

A CLINICAL STUDY OF PSEUDO CYST OF PANCREAS, CHALLENGES AND ITS OUTCOMES: A TERTIARY CARE CENTRE STUDY.

Dr Nishant Saxena^{1*}, Dr Amal Mariadas Boobily²

^{1*} Associate Professor, Department of Surgery, Government Medical College, Orai, Jalaun, India.

² Post Graduate Resident, Department of Surgery, Government Medical College, Orai, Jalaun, India.

***Corresponding Author:** Dr Nishant Saxena

*Associate Professor, Department of Surgery, Government Medical College, Orai, Jalaun, India.
Email id—nishantdr2223@gmail.com

ABSTRACT:

Background: Since the first surgical internal drainage in 1921¹, surgery remained until recently the cornerstone in the management of PP. Pancreatic pseudocysts may arise as a complication of either acute or chronic pancreatitis. The evolving landscape of pseudocyst comprehension can be attributed to the progress in radiology and the advent of novel treatment approaches. This research aimed to evaluate the clinical characteristics, etiology, and diverse management strategies employed for pseudocysts within a tertiary care hospital setting.

Materials and Methods: This is a prospective study involving 82 adult patients conducted over a span of one year, in the Department of surgery, Government Medical College, Orai, Jalaun, India.

Results and Observations: Pseudocysts exhibit a higher prevalence in males, with alcohol identified as the most common associated etiology. Initial radiological assessments consisted of ultrasound, followed by contrast-enhanced computed tomography (CECT) of the abdomen for all patients. Complications linked to pseudocysts included gastric outlet obstruction and ascites. Internal drainage emerged as the predominant intervention. Post-drainage complications, notably infections, were addressed through antibiotic therapy, with endoscopic drainage implemented in cases of recurrence. Pain emerged as a significant post-operative issue. The preference for endoscopic drainage is growing, given its less invasive nature, higher long-term success rate, shorter hospital stay, and enhanced patient comfort.

Conclusion: Notably, pseudocysts exhibit a higher prevalence in males than females, with a concentration in the age group of 21-30 years, followed by individuals aged between 31-40 years. Management of PPs has evolved over the years, from an aggressive approach, to a more conservative management. Pancreatic pseudocysts predominantly afflict males, often associated with alcoholism. The clinical presentation varies, with abdominal pain being the most prevalent grievance, followed by nausea and vomiting. Initial intervention involves supportive care, but persistent symptoms and complications may necessitate surgical drainage, the most frequently employed management approach. Emerging treatment modalities, such as endoscopic interventions, offer distinct advantages, including reduced pain, shorter hospital stays, and lower recurrence rates.

Management of PPs has evolved over the years, from an aggressive approach, to a more conservative management. In cases of symptomatic or complicated pseudocysts, a plethora of techniques and types of drainage can lead to almost 100% primary and overall success of pseudocyst drainage.

Keywords: Pancreatic pseudocysts, Intervention, endoscopic, pseudocyst, Contrast-Enhanced Computed Tomography (CECT),

INTRODUCTION:

Since the first surgical internal drainage in 1921¹, surgery remained until recently the cornerstone in the management of PP. In the recent years, minimally invasive techniques, including laparoscopic procedures, endoscopic and radiology-guided interventions, have increased the available options in the treatment of PP. However, inconsistency of definitions but mainly the lack of large series of patients, have limited the amount of randomized control trials about diagnosis and treatment of PP. Pancreatic pseudocysts, categorized within the broader spectrum of pancreatic fluid collections and cystic lesions, play a pivotal role in the intricacies of pancreatic pathology. According to the revised Atlanta classification, pancreatic pseudocysts typically manifest with a temporal delay of at least 4 weeks following the initiating event. They exhibit distinctive characteristics, including a well-defined inflammatory wall and a homogeneous fluid content without necrosis.² This specific profile aids in differentiating pseudocysts from other entities within the realm of pancreatic pathology. It is worth noting that the differentiation between small pseudocysts and cystic tumors of the pancreas can pose a diagnostic challenge, requiring careful consideration and evaluation in clinical practice. In support of the complexity and confusion in the management of PP, there are numerous classifications based on time of onset, morphological and clinical characteristics. Sarles *et al.* provided one of the first classifications of pseudocysts based on the underlying existence of acute or chronic pancreatitis³. In 1991, D'Edigio *et al.*, included in their classification the underlying chronic or acute pancreatitis, the pancreatic ductal anatomy and the presence of communication between the cyst and the ducts, defining three distinct types of pseudocysts⁴. Other classifications are based upon the extension of necrosis or entirely upon the pancreatic duct anatomy⁵. Finally the Atlanta classification in 1992 and especially its revision in 2012, tried to distinguish pseudocysts, from acute peripancreatic fluid collections and acute necrotic collections, stating that the development of pseudocyst in the setting of acute pancreatitis is rare⁶.

Pancreatic pseudocysts, emerging as a consequential outcome of either acute or chronic pancreatitis, are routinely identified through diagnostic modalities such as abdominal ultrasound (USG) and contrast-enhanced computed tomography (CECT) of the abdomen.² While a considerable proportion of these pseudocysts exhibit a tendency to spontaneously resolve when managed with supportive care, the prognosis becomes intricately linked to their dimensions and the duration of their presence. Larger cysts, in particular, carry a heightened risk of complications, necessitating vigilant monitoring and tailored management strategies. The landscape of pseudocyst comprehension has undergone dynamic transformations over time, primarily driven by advancements in radiological technologies and the introduction of novel treatment modalities. These strides in medical imaging and therapeutic interventions not only contribute to enhanced diagnostic precision but also expand the repertoire of options available for managing pancreatic pseudocysts. This paradigm shift

underscores the significance of staying abreast of evolving medical practices to ensure optimal outcomes for individuals grappling with this pancreatic complication.⁷The majority, approximately 70%, of pancreatic pseudocysts are intricately linked to chronic pancreatitis induced by alcohol consumption, underlining the significance of this etiological factor. However, the spectrum of triggers for pseudocyst formation is broad, encompassing acute pancreatitis, traumatic incidents, and various surgical interventions. The clinical landscape of pancreatic pseudocysts is diverse and complex, with symptoms and complications hinging on factors such as the cyst's location and size. Predominantly, patients with pancreatic pseudocysts commonly present with abdominal pain, reflecting the often-painful nature of this condition. Treatment strategies for pancreatic pseudocysts are notably varied and lack a standardized approach. Only a handful of clear indications, such as cyst infection or biliary obstruction, provide specific guidance for therapeutic interventions. The absence of universally accepted and well-defined protocols is compounded by the multifaceted nature of symptoms and complications associated with pancreatic pseudocysts.^{8,9}Challenges in comprehensively studying and understanding pancreatic pseudocysts stem from limitations in existing research, characterized by relatively small sample sizes and a lack of uniform definitions. This impediment makes it difficult to conduct meta-analyses with a sufficiently robust cohort, hindering the establishment of definitive conclusions in the field. Moreover, the landscape of therapeutic interventions has evolved over the last decade, with endosonographic drainage techniques gaining prominence and progressively supplanting surgical drainage procedures like pseudocystojejunostomy, which was once considered the gold standard of therapy. Despite the emergence of randomized controlled trials comparing endosonographic drainage to conventional techniques, critical questions concerning the selection of patients for treatment and optimal timing remain insufficiently addressed in the current body of literature.¹⁰

In the management of pancreatic pseudocysts, the decision to pursue invasive drainage procedures is typically driven by two main considerations: the persistence of patient symptoms and the presence of complications. Among the available drainage modalities, endoscopic techniques offer less invasive alternatives. These include transpapillary and transmural approaches, providing access either through the pancreatic duct or directly through the gastrointestinal wall. These endoscopic methods are associated with shorter recovery times compared to surgical options. Percutaneous catheter drainage represents another viable approach, involving the insertion of a catheter through the skin and into the pseudocyst under imaging guidance, effectively draining fluid and reducing cyst size. Surgical interventions, such as cystojejunostomy or external drainage procedures, may be considered when endoscopic or percutaneous approaches prove impractical or unsuccessful.¹¹ The choice of drainage modality is tailored to factors like pseudocyst size, location, patient health, and the expertise available. This decision-making process is collaborative, involving the patient and healthcare team, and is based on individual circumstances and preferences.

MATERIALS AND METHODS:

In the course of this prospective study was conducted in the Department of surgery, Government Medical College, Orai, Jalaun, India, involving 82 adult participants, a meticulous approach was employed to gather a comprehensive dataset upon their admission to the medical facility. Thorough examinations of each patient's medical history, clinical presentations, and the results of relevant

diagnostic investigations conducted during their hospital stay constituted the foundational data collection process.

To be included in the study, participants had to meet specific criteria:

1. Diagnosis of a pancreatic pseudocyst, a confirmation achieved through either ultrasound examination of the abdomen or contrast-enhanced computerized tomography (CECT) scan of the abdominal region.
2. Willingness to actively participate by providing valid informed consent.

Conversely, certain criteria were established to exclude individuals from the study:

1. Patients below the age of 17 who had received a diagnosis of a pancreatic pseudocyst.
2. Individuals diagnosed with cystic neoplasms of the pancreas were excluded from participation.

These stringent inclusion and exclusion criteria were designed to focus the study on adult patients specifically diagnosed with pancreatic pseudocysts, ensuring the relevance and specificity of the collected data. Adherence to these criteria enhances the precision of the study's outcomes and bolsters the validity of its findings, providing a robust foundation for investigating the nuanced aspects of pancreatic pseudocysts within the adult population. The careful consideration of these criteria is essential for maintaining the integrity and applicability of the study's results in advancing our understanding of this complex medical condition.

Patients diagnosed with acute pseudocysts were subjected to a conservative management approach, primarily focusing on symptomatic treatment. This initial strategy aimed to observe and monitor the patients closely, assessing the progression of the pseudocysts over time. The patients were carefully followed up to determine whether the cysts regressed or matured. For those individuals whose pseudocysts reached a mature stage, characterized by specific criteria or a certain timeframe, a more proactive intervention was employed. The decision-making process involved selecting the most appropriate drainage procedure tailored to the individual characteristics of each pseudocyst. This approach reflects a dynamic and patient-centered strategy, wherein the management plan evolves based on the natural course of the pseudocyst and its response to initial conservative measures. Such a nuanced approach allows for a more personalized and effective treatment strategy, ensuring that interventions are applied judiciously based on the evolving clinical circumstances of each patient.

Prognosis and diagnosis:

Diagnosis can only be set with medical imaging. Transabdominal ultrasound with its portability and ease of access is one of the most frequently used diagnostic tools in evaluating a pseudocyst. However, it is operator-dependent, with not reproducible results and imaging limitations such as overlying bowel-gas. Its sensitivity in the detection of PPs ranges from 70–90%. Computer tomography (CT), visualizing a thick-walled and clear fluid-filled mass adjacent to the pancreas, in a patient with history of acute or chronic pancreatitis, is almost pathognomonic for PP. Moreover, CT is also useful in the differential diagnosis between pseudocysts and walled-off necrosis, offering recognition of solid components and debris. Sensitivity of CT in diagnosing pseudocysts ranges from 90–100%. Magnetic resonance imaging (MRI) and magnetic resonance cholangiopancreatography (MRCP), are the most accurate and sensitive diagnostic tools, in order to evaluate the anatomy of the pancreatic duct.

The percutaneous drainage procedure was executed under radiological guidance as part of the intervention strategy. In selected cases, a more targeted approach was employed, utilizing either endoscopic drainage or surgical drainage techniques such as cystogastrostomy and Roux-en-Y cystojejunostomy. The selection of these procedures was likely based on the specific characteristics and requirements of each pseudocyst, ensuring a tailored and effective treatment approach. Following the discharge of patients from the hospital, a comprehensive follow-up protocol was implemented, spanning a period of 6 months to 1½ years. During this post-discharge phase, patients were regularly monitored to assess the long-term outcomes of the implemented drainage procedures. The details of their progress, complications, and overall well-being during this extended follow-up period were meticulously recorded in the study proforma. Subsequently, a thorough analysis of the compiled data was undertaken, aligning with the various aims and objectives outlined in the study. This analytical phase likely involved scrutinizing the effectiveness of different drainage modalities, evaluating the recurrence rates, and assessing the overall impact on patient outcomes. The meticulous collection and analysis of data following a diverse range of interventions contribute to a more comprehensive understanding of the dynamics and efficacy of different management strategies for pancreatic pseudocysts.

RESULTS:

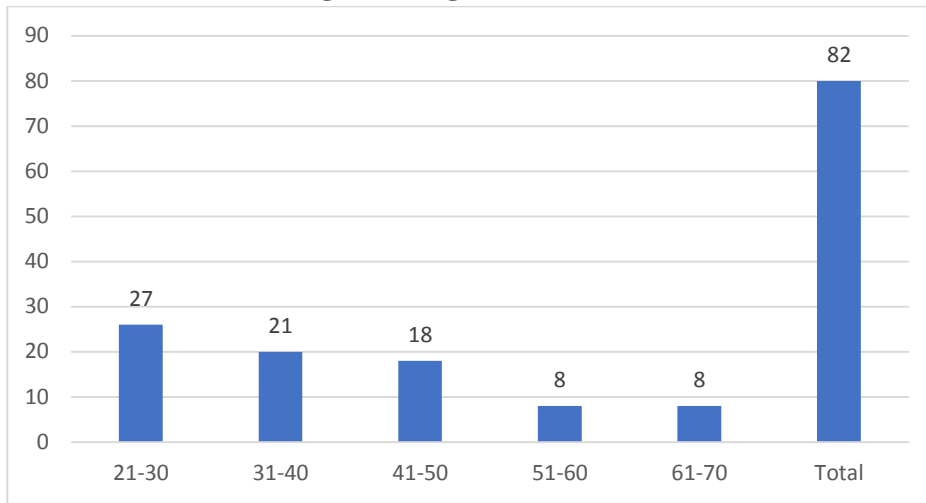
This prospective study involved 80 adult patients, providing valuable insights into the demographic distribution within the cohort. Among the participants, a notable 32.5% fell within the age range of 21 to 30 years, reflecting a substantial representation of younger adults. The subsequent age group of 31 to 40 years comprised 25% of the study population, indicating a sustained presence in the relatively younger adult demographic. The mean age across the entire cohort was calculated to be 39 ± 13 years, offering a central reference point for the distribution.

Conversely, a comparatively smaller proportion, specifically 20%, was observed beyond the age of 50 years. This finding suggests a declining frequency of cases in older age groups within the study sample. The distribution of ages in this study provides a nuanced understanding of the prevalence of pancreatic pseudocysts across different age brackets, highlighting a concentration in the younger adult population and a decreasing trend in occurrence with advancing age. Such demographic insights contribute to the contextualization of the study's findings and may have implications for the understanding and management of pancreatic pseudocysts in distinct age groups.

Table 1: Age distribution.

Age in years	Number of patients	Percentage
21-30	27	32.5
31-40	21	25
41-50	18	22.5
51-60	8	10
61-70	8	10
Total	82	100

Figure 1: Age distribution.



In our study involving 82 patients, a notable gender-based distribution was observed, revealing that 90% of the participants were males, while the remaining 10% were females. This significant male predominance in the study population suggests that the particular disease under investigation exhibits a substantial gender bias, with a male-to-female ratio of 9:1. The skewed gender distribution underscores the importance of considering gender-specific factors in the context of the disease's prevalence and presentation. Such insights can have implications for both the understanding of the disease's underlying mechanisms and the development of targeted interventions. Additionally, this finding prompts further exploration into the potential role of gender-related factors in the pathogenesis and manifestation of the studied condition, offering valuable considerations for future research and clinical management strategies.

Figure2: Gender distribution

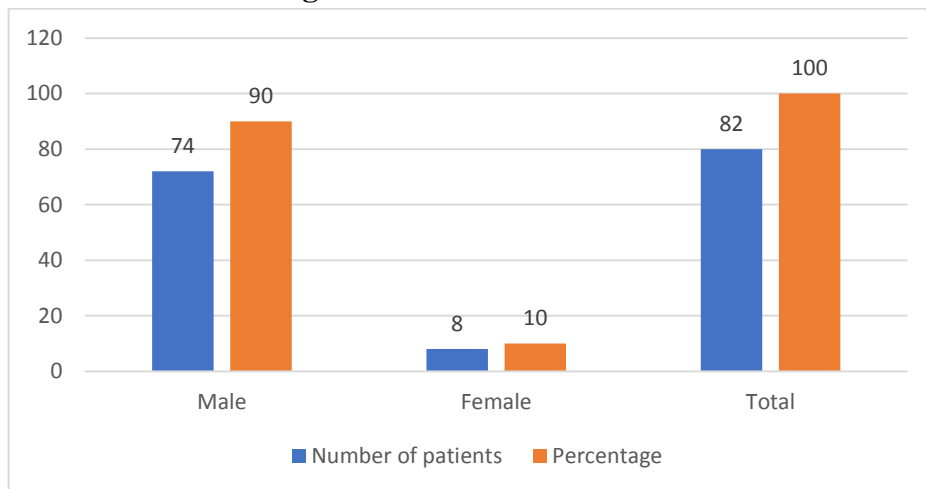


Figure3: Etiology

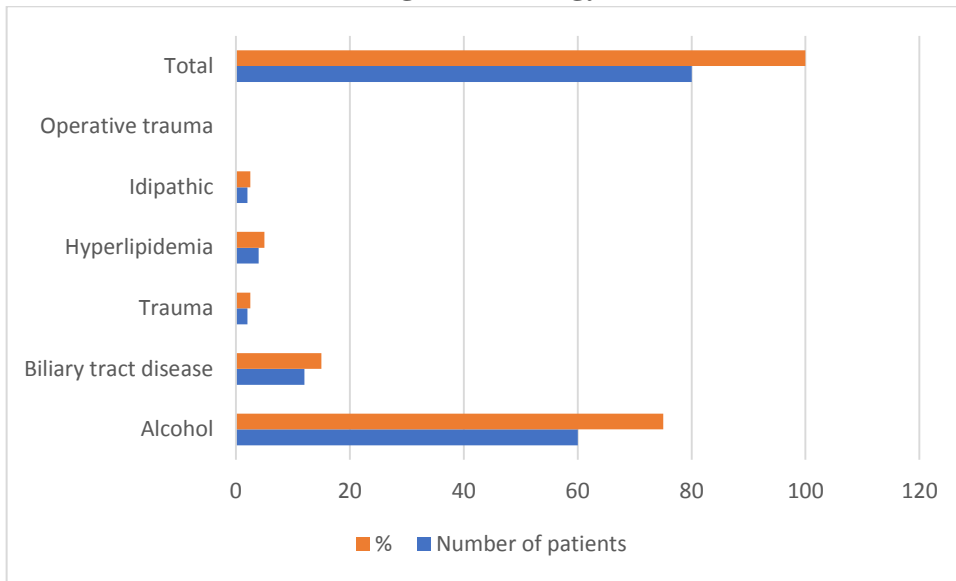
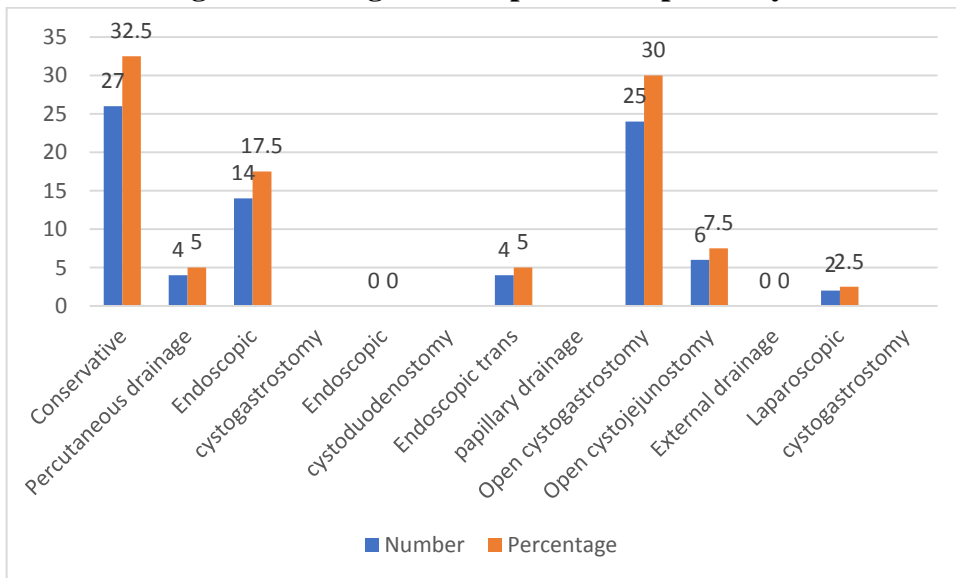


Table 2: Co-morbid conditions.

Co-morbid conditions	Number of patients	%
Absent	35	42.5
Present	47	57.5
LD	4	5
DM	18	22.5
HTN	21	25
IHD	4	5

Figure4: Management of pancreatic pseudocyst



DISCUSSION:

In this comprehensive study involving 82 patients, a thorough analysis of demographic and clinical data revealed significant patterns related to age, gender, and associated risk factors. The majority of patients, accounting for 32.5%, fell within the 21-30 years age group, with a subsequent proportion in the 31-40 years age range. The mean age of 39 ± 13 years indicated that pancreatic pseudocysts are more prevalent in the younger and middle-aged population, potentially attributed to increased alcohol consumption within this age cohort.¹² Further examination of gender distribution demonstrated a noteworthy predominance in males, constituting 90% of the study population, reaffirming the association between male gender and a higher incidence of pancreatic pseudocysts. This correlation is likely influenced by the elevated rates of alcohol consumption observed among males in the study, with 75% of patients reporting a history of alcohol intake. Notably, the study also identified biliary tract disease as a contributing factor in 15% of cases. Symptomatology analysis revealed that 85% of patients presented with abdominal pain, making it the most common presenting complaint. A significant portion, 60%, exhibited a mass in the abdomen, while 40% reported symptoms of nausea and vomiting. These findings underscore the prominence of abdominal pain and gastrointestinal symptoms as primary reasons for seeking medical attention.¹³ The study's multifaceted insights contribute to a nuanced understanding of the demographic and clinical landscape of pancreatic pseudocysts, emphasizing the interplay of age, gender, and lifestyle factors in the manifestation of this condition.

In our extensive study, the intricate web of complications associated with pancreatic pseudocysts came to light, with gastric outlet obstruction emerging as the most prevalent complication, affecting 10% of the patients. This was followed closely by the occurrence of ascites and infection, documented in 7.5% and 5% of patients, respectively. The diversity in these complications underscores the multifaceted nature of pseudocysts, a complexity intricately woven by factors such as their size, location, and duration. Radiological imaging conducted in our study provided a revealing glimpse into the underlying pancreatic conditions, identifying acute pancreatitis in 22.5% of patients and chronic pancreatitis in a substantial 40% of the cohort.¹⁴ These findings align seamlessly with the observations of Rosso et al., who reported pseudocysts arising in 10-20% of cases in acute pancreatitis and 20-40% in chronic pancreatitis. This concurrence further solidifies the understanding of the interplay between pseudocysts and different stages of pancreatic inflammation. Internal drainage emerged as the cornerstone of our management strategy, standing out as the most frequently performed procedure. This reflects the clinical utility and effectiveness of internal drainage techniques in addressing the challenges posed by pseudocysts. Notably, within the subset of patients undergoing endoscopic drainage (comprising 22.5% of the cohort), a significant 77.8% opted for the transmural drainage approach. This choice echoes the efficacy of transmural drainage, a sentiment reinforced by Baron et al.'s study, where 84.3% of patients undergoing endoscopic drainage similarly embraced this approach. These findings collectively underscore the pivotal role of internal drainage techniques, particularly the transmural method, as a less invasive yet highly effective alternative in the nuanced management of pseudocysts. The study's comprehensive insights contribute significantly to the evolving understanding of this complex medical condition, shedding light on varied complications and management strategies and paving the way for enhanced clinical practices in the future.

The landscape of outcomes associated with drainage procedures for infected pancreatic pseudocysts has become a subject of considerable debate within the medical community, yielding conflicting findings in the literature.¹⁵ A study by Sadik et al. reported a notable incidence of complications following the drainage of infected pseudocysts, sounding a cautionary note regarding the potential risks inherent in such interventions. In contrast, our study aligns more closely with the observations made by Varandajuru et al., which suggest a relatively lower rate of complications following the drainage of infected pseudocysts.

Delving deeper into the intricacies of infection and its systemic markers, our research explored the relationship between elevated infection parameters—specifically, C-reactive protein and white blood cell count—and the occurrence of complications. Surprisingly, we observed that heightened infection parameters did not show a significant correlation with an increased likelihood of complications. This intriguing finding raises the prospect of chronic systemic inflammation and accelerated biological aging influencing the outcomes in patients with chronic pancreatitis. While our study provided valuable insights into the general trends surrounding complications, we identified specific risk factors associated with drainage procedures.¹⁶ Notably, large pseudocysts situated in the pancreatic head were found to be more susceptible to treatment-related complications, including hemorrhage, perforation, and the formation of fistulae. In response to this challenge, innovative approaches were considered, such as the implementation of irrigation via a nasocystic drainage. This method holds promise as a potential strategy for reducing complication rates in large cysts, presenting an avenue for enhancing the safety and efficacy of drainage procedures. In summary, our study contributes a nuanced perspective to the ongoing discourse on the outcomes of drainage procedures for infected pancreatic pseudocysts. By shedding light on risk factors and proposing potential mitigating strategies, we aim to advance the understanding of the complexities involved in managing these challenging cases, ultimately fostering improved clinical practices.¹⁷ The conclusion drawn from various studies suggests that the ultimate choice of management for pancreatic pseudocysts is contingent upon the availability of resources and local expertise. In the present study, a notable 37.5% of patients underwent internal drainage, surpassing the 22.5% of patients managed through endoscopic interventions. This discrepancy may be attributed to the varying clinical presentations and complexities of pseudocysts, prompting a tailored approach based on individual patient characteristics and the resources at hand. All patients, regardless of the chosen management strategy, were diligently followed up for a duration spanning from 6 months to 1½ years post-discharge. Those who underwent conservative management experienced complete resolution of the cyst by the conclusion of the study period. This favorable outcome underscores the effectiveness of conservative approaches, emphasizing the importance of vigilant monitoring and appropriate intervention based on the evolving clinical course. For patients managed endoscopically, a meticulous follow-up protocol was implemented. Regular ultrasound examinations of the abdomen were conducted every month to monitor the progress and assess the resolution of the pseudocyst.^{18,19} Additionally, in 20 patients, double pigtail stents, commonly used in endoscopic drainage procedures, were removed as part of the post-treatment follow-up. This iterative monitoring approach ensures the comprehensive evaluation of treatment outcomes and provides valuable insights into the long-term efficacy of endoscopic interventions for pancreatic pseudocysts. In summary, the diverse management strategies observed in the study reflect the nuanced decision-making process influenced by available resources and local expertise. The

meticulous follow-up protocols employed for both conservative and endoscopic approaches contribute to a comprehensive understanding of the trajectory of pseudocyst resolution, further refining the knowledge base for optimal management strategies in varied clinical scenarios. On the other hand, pathogenesis of pseudocysts formation following chronic pancreatitis is not well understood. It seems that apart from the acute fluid exacerbation, blockage of the main pancreatic duct from a protein plug or calculus can lead to the pseudocyst formation. Connection between a pseudocyst and the main pancreatic duct can be demonstrated in two thirds of the patients, whereas in the rest, the connection is sealed probably from an inflammatory reaction. Nowadays, surgical resection is warranted for cases in which the other modalities of treatment have failed or cannot be performed, for cases of recurrent pseudocysts, when the diagnosis of cystic neoplasm cannot definitely be ruled out and finally for cases combined with bile duct or duodenal stenosis^{20, 21}.

CONCLUSION:

Notably, pseudocysts exhibit a higher prevalence in males than females, with a concentration in the age group of 21-30 years, followed by individuals aged between 31-40 years. Management of PPs has evolved over the years, from an aggressive approach, to a more conservative management. In cases of symptomatic or complicated pseudocysts, a plethora of techniques and types of drainage can lead to almost 100% primary and overall success of pseudocyst drainage. The study's findings offer a comprehensive overview of pancreatic pseudocysts, aligning with the statistical data collected. The primary etiological factors identified are alcohol consumption, followed by biliary tract disease. Clinical presentations predominantly involve pain abdomen, followed by the occurrence of a mass in the abdomen. Complications associated with pseudocysts include gastric outlet obstruction and ascites. Biochemical analyses revealed elevated levels of amylase in 57.5% of patients and lipase in 80% of patients, with a consistent elevation noted in drain amylase/lipase for those who underwent endoscopic or open surgery. Radiologically, ultrasound served as the foundational investigation for all patients, supplemented by contrast-enhanced computerized tomography (CECT) abdomen when ultrasound alone was insufficient for diagnosis. The study advocates an initial conservative approach, reserving interventions for cases where necessary. However, when intervention is deemed essential, endoscopic drainage emerges as the preferred option due to its less invasive nature, high long-term success rates, shorter hospital stays, and increased patient comfort. Post-intervention, wound infections, pain, and bleeding were identified as the most notable complications. These comprehensive findings contribute to the evolving understanding of pancreatic pseudocysts, emphasizing the importance of tailored management strategies based on a thorough assessment of patient demographics, clinical presentations, and available resources.

REFERENCES:

1. Parks RW, Tzovaras G, Diamond T, et al. Management of pancreatic pseudocysts. *Ann R Coll Surg Engl* 2000;82:383-7.
2. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, et al. Classification of acute pancreatitis—2012: revision of the Atlanta classification and definitions by international consensus. *Gut*. 2013; 62(1):102–11.

3. Sarles H, Martin M, Camatte R, et al. The separation of the pancreatitis: the pseudocysts of acute pancreatitis and of chronic pancreatitis. *Presse Med* 1963;71:237-40.
4. D'Egidio A, Schein M. Pancreatic pseudocysts: a proposed classification and its management implications. *Br J Surg* 1991;78:981-4.
5. Nealon WH, Walser E. Main pancreatic ductal anatomy can direct choice of modality for treating pancreatic pseudocysts (surgery versus percutaneous drainage). *Ann Surg* 2002;235:751-8.
6. Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis--2012: revision of the Atlanta classification and definitions by international consensus. *Gut* 2013;62:102-11.
7. Bradley EL 3rd. A clinically based classification system for acute pancreatitis. Summary of the International Symposium on Acute Pancreatitis, Atlanta, Ga, September 11 through 13, 1992. *Arch Surg*. 1993; 128(5):586-90.
8. Ammann RW, Akovbiantz A, Largiader F, Schueler G. Course and outcome of chronic pancreatitis. Longitudinal study of a mixed medical-surgical series of 245 patients. *Gastroenterology*. 1984; 86(5 Pt 1):820-8.
9. O'Malley VP, Cannon JP, Postier RG. Pancreatic pseudocysts: cause, therapy, and results. *Am J Surg*. 1985; 150(6):680-2.
10. Cannon JW, Callery MP, Vollmer CM Jr. Diagnosis and management of pancreatic pseudocysts: what is the evidence? *J Am Coll Surg*. 2009; 209(3):385-93.
11. Gumaste VV, Pitchumoni CS. Pancreatic pseudocyst. *The Gastroenterologist*. 1996; 4(1):33-43.
12. Gurusamy KS, Pallari E, Hawkins N, Pereira SP, Davidson BR. Management strategies for pancreatic pseudocysts. *The Cochrane database of systematic reviews*. 2016.
13. Habashi S, Draganov PV. Pancreatic pseudocyst. *World J Gastroenterol*. 2009;15:38-47.
14. Morgan DE, Baron TH, Smith JK, Robbin ML, Kenney PJ. Pancreatic fluid collection prior to intervention: evaluation with MR imaging compared with CT and US. *Radiology*. 1997;203:773-8.
15. Callery MP, Meyers WC. Surgical treatment of pseudocysts after acute pancreatitis In Beger HG, Warshaw A, Carr-Locke DL, Russel RCG, Büchler M, Neoptolemos JP, Saar M (eds): *The pancreas*. Boston, Black well Scientific. 1998;614-26.
16. Nealon WH, Walser E. Surgical management of complications associated with percutaneous and/or endoscopic management of pseudocyst of the pancreas. *Ann Surg*. 2005;241:948-60.
17. Imrie CW. Epidemiology, clinical presentation and behaviour of acute pseudocysts. In, Bradley EL. *Acute pancreatitis diagnosis and Therapy*, New York, Raven Press. 1994:175-9.
18. Walt AJ, Bouwman DL, Weaver DW, Sachs RJ. The impact of technology on the management of pancreatic pseudocyst. 5th annual Samuel Jason Mixter Lecture. *Arch Surg*. 1990;125:759-63.
19. Pancreas club.com. Los Angeles: History of pancreas, pancreas club, Inc. c2012-13. Available at: <https://pancreasclub.com/home/pancreas/>.
20. Khanna AK, Tiwary SK, Kumar P. Pancreatic pseudocyst: therapeutic dilemma. *Int J Inflamm* 2012;2012:279476.
21. Andren-Sandberg A, Ansoorge C, Eiriksson K, et al. Treatment of pancreatic pseudocysts. *Scand J Surg* 2005;94:165-75.