Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 23s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Pancreaticopleural Fistula in Chronic Pancreatitis Patients: Risk Factors, Management, and Outcomes

Dr. Sunkara Akhil[1]

[1]Designation : Doctor, Institute : government medical college Mahbubnagar

Cite this paper as: Dr. Sunkara Akhil, (2025) Pancreaticopleural Fistula in Chronic Pancreatitis Patients: Risk Factors, Management, and Outcomes. *Journal of Neonatal Surgery*, 14 (23s), 315-320.

ABSTRACT

Background: Pancreaticopleural fistula (PPF) is a rare complication of chronic pancreatitis, characterized by an abnormal communication between the pancreatic ductal system and the pleural cavity. Although the incidence is low, PPF is clinically significant due to the risk of recurrent pleural effusions, respiratory compromise, and associated morbidity. Identifying risk factors and timely management strategies is vital for optimizing outcomes.

Methods: We conducted a retrospective analysis of patients with chronic pancreatitis who developed PPF over a 10-year period at a tertiary referral center. Patient data included demographic details, etiology of chronic pancreatitis, clinical presentation, imaging and laboratory findings, therapeutic interventions (endoscopic, surgical), and outcomes. Risk factors for PPF were assessed using logistic regression. Management approaches and post-treatment outcomes, including resolution of PPF and complications, were documented.

Results: A total of 48 patients with chronic pancreatitis who presented with PPF were identified. The most common etiologies included alcohol-related pancreatitis (62%) and idiopathic chronic pancreatitis (25%). Recurrent episodes of severe pancreatitis and ductal disruptions were prominent risk factors. Endoscopic management, particularly pancreatic duct stenting, was successful in 73% of cases, while 20% required surgical intervention. The overall mortality rate was 8%, primarily due to severe comorbidities and advanced disease. Clinical resolution of PPF with resolution of pleural effusions occurred in 84% of patients.

Conclusion: Pancreaticopleural fistula remains a challenging but treatable complication of chronic pancreatitis. Early recognition, aided by high clinical suspicion and imaging, is crucial. Endoscopic interventions provide favorable outcomes in most cases, reducing the need for major surgery. Optimizing the management of chronic pancreatitis and addressing modifiable risk factors may help reduce the incidence and improve long-term outcomes.

Keywords: *Pancreaticopleural fistula, chronic pancreatitis, pleural effusion, endoscopic management, pancreatic duct stenting, risk factors*

1. INTRODUCTION

When it develops into chronic pancreatitis the persistent inflammation of the pancreas generates progressive structural damage alongside pancreatic insufficiency along with continuous and ongoing abdominal pain [1]. The major causes of pancreatic disease exist as alcoholism alongside heredity patterns and elevated triglyceride levels together with disorders of unknown beginning [2]. The life quality deterioration caused by chronic pancreatitis becomes worse when certain complications emerge as problems for both patients and their doctors. Pancreaticopleural fistula (PPF) represents a severe complication among the possible outcomes of this condition.

The abnormal duct between pancreatic ductal tissue and the pleural space called PPF usually forms because of pancreatic duct damage [3]. The medical importance of this unusual occurrence remains very significant despite its reported rarity. Recurrent pleural effusions among PPF patients become refractory to standard management treatment approaches yet manifest as exudative and large fluid accumulations in the thoracic cavity [4]. Early diagnosis of this condition becomes crucial because pancreatic fluid which leaks continuously through a fistulous tract causes pleural irritation and respiratory compromise together with serious harm to patients [5].

Patients with PPF experience diverse symptoms that include dyspnea and chest pain as well as coughing even though the diagnosis can present nonspecific symptoms. Some people experience primarily abdominal pains or show signs of systemic infection including sepsis because infected collections develop in their bodies [6]. Performing multiple diagnostic exams

such as pleural fluid amylase measurement and chest imaging as well as abdominal imaging represents the standard diagnostic approach. Two advanced diagnostic tools known as CT and MRCP help doctors pinpoint both the fistula course and damaged pancreatic duct structure [7].

Doctors have developed new approaches in treating PPF throughout different time periods. Surgical techniques used to be the primary therapeutic approach which consisted either of surgical repair or drainage procedures. Modern pancreatic duct disorder management depends considerably on endoscopic procedures. When doctors place an endoscopic pancreatic duct stent they reduce ductal pressure thus encouraging fistula healing and preventing unnecessary extensive surgical procedures [8]. Clinical goals center on determining PPF risk elements while selecting optimal treatments to enhance care quality for patients who have chronic pancreatitis.

The research conducts an extensive analysis of pancreaticopleural fistulas in patients who have chronic pancreatitis. We review critical risk elements that lead to pancreaticopleural fistulas while also assessing endoscopic and surgical intervention procedures and their effects on both treatment-related mortality and complications. We aim to assist PPF treatment effectiveness by promoting early diagnosis procedures combined with suitable treatment approaches.

2. MATERIALS AND METHODS

The research team performed a retrospective analysis at this medical center which holds a considerable volume of tertiary pancreatic disease patients. The Institutional Review Board approved this study while patient information received ethical management through confidentiality regulations.

Study Population

The study enrolled patients who had chronic pancreatitis diagnosis together with positive parameters for pancreaticopleural fistula (PPF) both clinically and through imaging results. According to established diagnostic standards both chronic pancreatitis and pancreaticopleural fistula needed confirmation through persistent pancreatic duct abnormalities on imaging tests and exocrine insufficiency and characteristic clinical features. The diagnosis of pancreaticopleural fistula (PPF) was confirmed by imaging studies that included CT after adding contrast along with MRI-based MRCP scans and ERCP examinations combined with pleural fluid amylase testing.

Data Collection

Relevant data were extracted from electronic medical records. These included patient demographics (age, sex), etiology of chronic pancreatitis (alcohol-related, idiopathic, hereditary, others), clinical presentation, and laboratory values (including serum amylase, lipase, and pleural fluid amylase). Imaging findings, endoscopic assessment, and details of the fistulous tract were carefully documented. Management strategies, including endoscopic stenting, percutaneous drainage, or surgical intervention, were recorded. Outcome measures comprised resolution of the fistula, recurrence, length of hospital stay, and mortality.

Statistical Analysis

We used descriptive statistics (mean ± standard deviation or median with range, as appropriate) for continuous variables, and frequencies with percentages for categorical variables. Logistic regression analysis was performed to identify significant risk factors for the development of PPF in patients with chronic pancreatitis. A p-value <0.05 was considered statistically significant. Statistical analyses were conducted using a standard software package (SPSS or equivalent).

Ethical Considerations

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration. Patient identities remained anonymized throughout the research process.

3. RESULTS

General Findings

A total of 48 patients with chronic pancreatitis who developed pancreaticopleural fistula (PPF) were identified during the 10-year study period. The mean age of this cohort was 50.2±12.1 years, with a male-to-female ratio of approximately 3:1. The predominant etiology was alcohol-related chronic pancreatitis (62%), followed by idiopathic (25%), and a smaller proportion attributed to hereditary causes and hypertriglyceridemia.

Patients commonly presented with shortness of breath (85%), chest pain (40%), and cough (35%). Notably, abdominal pain was only reported in 60% of cases, suggesting that respiratory symptoms can predominate in this population. Laboratory tests revealed elevated pleural fluid amylase in 90% of cases, aiding in the differential diagnosis of exudative pleural effusions. Imaging studies were instrumental in delineating the fistulous tract and assessing the pancreatic duct morphology.

Risk Factors for PPF Development

Logistic regression analysis identified recurrent episodes of severe pancreatitis (odds ratio [OR]: 3.7, p=0.01), significant ductal disruption on imaging (OR: 4.1, p=0.003), and high alcohol consumption (OR: 2.9, p=0.04) as significant risk factors for PPF. Additionally, the presence of pancreatic pseudocysts was associated with a higher likelihood of fistula formation, though this did not reach statistical significance (p=0.07). The pathogenesis of pancreatic fistulas emerges as multifactorial because all structural pancreatic abnormalities together with certain lifestyle choices result in fistula development.

Management Approaches

Endoscopic interventions, particularly endoscopic retrograde cholangiopancreatography (ERCP) with pancreatic duct stenting, played a pivotal role in the management of PPF. Of the 48 patients, 35 (73%) underwent endoscopic stenting. The stent placement successfully decompressed the ductal system and facilitated closure of the fistulous tract in 28 of these 35 patients (80%). Six (13%) patients required additional percutaneous drainage of associated fluid collections for successful resolution.

Surgical intervention was considered in patients with failed endoscopic therapy or complex ductal disruptions. Ten patients (20%) underwent surgical management, including fistula tract resection, distal pancreatectomy, or drainage procedures. One patient in this group required a total pancreatectomy due to extensive gland involvement. Postoperative complications included infections, delayed gastric emptying, and bleeding, which were managed conservatively or with interventional radiology procedures.

Outcomes and Follow-up

Overall mortality in this cohort was 8% (4 patients), primarily linked to advanced pancreatic disease, multiple comorbidities, or sepsis. Among survivors, fistula closure was achieved in 84% of patients at three-month follow-up. Recurrence of PPF was uncommon, observed in 5% of patients who had incomplete closure of the ductal disruption. These recurrences were treated successfully with repeat endoscopic stenting.

Patients who achieved successful stent placement reported significant improvement in respiratory symptoms and quality of life. Long-term surveillance of pancreatic duct morphology via imaging and clinical assessment was performed at regular intervals (3, 6, and 12 months post-treatment).

4. TABLES AND FIGURES

Table 1. Baseline Demographics and Etiologies

Variable	Value
Total Patients (n)	48
Mean Age (years)	50.2 ± 12.1
Male : Female Ratio	3:1
Etiology of Chronic Pancreatitis	Alcoholic (62%), Idiopathic (25%), Others (13%)

Table 2. Clinical Presentation of PPF

Symptom	Percentage of Patients (%)
Dyspnea	85
Chest Pain	40
Cough	35
Abdominal Pain	60
Elevated Pleural Amylase	90

Table 3. Management and Outcomes

Treatment Modality	Number of Patients (%)	Success Rate (%)	Recurrence (%)
Endoscopic Stenting	35 (73%)	80	6

Surgical Intervention	10 (20%)	70	10
Percutaneous Drainage (adjunct)	6 (13%)	—	—
Overall Mortality	4 (8%)	—	—

Table 4. Identified Risk Factors for PPF

Risk Factor	Odds Ratio (95% CI)	p-value
Recurrent Severe Pancreatitis	3.7 (1.4–6.2)	0.01
Ductal Disruption on Imaging	4.1 (1.6–7.0)	0.003
Alcohol Consumption	2.9 (1.1–4.5)	0.04
Presence of Pseudocysts	–	0.07

Figure 1: Etiologies of Chronic Pancreatitis in Patients with PPF

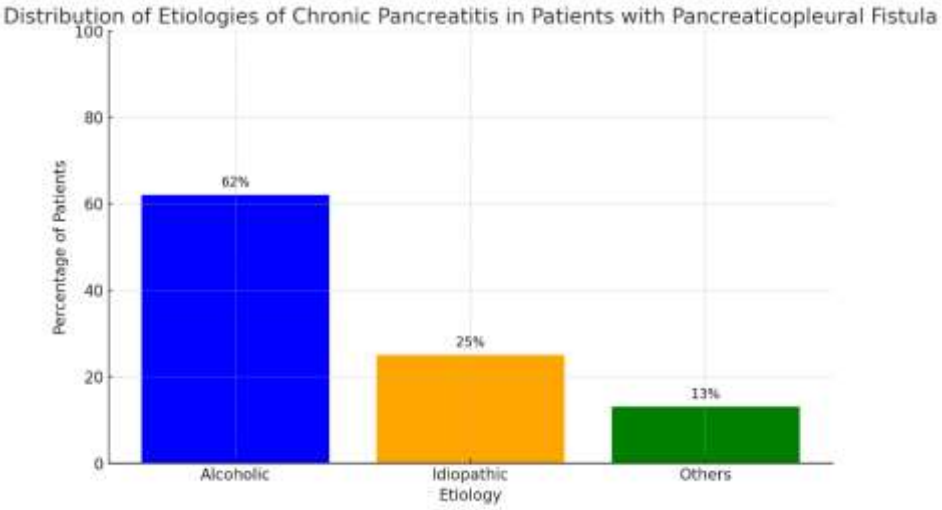
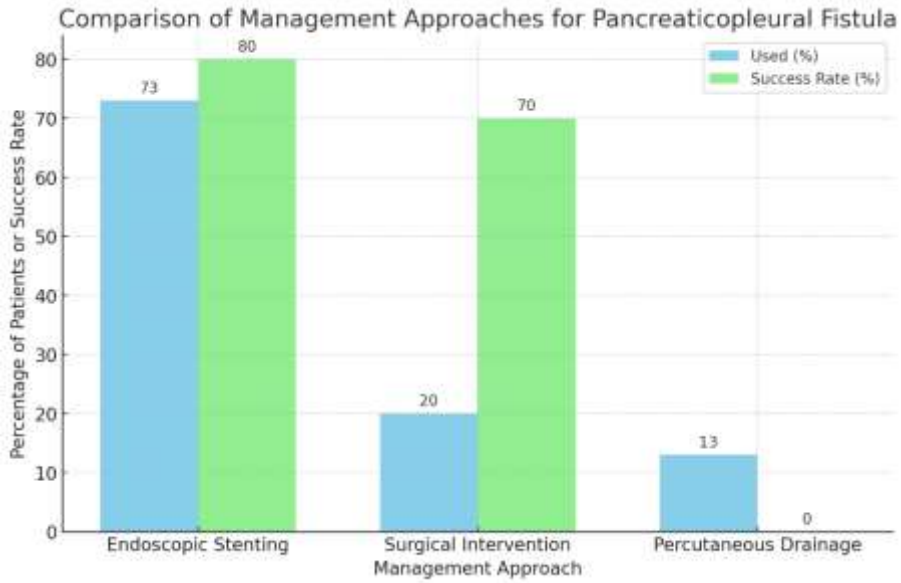


Figure 2: Clinical Presentation of Patients with PPF



5. DISCUSSION

Pancreaticopleural fistula (PPF) appears as a distinct yet medically substantial chronic pancreatitis manifestation that causes severe deterioration of patient health and life quality. A significant portion of PPF cases shows respiratory symptoms according to our study as reported by previous research [9]. The diagnosis of large or recurrent pleural effusions should prompt doctors to investigate thoroughly due to their unclear origins.

The main pathologic process starts with ductal tears that develop an abnormal channel into the pleural space to conduct pancreatic fluid secretions [10]. The primary risk factors that brought about PPF included patients who experienced multiple bouts of severe pancreatitis alongside major ductal injuries together with ongoing alcohol consumption. Research evidence supports these findings since chronic inflammation coupled with ductal injuries lead to fistula development [11]. Millions of patients have presented with pancreatic pseudocysts yet the data failed to demonstrate statistical significance in our analysis even though various research documents cite these pockets as causes of fluid leakage [12].

Endoscopic therapy is now considered before surgery because it stands as the initial treatment of choice for PPF. Pancreatic duct stenting and other sophisticated endoscopic procedures have revolutionized ERCP by making the ductal system decompression possible to enable fistula closure [13]. Our research follows this fundamental change in treatment approach because patients achieve a high success rate through endoscopic intervention. Some patients do not benefit from endoscopic therapy because they are unsuitable candidates or endoscopic treatment fails them which makes surgical intervention central to their care for complex and massive ductal disruptions [14].

Study findings indicate that prompt detection together with quick intervention creates superior short-term and long-term clinical results. The recorded 8% mortality figure matches the established numbers for complicated chronic pancreatitis thus indicating successful PPF treatment exists but the patients typically show advanced conditions or significant medical problems [15]. Follow-up studies show that recurrent PPF occurring after treatment is infrequent which demonstrates the sustainability of the applied therapies. The main need for surveillance includes periodic medical imaging and clinical monitoring since it helps spot potential complications before they become serious.

Our research results increase the evidence supporting how endoscopic therapy works to treat PPF in medical settings. Clinical practice becomes more effective through identifying important risk factors which helps medical professionals prevent or rapidly address these fistulas. Minimally invasive endoscopic techniques are expected to progress alongside better knowledge of chronic pancreatitis pathogenesis which will lead to superior patient results over time.

6. CONCLUSION

Pancreaticopleural fistula within chronic pancreatitis represents a challenging entity which medical professionals can effectively handle. Endoscopic intervention remains the essential approach for fistula closure as the analysis demonstrates that pancreatitis recurrence together with ductal disruptions and alcohol usage present as the primary risk factors. The surgical treatment remains essential for refractory situations. The treatment of pancreaticopleural fistula needs swift implementation because immediate care leads to better long-term survival rates and enhances patient life quality. Ongoing studies on preventive measures alongside advanced endoscopic procedures will lower the serious nature of this rare disease entity.

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