drainage, external drainage and therapy by resection.

The choice is influenced by classical surgery:

- the nature of the complication (infection , hemorrhage, obstruction)
- location of the pseudocyst
- morphological characteristics of PP (walls, content).

Immediate complications and operative risks are higher compared to other methods of drainage (endoscopic, percutaneous) but long-term results (recurrence) are best for classical interventions. Percutaneous drainage guided by ultrasound or CT (2 cases in our statistics) as an interventional radiology procedure, remains a method with limited indications (immature or infected pseudocysts located in the tail of the pancreas) due to the large number of failures and incidents or complications that can generate powerful lesions of adjacent viscera (stomach, spleen, colon, intestine), gastrointestinal bleeding, cellulitis at the site of implantation of the catheter, infection, and especially, pancreatic fistula. In this moment the first-line therapy for PP is the endoscopic drainage, which in recent years has proven effective with minimal complications and recurrences, combining long-term outcomes with miniinvasive approach.

There are two ways of endoscopic drainage: transpapillary drainage during ERCP and transmural (transgastric or transduodenal) under EUS control.

Direct endoscopic transmural drainage through the gastric or duodenal wall is to create an internal fistula between the pseudocyst and the stomach or duodenum, which provides drainage of pseudocysts. The method risks mainly bleeding, the interception of a blood vessel wall pseudocyst, a complication that we have met in a case resolved by conventional surgery: hemostasis and anastomosis between pseudocyst and stomach. The use of endoscopic ultrasound reduces the risk of bleeding, Doppler mode allowing visualization of blood vessels in the wall of

the digestive tract and the pseudocyst and the choice of avascular areas for pseudocyst puncture and stent placement.

The main complications that can occur during endoscopic drainage are bleeding and perforation. Risk reduction is indicated using endoscopic ultrasound to assess the wall PP, collateral circulation and fluid content of PP.

Conclusions

- Pancreatic pseudocyst, sometimes evolving simple but equally burdened by the possibility of developing important complications, is the main late complication (3-6 weeks) of acute pancreatitis.

- Excessive alcohol consumption in men and women biliary etiology are the main factors incriminated in acute pancreatitis and pancreatic pseudocyst.

- Positive diagnosis is suggested by the clinical picture but abdominal ultrasound, computed tomography and EUS are necessary for a correct pathological classification of PP, with implications in the choice of therapeutic procedure.

- Most important complications are bleeding, compression of the biliary or gastrointestinal tract, infection and rupture of the pseudocyst. These complications require immediate therapeutic intervention and increase morbidity and postoperative mortality.

- Pancreatic pseudocysts which are asymptomatic, uncomplicated, regardless of their size, benefit from conservative medical treatment until their spontaneous resolution.

- Interventional treatment is indicated in case of symptomatic and unresponsive to conservative medical treatment of complicated pseudocysts.

- The choice of drainage depends on the pathological characteristics of PP and the therapeutic methods available.

- Guided percutaneous external drainage is indicated in case of pancreas tail pseudocysts, with immature wall or infection, patients with poor performance status and as an emergency in case of contraindications for surgical therapy.
- Endoscopic internal drainage tends to become the main therapeutic method of PP, with minimal complications, conditions are represented by the fluid content of the PP and the proximity to the digestive tract.
- Surgery is reserved for internal drainage of pseudocysts complicated, failure of miniinvasive treatment methods or recurrence after endoscopic drainage. Laparoscopic approach is a therapeutic option booming in many surgical centers.
- The introduction of a protocol for diagnosis and treatment contribute to the optimal choice of drainage option with a positive impact on perioperative morbidity and mortality.

References

- Bradley EL: A clinically based classification system for acute pancreatitis. Summary of the International Symposium on Acute Pancreatitis, Atlanta, 1992. Arch Surg 1993; 128:586-590.
- Gorelick FS. Acute pancreatitis. In Yamada T ed. Textbook of gastroenterology second edition. Philadelphia: Lippincot-Raven, 1996
- Andren-Sandberg A, Dervenis C. Pancreatic Pseudocysts in 21st century. Part II: Natural history. JOP. JPancreas Online 2004; 5:8-24
- Sarr MG, Banks PA, Bollen TL, et al.. Revision of the Atlanta classification of acute pancreatitis. Acute Pancreatitis Classification Workgroup, April 2008.
- Thoeni RF. The revised Atlanta classification of acute pancreatitis: its importance for the radiologist and its effect on treatment. Radiology. 2012 Mar;262(3):751-64.
- Stamatakos M, Stefanaki C, Kontzoglou K, Stergiopoulos S, Giannopoulos G, Safioleas M. Walled-off pancreatic necrosis. World J Gastroenterol. 2010 Apr 14;16(14):1707-12.
- Traverso LW, Kozarek RA. Interventional management of peripancreatic fluid collections. Surg Clin North Am 1999; 79: 745-57

- Agha FP. Spontaneous resolution of acute pancreatic pseudocysts, *Surg Gynecol Obstet* 1984; 158:22-6.
- Warshaw AL, Rattner DW. Timing of surgical Drainage for pancreatic pseudocyst. *Ann Surg* 1985; 202:720-4
- D'Egidio A, Schein M. Pancreatic pseudocysts: a proposed classification and its management implications. *Br J Surg* 1991; 78:981-4
- Andersson R, Janzon M, Sundberg I, Bengmark S. Management of pancreatic pseudocysts. *Br J Surg* 1989; 76:550-2
- Usatoff V, Brancatisano R, Williamson RC. Operative treatment of pseudocysts in patients with chronic pancreatitis. *Br J Surg* 2000; 87: 1494-9
- Nguyen BL, Thompson JS, Edney JA, Bragg LE, Rikkens LF. Influence of the etiology of pancreatitis on the natural history of pancreatic pseudocysts. *Am J Surg* 1991; 162:527-31
- Andrén-Sandberg A, Dervenis C. Pancreatic pseudocysts in the 21st century. Part I: classification, pathophysiology, anatomic considerations and treatment. *JOP* 2004 Jan;5(1):8-24.
- Nealon WH, Townsend CM Jr, Thompson JC. Preoperative endoscopic retrograde cholangiopancreatography (ERCP) in patients with pancreatic pseudocyst associated with resolving acute and chronic pancreatitis. *Ann Surg.* 1989 May;209(5):532-8; discussion 538-40.
- Kim KO, Kim TN. Acute Pancreatic Pseudocyst: Incidence, Risk Factors, and Clinical Outcomes. *Pancreas.* 2012 Jan 5. [Epub ahead of print]
- Behrns KE, Ben-David K. Surgical therapy of pancreatic pseudocysts. *J Gastrointest Surg.* 2008 Dec;12(12):2231-9. Epub 2008 May 7.
- Nealon WH, Bhutani M, Riall TS, Raju G, Ozkan O, Neilan R. A unifying concept: pancreatic ductal anatomy both predicts and determines the major complications resulting from pancreatitis. *J Am Coll Surg.* 2009 May;208(5):790-9; discussion 799-801.
- Byrne MF, Mitchell RM, Baillie J. Pancreatic Pseudocysts. *Curr Treat Options Gastroenterol.* 2002 Oct;5(5):331-338.
- Shiraishi M, Tokashiki H, Samura H, Nakamoto I, Yogi M, Kudaka H, Muto Y. Avoiding an overdiagnosis of pancreatic pseudocysts. *Hepatogastroenterology.* 2001 Nov-Dec;48(42):1758-61.
- Kim HC, Yang DM, Kim HJ, Lee DH, Ko YT, Lim JW. Computed tomography appearances of various complications associated with pancreatic pseudocysts. *Acta Radiol.* 2008 Sep;49(7):727-34.
- Pitchumoni CS, Agarwal N. Review Pancreatic pseudocysts. When and how should drainage be performed? *Gastroenterol Clin North Am.* 1999 Sep; 28(3):615-39.
- Walt AJ, Bouwman DL, Weaver DW, Sachs RJ Review The impact of technology on the management of pancreatic pseudocyst. Fifth annual Samuel Jason Mixter Lecture. *Arch Surg.* 1990 Jun; 125(6):759-63.
- Imrie CW, Buist LJ, Shearer MG. Importance of cause in the outcome of pancreatic pseudocysts. *Am J Surg.* 1988 Sep; 156(3 Pt 1):159-62.

- Hookey LC, Debroux S, Delhaye M, Arvanitakis M, Le Moine O, Devière J. Endoscopic drainage of pancreatic-fluid collections in 116 patients: a comparison of etiologies, drainage techniques, and outcomes. *Gastrointest Endosc.* 2006;63:635–643
- Stefan Seewald, Tiing Leong Ang, Karl C Yu Kim Teng, Nib Soehendra. EUS-Guided drainage of pancreatic pseudocyst, abscesses and infected necrosis. *Digestive Endoscopy. Special Issue: Proceedings of the Endoscopy Forum, Japan 2007–2008.* Volume 21, Issue Supplement s1, pages S61–S65, July 2009.
- Seifert H, Wehrmann T, Schmitt T, Zeuzem S, Caspary WF. Retroperitoneal endoscopic debridement for infected peripancreatic necrosis. *Lancet* 2000; 356: 653–5.