

## CLINICAL STUDY AND MANAGEMENT OF PSEUDOCYST OF PANCREAS

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**Abstract**

**Background:** Pseudocyst is a common complication of pancreatitis. Accurate diagnosis and timely management is important. This study is to know the various etiologies and relative frequency of pseudocyst in relation to age and sex, establish an accurate diagnosis by relevant investigations, and to study the various modes of management like conservative, percutaneous drainage and surgery. The current study aims to review the various diagnostic and therapeutic procedures available for intervention and the relative efficacy of different management strategies for pseudocysts. **Material and Methods:** 30 patients with signs and symptoms of pseudocyst of pancreas admitted in Government General Hospital, Department of General Surgery, Kurnool during November 2018 to October 2020 were studied. Data related to the objectives of the study were collected. Collected data were analysed by comparing with various standard studies. **Results:** Majority of patients belonged to the age group of 31-50 years, which constituted 15 (50%) patients in the study. M: F = 5:1. Most common etiological factor was alcohol; most common mode of presentation was pain abdomen and tenderness. Incidence of palpable mass was in 80% of the patients studied, but with the usage of USG and CT- scan, pseudocyst was detected in all the cases. Conservative treatment was useful in uncomplicated, acute pseudocysts till they regress or mature when surgery became necessary. The results of internal drainage were excellent, which was done in 60% of the patients in our study. The postoperative complications include pain abdomen and wound infection seen in 9 patients in our study. **Conclusion:** Pseudocyst is the most common complication of pancreatitis. Early diagnosis with the aid of USG / CECT abdomen and timely management - internal drainage for mature cysts, external drainage for complicated cysts results in good prognosis.

## INTRODUCTION

The pancreas is the most unforging organ in the human body, leading most surgeons to avoid even palpating it unless necessary; hidden by its retroperitoneal location, the pancreas has, in the past, been a somewhat mysterious organ.

The rapid development of noninvasive imaging techniques has led to a much better understanding of pancreatic disease and pathology.

Pancreatitis is classified as acute or chronic based on its clinical characteristics, pathologic changes, and natural history.

Acute pancreatitis usually characterized by the acute onset of symptoms in a previously healthy individual and the disappearance of those symptoms as the attack resolves; in contrast, patient with chronic pancreatitis may have prior attacks or symptoms of either exocrine or endocrine insufficiency before the

current attack, and their symptoms may persist even after resolution of the current attack.

Complications of pancreatitis, including peripancreatic effusions, acute pseudocyst, and pancreatic necrosis, are now being differentiated.

The ability to study these lesions noninvasively at multiple points in times has allowed the distinction between acute and chronic pseudocyst, two seemingly similar entities with quite different natural history and treatment requirements.

**Aims and Objectives**

- To study various modes of clinical presentation (clinical profile) of patients with pseudocyst of pancreas admitted in Government General Hospital, Kurnool during the period – October 2018 to October 2020.
- To analyze the risk factors, clinical features, complications, and relative frequency of pseudocyst of the pancreas in relation to age and sex

- To establish an accurate diagnosis by various investigative procedures like USG abdomen, CECT abdomen, Barium meal, ERCP, etc....
- To evaluate the changing trends and relative efficacy of various modes of management like conservative, percutaneous drainage, and surgery.

## MATERIAL AND METHODS

### Patients and Methods

The Prospective clinical study of 30 cases of who presented with signs and symptoms of pseudocyst of the pancreas was conducted in Government General Hospital, Department of General Surgery, Kurnool, during a period of 2 years from November 2018 to October 2020.

### Method of Collection of Data

All the patients with suspected pseudocyst of the pancreas were investigated, offered individualized treatment, and followed up.

### Plan for Data Analysis

The clinical outcomes were documented using a standard proforma. The collected data were analyzed by comparing them with various standard studies on the pseudocyst of the pancreas.

### Inclusion Criteria

- Patients diagnosed as pseudocyst of pancreas with the help of clinical examination and diagnostic procedure like USG abdomen, CECT Abdomen, Upper GI endoscopy, Barium meal, ERCP, etc.,
- Admitted patients of both sexes and all age groups.

### Exclusion Criteria

- All the true cysts of the pancreas.
- Neoplastic cystic swellings of the pancreas.
- Parasitic cysts (Hydatid cyst) of the pancreas.
- Congenital cysts of the pancreas.

This study includes both adults and pediatric age group patients. Patients with a diagnosis of pancreatitis were admitted and monitored. If, during the course of their illness, they developed symptoms suggestive of the pancreatic pseudocyst, Ultrasonography of the abdomen was done, and if it confirms the presence of the pseudocyst, those patients were included in our study.

Those patients only with acute or chronic pancreatic or peripancreatic fluid collection without evidence of encapsulation on USG or who refused operation were excluded from the study.

The diagnosis of pseudocyst was made in all patients by USG abdomen initially. In addition, a CECT scan of the abdomen was performed in all 30 patients to define the exact size, location, extent, and relation of the pseudocyst to adjacent viscera, cyst wall thickness (maturity), and to diagnose any complications. Upper gastrointestinal endoscopy (UGIE) was performed in 25 patients to look for the indentation of the posterior wall of the stomach/duodenum caused by the pseudocyst and to plan the surgical approach accordingly. Barium meal was done in selected (5) patients to know the

compression effect on adjacent organs - mainly the stomach.

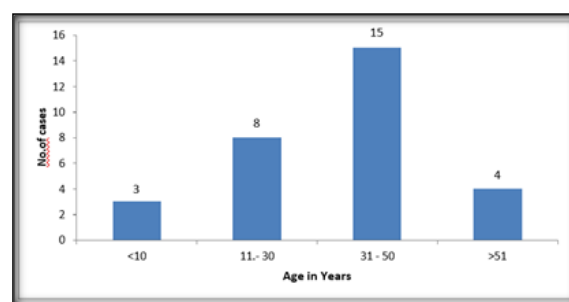
Demographic data were collected, including the age and sex of the patient, as well as the etiology of pancreatitis. Every patient with a pseudocyst had serial USG studies to monitor the progression of the cystic collection.

All patients with acute pseudocyst were managed conservatively by withholding oral intake, IV fluids, analgesics, and antibiotics as long as they had pain abdomen, vomiting, or ileus. They were then followed up if the cyst did not regress. Follow up continued till the cyst wall is matured.

All mature cysts were treated surgically. Data like duration of hospital stay, conservative management, and its results and surgical procedure done and their results, complications if any, the progress of the pseudocyst on follow-up were carefully recorded.

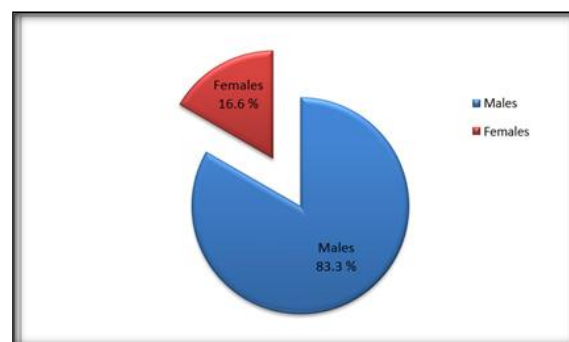
## RESULTS

The results obtained in our study during the period – October 2018 to October 2020 at Government General Hospital, Kurnool, were analyzed as follows.



Graph 1: Age Distribution

In our study of 30 patients, the age of patients was from 2 years to 65 years. Pseudocyst of the pancreas was common in the age group 31 – 50 years (50%) with a mean age of 37 years. This is probably due to alcohol use, which is common in this age group.

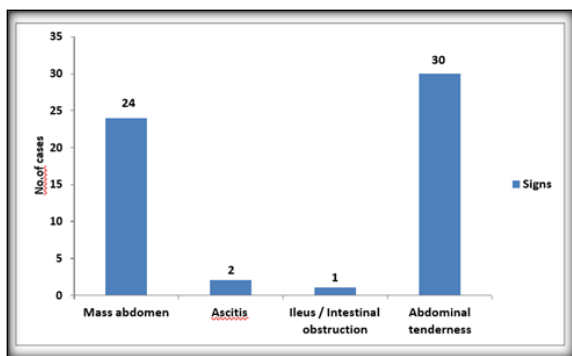


Graph 2: Sex Distribution

In our study of 30 patients, there were 25 (83.3%) male patients and 5 (16.6%) female patients, indicating that the disease is more common in males with a male to female ratio of 5:1. This was due to a higher alcohol intake in males.

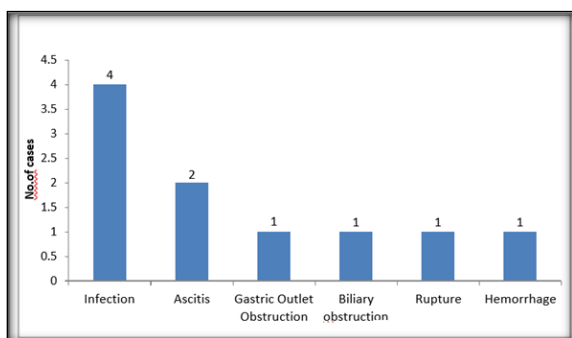
The most common symptom was upper abdominal pain, which was present in all patients (100%), followed by nausea/vomiting, which was present in 80% of the patients,

and abdominal distension (mass) present in 80% of the patients. [Table 1]



**Graph 3: Signs**

The most common sign was upper abdominal tenderness, which was present in all patients (100%), followed by mass per abdomen, which was present in 80% of the patients. The most common risk factor was alcohol, which was present in 66.6% of the patients, followed by idiopathic in 16.6%, blunt trauma was present in 13.3%, and biliary disease in one patient (3.33%). [Table 2]



**Graph 4: Associated Complications**

Infection was the most common complication found in 13.3% of patients, followed by ascites (6.66%), one case each with gastric outlet obstruction, biliary obstruction/jaundice, and ruptured pseudocyst (3.33% each), and there was one case of hemorrhage presenting as massive hematemesis (3.33%).

USG was the basic investigation done in all patients (100%).

Contrast-enhanced CT scan (with oral and intravenous contrast) was performed in all 30 patients to assess the exact size, location, wall thickness, and relation of the pseudocyst to adjacent organs and also to look for associated complications and guide the appropriate modality of treatment. CECT scan also provided information about the status of the pancreatic parenchyma and pancreatic duct, i.e., any evidence of pancreatic necrosis, main pancreatic duct dilatation or calculi, etc.

Upper gastrointestinal endoscopy was done in 17 cases, and Barium meal was done in 5 (16.6%) of the patients with complaints suggestive of adjacent organ compression - mainly stomach.

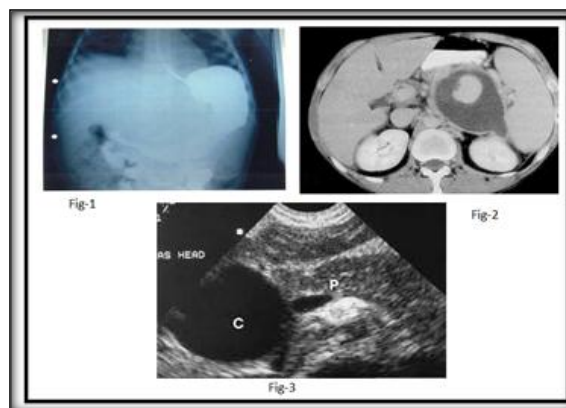
Two patients (6.6%) who needed an ERCP: 1 patient with jaundice due to extrinsic biliary compression by the pseudocyst underwent ERCP with Endoscopic Sphincterotomy and Common Bile Duct stenting. Another patient with a ruptured pseudocyst and massive ascites was managed initially with external catheter drainage. An ERCP at a later date showed pancreatic duct disruption - a

pancreatic duct stent was placed with subsequent resolution of ascites.

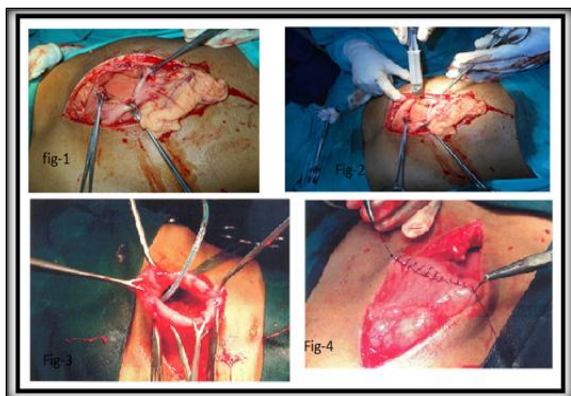
Serum amylase was raised in 12 (40%) patients who presented with a picture of acute on chronic pancreatitis. Ascitic fluid amylase was done in 2 (6.6%) of the patients, and the result was positive. [Table 3]

Surgery was the mainstay of treatment in the majority of the patients - with cystogastrostomy being the most commonly performed procedure in 14 patients (46.66%) - 12 patients underwent Open Cystogastrostomy, and two patients with appropriately located pseudocysts in the lesser sac arising from the body of pancreas and indenting the posterior gastric wall were offered Laparoscopic anterior trans-gastric cystogastrostomy (mean operating time = 110 min; mean hospital stay = 6 days). Conservative management was successful in 6 (20%) patients. External catheter drainage was needed in 5 (16.66%) patients, especially those with infected pseudocysts / ascitis, and in 1 patient who had ruptured pseudocyst with gross ascites. Percutaneous USG guided aspiration sufficed in 1 (3.33%) patient with a small collection in the sub-hepatic pouch. The other surgical procedures performed were: Roux-en-Y Cystojejunostomy in 2 (6.66%) patients, Cystoduodenostomy was done in 1 (3.33%) patient. One patient who presented with massive hematemesis and was found to have splenic artery pseudoaneurysm with hemorrhagic pseudocyst in the tail of the pancreas underwent Distal Pancreatic-splenectomy.

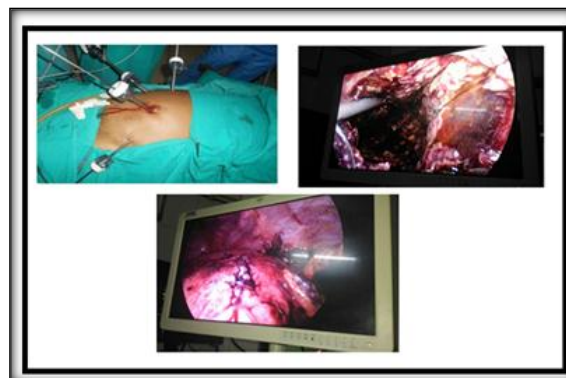
In all the surgical cases, the pseudocyst fluid was rich in amylase, and the cyst wall biopsy was negative for malignancy. [Table 4]



**Figure 1: Barium meal X-ray AP view stomach compressed on medial aspect and pushed laterally and downwards by PPC. Figure 2: CT scan showing i.v contrast leak within a hemorrhagic pseudocyst with splenic artery pseudoaneurysm Figure 3: USG showing edematous pancreas with pseudocyst**



**Figure 1:** PPC seen on opening the anterior wall of the stomach, **Figure 2:** Pseudocyst fluid being aspirated through the posterior wall of the stomach, **Figure 3:** Completed Cystogastrostomy, **Figure 4:** Closure of anterior wall of the stomach



**Laparoscopic anterior trans-gastric cysto-gastrostomy**

**Table 1: Symptoms**

Symptoms	No. of patients	Percentage (%)
Abdominal pain	30	100.0
Nausea / vomiting	24	80.0
Abdominal distension	24	80.0
Anorexia / Weight loss	6	20
Fever	4	13.3
Jaundice	1	3.3
Hematemesis	1	3.3

**Table 2: Risk Factors**

Risk factors	No. of case	Percentage (%)
Alcohol	20	66.6
Idiopathic	5	16.6
Blunt trauma	4	13.3
Biliary disease	1	3.3

**Table 3:**

Investigation findings	No. of case	Percentage (%)
Increased Serum amylase	12	40
Increased Ascitic amylase	2	6.6
USG (+ve)	30	100
CECT scan (+ve)	30	100
Upper GI endoscopy	17	56.6
Barium meal	5	16.6
ERCP	2	6.6

## DISCUSSION

A pseudocyst is a well-circumscribed fluid collection with no associated necrosis of tissue that is present for four or more weeks after disease onset. The development of the pseudocyst requires disruption of the pancreatic duct, and this occurs in the context of acute pancreatitis (10-15% of cases), trauma, or duct obstruction in chronic pancreatitis (20-40% of cases).<sup>[1,2]</sup>

The clinical study of 30 cases of pseudocyst of the pancreas was conducted by selecting patients from Government General Hospital, Kurnool, during a period of 2 years from October 2014 to October 2016. Most of the results of our study were compared with two standard studies by Tuula kiviluoto et al,<sup>[3]</sup> (1989) and V. Usatoff et al. (2000).<sup>[4]</sup>

Out of 30 cases, three were of the pediatric age group, and the rest 26 cases belonged to the adult group.

Out of 30 cases, 25 patients were male, and five patients were female. This is compared with the study of V. Usatoff et al. (2000) and Tuula kiviluoto et al. (1989).

Alcohol is the most common risk factor for acute/chronic pancreatitis and the subsequent development of pseudocyst. In our study, the incidence of pseudocyst of pancreas predominated in males (25 Males Vs. 5 Females) with an M: F ratio of 5:1. This is because of the fact that alcohol consumption is more common in males compared to females. Our results are comparable with that of Tuula kiviluoto et al., where the M: F ratio was 4:1. In this study, the common age group was 31-50 years (50% cases) and was compared with a study group of Tuula kiviluoto et al. (1989) and V. Usatoff et al. (2000).

These findings are probably due to the increased frequency of alcohol consumption in this age group

(31-50 years). 4 patients were over the age of 51 years in our study. There were only three patients in the pediatric age group, the cause of pancreatitis/pseudocyst formation was blunt trauma abdomen in one child, and in the remaining two children, the reason was unknown/idiopathic.

The mean age at diagnosis in this study was 37 years, which is comparable to the study by V. Usatoff et al., in which the mean age at presentation of pseudocyst was 39 years.

In our study, the most common symptom patients presented with was pain abdomen and mass per abdomen. These symptoms were compared with the study group of Tuula kiviluoto et al. (1989) and V. Usatoff, et al. (2000).

All 30 patients in our study group presented with pain abdomen, and 24 patients had a mass per abdomen (80%).

The most common risk factor in our study was alcohol (66.6%). This is compared with the study group of Tuula kiviluoto et al.

In our study, alcohol was the commonest risk factor for the development of pseudocyst of the pancreas, especially in males.

#### **Alcohol has a number of deleterious effects on the pancreas**

- It triggers pro-inflammatory pathways such as nuclear factor  $\kappa$ B (NF- $\kappa$ B), which increases the production of TNF- $\alpha$  and IL-
- It also increases the expression and activity of caspases – proteases that mediate apoptosis.
- In addition, alcohol decreases pancreatic perfusion, induces sphincter of Oddi spasm, and obstructs pancreatic ducts through the precipitation of proteins (lithostathine and GP 2) inside the ducts.<sup>[5]</sup>
- Several products of ethanol metabolism, such as fatty acid ethyl esters and reactive oxygen species, cause fragility of Intra acinar zymogen granules and lysosomes, which leads to abnormal pancreatic enzyme activation and autodigestion.
- Acetaldehyde, another alcohol metabolite, causes direct acinar cell injury.

All the above mechanisms are causative in the pathogenesis of acute/chronic pancreatitis and pseudocyst formation.

#### **Complications**

With the advent of modern imaging practice, a higher proportion of asymptomatic pseudocysts are diagnosed. As a result, the risks of pseudocyst-related complications are probably less than previously considered when pseudocysts were diagnosed on the basis of symptoms. Complications occur in about ten percent of cases, and the four main complications are infection, rupture or internal fistulation, bleeding, and mass effect.<sup>[6]</sup> The most common complication in our study was an infection, followed by ascites. This is compared with the results of V. Usatoff et al. (2000).

Poor, ignorant patients belonging to low socio-economic status often present late with complications

to our setup / Government General Hospital, Kurnool, due to lack of awareness of the pancreatitis disease process and limited access to healthcare facilities. This may be the reason for the slightly higher incidence of pseudocysts with complications in our study as compared to V. Usatoff et al.

Pseudocysts are initially sterile, but infection can occur in up to 25% of cases.<sup>[6,7]</sup> An infected pseudocyst is a circumscribed intra-abdominal collection of pus, usually in close proximity to the pancreas. 4 patients in our study had infected pseudocysts and were managed by Percutaneous / External catheter drainage with the widest possible drains placed under image (USG) guidance along with appropriate antibiotics and supportive care. The progress of the patients was assessed with repeated scans, and the drains needed to be flushed regularly. 2 patients required repositioning/reinsertion of the drains.

One patient presented acutely with massive, generalized, enzyme-rich pancreatic ascites secondary to a ruptured pseudocyst.

Paracentesis revealed turbid fluid with a high amylase level. Adequate drainage with wide bore drains placed under USG guidance was attempted. The patient received parenteral nutrition, and octreotide was administered to suppress pancreatic secretion.

An ERCP demonstrated duct disruption, and the patient underwent pancreatic duct stent placement with subsequent resolution of ascites.

Bleeding associated with pseudocyst of the pancreas can be a life-threatening complication. One patient in our study presented in the emergency setting with massive hematemesis and hemoglobin of 4.5gm%. The patient was resuscitated with four units of blood transfusion, and a triple-phase contrast-enhanced CT scan of the abdomen was performed, which revealed a hemorrhagic pseudocyst in the tail of the pancreas with a splenic artery pseudoaneurysm. The action of pancreatic enzymes (especially elastase) on the vessel wall can lead to the thinning of the vessel wall with pseudoaneurysm formation. The bleeding risk is increased in the presence of local infection. This situation carries high mortality (20%).<sup>[8]</sup>

On exploration, splenic artery pseudoaneurysm densely adherent to adjacent structures and associated with distal pancreatic necrosis was found. We performed a distal pancreatic-splenectomy with proximal ligation of the feeding vessel with necrosectomy. The patient went into irreversible hemorrhagic shock and succumbed to death on 1st postoperative day.

Recent data suggest that symptomatic and high-risk peripancreatic pseudoaneurysms should be promptly identified and treated. Nowadays, transcatheter embolization is also a good option with comparable results in stable patients.<sup>[9]</sup>

#### **Treatment**

The treatment of choice for pseudocyst of pancreas depends on a number of factors, including size, number, and location of pseudocysts; whether the

MPD is obstructed or communicating with the pseudocyst; and whether there are complications of the pseudocyst. The most important factor dictating the mode of treatment is local expertise.<sup>[10]</sup>

Treatment commonly performed in our study was internal drainage in 53.3%.

This is compared with a study group of Tuula kiviluoto et al. (1989) and V. Usatoff et al. (2000). Conservative management was done in 20% of the patients, and percutaneous aspiration in 3.3% of patients in our study group. 16.6% of the cases in our study, especially those with infected pseudocysts/ascites, underwent external catheter drainage.

A well-matched population-based study comparing percutaneous (n = 8121) with open surgical drainage (n = 6409) in 14,914 patients with pancreatic pseudocysts revealed a longer length of hospital stay and twice the mortality (5.9% vs. 2.8%) for the former.<sup>[11]</sup> Currently, there is limited use of percutaneous/external pseudocyst drainage unless there is an underlying medical problem or cyst complication.

Despite many alternatives and less invasive approaches, it is important to emphasize that the most effective and reliable approach to treating a pseudocyst is internal drainage by an open surgical approach. In our study, surgery was the mainstay of treatment in a majority of the patients - with cystogastrostomy being the most commonly performed procedure in 14 patients (46.66%) – 12 patients underwent Open Cystogastrostomy, and two patients with appropriately located pseudocysts were offered Laparoscopic Cystogastrostomy (mean operating time = 110 min; mean hospital stay = 6 days). The other surgical procedures performed were: Roux-en-Y Cystojejunostomy in 2 (6.66%) patients, Cystoduodenostomy was done in 1 (3.33%) patient.

#### **Laparoscopic procedures**

At GEM Hospital, India, in 2007, Chinnusamy Palanivelu et al. evaluated 108 cases with pseudocyst managed laparoscopically.<sup>[12]</sup>

Laparoscopic Cysto-gastrostomy (LCG) was performed in 90 cases (83.4%), Laparoscopic Cystojejunostomy (LCJ) in 8 cases (7.4%), Open cysto gastrostomy (OCG) in 2 cases (1.8%), and laparoscopic external drainage in 8 cases (7.4%). The mean operating time was 95 minutes, and the mean hospital stay was 5.6 days. All operations were successful without any significant intraoperative complications.

In their study, two patients were reoperated for bleeding and gastric outlet obstruction, while another patient had a late recurrence due to inadequate stoma size and was managed by open CG later. No mortality was reported in the postoperative period.

Laparoscopic pseudocyst surgery is minimally invasive, provides detailed information about pseudocyst location and the relationship with adjacent organs, and enables adequate drainage.

The morbidity is low, cyst wall biopsy is achievable, and cholecystectomy can be added to the procedure in the presence of biliary pancreatitis.

Numerous techniques have been reported for laparoscopic pseudocyst surgery thus far, including anterior and posterior cystogastrostomies, endoscopy-assisted surgery, and cystojejunostomy.<sup>[13,14]</sup>

However, there is no consensus on the appropriate technique of laparoscopic surgery, and the conclusions were usually built upon individual preferences.

We considered the adherence between the posterior gastric wall and pseudocyst, as it is the surgical landmark in deciding on the appropriate technique. In our study, two patients with appropriately located pseudocysts in the lesser sac arising from the body of pancreas and indenting the posterior gastric wall were offered Laparoscopic anterior trans-gastric cystogastrostomy (mean operating time = 110 min; mean hospital stay = six days), and the outcomes were excellent.

Laparoscopic surgery for internal drainage of pseudocyst of the pancreas is a safe procedure and offers all the benefits of minimally invasive surgery, but needs expert skills.

#### **Endoscopic drainage procedures**

The purpose of endoscopic drainage is to create a connection between the pseudocyst and the digestive canal. This is accomplished through transmural or transpapillary drainage.<sup>[15]</sup>

Transmural drainage is performed through the gastric, duodenal, or jejunal wall when the distance between the pseudocyst and the gastrointestinal wall is <1 cm.

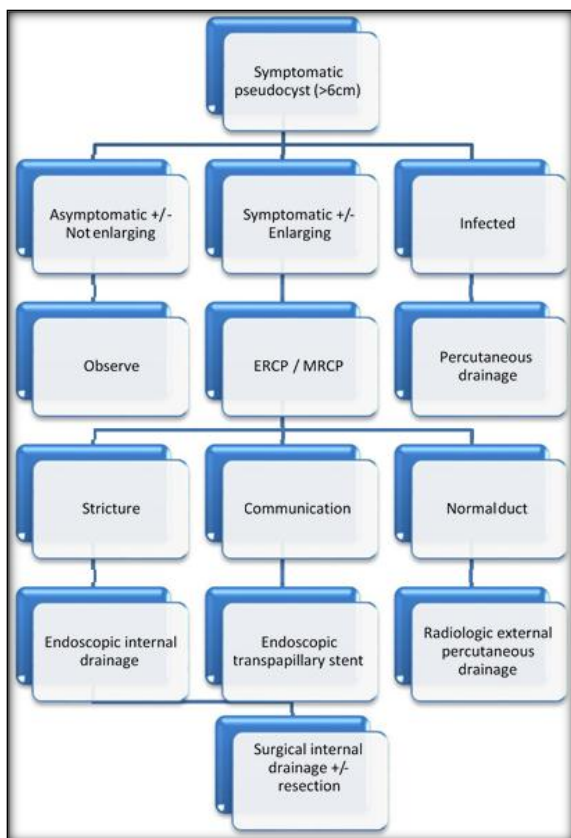
Transpapillary drainage is performed by Endoscopic Retrograde Cholangiopancreatography (ERCP) when the pseudocyst cavity has a communication with the pancreatic duct.

Endoscopic drainage procedures are associated with a higher complication rate of (20%) and are limited to specialized centres.

Endoscopic drainage of pseudocysts could not be performed in our study setup due to a lack of necessary equipment and expertise.

#### **TREATMENT ALGORITHM FOR PANCREATIC PSEUDOCYSTS**

With the range of approaches to the treatment of pancreatic pseudocysts and the variation in the availability of equipment and expertise, it is necessary to develop a rational treatment algorithm that is appropriate for the clinical setting and patient.



**Algorithm for investigation and treatment of pancreatic pseudocysts. ERCP, Endoscopic retrograde cholangiopancreatography; MRCP, Magnetic resonance cholangiopancreatography**

### Postoperative complications

In our study, the most common complication was persistent pain abdomen followed by wound infection in the immediate postoperative period. This is compared with the study group of Tuula Kiviluoto et al. (1989) and V. Usatoff, et al. (2000).

Immediate postoperative complications in our series include: pain abdomen present in 16.6% of the patients and wound infection in 13.3% of the patients. The total duration of hospital stay in our study was 10 to 15 days.

### Mortality

In our study, one patient (3.3%) with pancreatic tail pseudocyst and actively bleeding splenic artery pseudoaneurysm who underwent splenic artery ligation and distal pancreatic-splenectomy died in the immediate postoperative period (post-op day 1) due to hemodynamic instability and shock.

### Follow up

In all surgical cases, the Pseudocyst wall biopsy was negative for malignancy in our study. Most patients in our study were followed up to periods varying from 3-6 months. There were no complications except recurrence in two patients who refused admission. Three of the patients were lost to follow up.

## CONCLUSION

The disease is most commonly seen in the age group 31-50 years. Most common in males. The most common cause of pseudocyst is alcohol-induced, followed by idiopathic. The most common presentation is pain abdomen with abdominal tenderness and mass per abdomen.

Ultrasonography was the most useful initial investigation for diagnosis and follow-up. CECT abdomen better delineated the size, location, and relation of the pseudocyst to adjacent viscera and was instrumental in the diagnosis of associated complications. Few patients required UGI endoscopy, ERCP, Barium meal, etc. Acute pseudocysts were treated conservatively; infected cysts and ruptured cyst required external drainage. Percutaneous aspiration resulted in recurrence in our case. Anastomoses of pseudocyst to the nearby bowel, either cystogastrostomy or cystojejunostomy, was done in the majority of the cases with good results.

Laparoscopic surgery for internal drainage of pseudocyst of the pancreas is a safe procedure and offers all the benefits of minimally invasive surgery, but needs expert skills.

Endoscopic drainage of pseudocysts could not be performed in our study setup due to a lack of necessary equipment and expertise.

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