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Original research article

Study of the Outcomes of Percutaneous Drainage of Pancreatic Pseudocyst in Tertiary Care Centers

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Abstract

Introduction: This study aims to study the various outcomes of percutaneous drainage of pancreatic pseudocyst and the factors that favor the successful outcome of this procedure.

Materials and Methods: This longitudinal study was approved by the Institutional Ethics Committee and included a group of 66 patients who were diagnosed with pancreatic pseudocyst with no prior intervention done at the time of admission. The patients were evaluated and underwent radiological image guided insertion of a percutaneous drain and were monitored throughout the course of their treatment and recorded drain amylase levels, complications, length of hospital stay and duration of catheter dwell time. Results were there analyzed to study those characteristics which increased the success of this procedure.

Results: A total number of 66 patients were included in this study out of which 29 were successfully treated with percutaneous drainage. Demographic data collected showed that men and those between the ages of 31-40 were most often diagnosed with a pancreatic pseudocyst. 37 patients did not benefit from this procedure and developed recurrence, complications and required need for surgical intervention. There were no deaths noted. In addition to this it was found that comparatively raised drain amylase levels were associated with a higher rate of failure. Patients were followed up for a period of 2 months after discharge.

Conclusion: This procedure despite being a safe and minimally invasive method of treatment of pancreatic pseudocyst requires proper patient selection to optimize the outcomes and reduce the risk of need for further surgical treatment.

Keywords: Amylase, Pancreatitis, Pancreatic pseudocyst, Percutaneous drainage

Introduction

Pancreatic pseudocysts develop as a complication following acute pancreatitis or an exacerbation of chronic pancreatitis. Historically, these have been managed by conservative or surgical approach. However, recent advances in radiological imaging and guided endoscopy have introduced a minimally invasive approach into their treatment algorithm. The management of pseudocyst largely depends on the etiology, location, size complications if any. Following an attack of acute pancreatitis, the cystic lesions within the pancreas are more likely to spontaneously resolve within a period of 6 weeks but this unlikely to occur in the event of chronic pancreatitis due maturation of the cyst wall.[1,2]

The incidence of pseudocysts in both settings have been studied in large series of clinical trials according to which the incidence of a pseudocyst following acute pancreatitis varies from 5-16% [3,4,5]. The rates are increased in patients suffering from chronic pancreatitis and range from 20-40% [6,7,8].

According to a study about the etiology of pseudocyst, the highest incidence is seen in those having a history of alcohol consumption and abuse. It has been found to be the causative factor in 64% of patients with chronic pancreatitis and 26% with acute pancreatitis. [9]
Studying these lesions at variable time points gives us the ability to decide the course of management that differs with each individual. Recently, as an alternative to surgical drainage, USG or CT guided percutaneous catheter drainage has been used, with previous studies reporting a success rate of 70-90%.[10] in diagnostic non-invasive imaging techniques has allowed us to gain a better understanding about the various pancreatic diseases and it's pathology. There have been multiple studies that compare the efficacy of percutaneous drainage with various minimally invasive methods of treatment of pancreatic pseudocysts. The majority of them state that although percutaneous drainage is a simple and cost effective method of initial management of a symptomatic pancreatic pseudocyst, it is found to have a higher rates of recurrence and need for reintervention.

AIM:

This study aims, to study the various outcomes of percutaneous drainage of pancreatic pseudocyst

MATERIALS AND METHODS:

This Longitudinal study was done at KMC affiliated hospitals, Kasturba Medical College, Mangalore, India. It included 66 patients diagnosed with pancreatic pseudocysts above the age of 18 years. The study was completed between September 2019 and September 2021 after written informed consent and ethical clearance. Patients excluded:

1. Age <18
2. Patients who have previously undergone any invasive procedure as a part of previous history of treatment of pancreatic pseudocyst.
3. Those patients who present with a recurrence of a pancreatic pseudocyst following any invasive procedure they had previously undergone.
4. Patients with neoplastic cystic swelling, congenital cysts, hydatid cysts.

SAMPLE SIZE:

With 95% confidence level & 9% error to the total sample size what they have taken, so a total of 116 was the sample size for this study. However, due to the COVID pandemic and taking into consideration the deadline for this study, 66 patients made up the cohort group for this

study. Decision of undergoing this procedure was given to the patient and after due informed consent, the patient was included in the study and monitored.

OUTCOME VARIABLES:

1. Number of patients who have successfully been treated with percutaneous drainage
2. Number of patients who have had no symptomatic relief with PCD
3. Number of patients who have recurrence of pancreatic pseudocyst following the procedure
4. Number of patients who must resort to another mode of surgical intervention following PCD
5. Correlate Serum Amylase levels with the success rates of percutaneous drainage.
6. Identify factors that favor the success rate and those that increase the failure rate

SAMPLING METHOD:

The patients were selected based on the above-mentioned inclusion and exclusion criteria based on a prospective convenience sampling method for selection of the patients.

DATA ANALYSIS:

The data was entered in Epidata version 3.1 and analysed using SPSS version 25.0 using univariate and multivariate analysis with a p value <0.05. Univariate and bivariate analysis was done by chi square test and students t-test. Receiver operating characteristics (ROC) curves were plotted and under the area under the curve (AUC) was calculated to identify the cut off score and sensitivity.

RESULTS:

TABLE 1: AGE DISTRIBUTION

		No of patients	Percentage %
AGE	30 and below	5	7.6%
	31 - 40	25	37.9%
	41 - 50	22	33.3%
	Above 50	14	21.2%
	Total	66	100.0%

In this study of 66 patients, pseudocysts were more common between the 31-40 years age group with a mean age of 42.86 years.

TABLE 2 : SEX INCIDENCE

		No of patients	Percentage %
SEX	F	6	9.1%
	M	60	90.9%
	Total	66	100.0%

The study showed that pseudocysts were significantly higher in the male population compared to the female population

TABLE 3: SYMPTOMS

		No of patients	Percentage %
SYMPTOM	Fever	15	22.7%
	Mass abdomen	14	21.2%
	Pain	36	54.5%
	Vomiting	1	1.5%
	Total	66	100.0%

The most common symptom among patients who were diagnosed with pseudocyst was pain abdomen which was seen in 36 out of the 66 patients (54.5%) followed by fever (22.7%).

TABLE 4: CHARACTERISTICS OF PSEUDOCYST

		No of patients	Percentage %
NUMBER OF CYSTS	1	55	83.3%
	2	9	13.6%
	3	2	3.0%
	Total	66	100.0%
SIZE (cm)	< 5cm	43	65.2%
	> 5cm	23	34.8%
	Total	66	100.0%
LOCATION	Body	26	39.4%
	Head	27	40.9%
	Tail	13	19.7%
	Total	66	100.0%

On clinical imaging, a single pseudocyst (83.3%) was the most common finding. The size of the cysts ranged from 9.1cms to 1.1cms. However, 65.2% of the patients were found to have at least one cyst to be of > 5 cm in greatest dimension. Pseudocysts were commonly found to be in the portion of the head and body (39.4% and 40.9% respectively) of the pancreas and less often found in the tail of the pancreas.

TABLE 5: OUTCOMES

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	66	26	66	42.86	9.423
DURATION OF CATHETER (DAYS)	66	10	48	27.83	11.380
HOSPITAL STAY (DAYS)	66	12	52	31.86	11.972

TABLE 7: COMPLICATIONS

		No. of patients	Percentage %
SUCCESS	Yes	29	43.9%
	No	37	56.1%
	Total	66	100.0%
BLEEDING	Yes	8	12.1%
	No	58	87.9%
	Total	66	100.0%
INFECTION	Yes	14	21.2%
	No	52	78.8%
	Total	66	100.0%
FISTULA	Yes	9	13.6%
	No	57	86.4%
	Total	66	100.0%
DEATH	Yes	0	0.0%
	No	66	100.0%
	Total	66	100.0%
INTERVENTION	None	46	69.7%
	Surgery	20	30.3%
	Total	66	100.0%
RECURRENCE	Yes	9	13.6%
	No	57	86.4%
	Total	66	100.0%

The most common complication encountered was development of secondary infection (21.2%) in the group that had successful outcomes with percutaneous drainage. Fistula and recurrence (13.6% and 13.6% respectively) followed by Bleeding (12.1%) were the complications encountered in those with failure of pseudocyst resolution. There were no deaths noted in either groups.

TABLE 8: CORRELATION BETWEEN SERUM AMYLASE AND COMPLICATIONS

						IQR		
			Mean	Std. Deviation	Median	Percentile 25	Percentile 75	Mann Whitney test p
AMYLASE START (U/L)	SUCCESS	Yes	23597.9	12446.5	19382.0	15939.0	**27404.0**	**0.002**
		No	38645.8	14005.0	40348.0	32829.0	49282.0	
	BLEEDING	Yes	37189.4	20346.6	48342.5	13957.0	51115.5	**0.028**
		No	31322.8	14473.3	31032.5	17392.0	42095.0	
	INFECTION	Yes	34718.6	11350.9	36444.0	29393.0	41829.0	**0.022**
		No	31311.1	16134.9	27839.5	16420.5	48292.0	
	FISTULA	Yes	38469.7	15058.2	47393.0	34930.0	48292.0	**0.036**
		No	31017.7	15138.9	29393.0	17389.0	42095.0	
		No	30527.9	14958.7	28275.0	16902.0	48292.0	
	INTERVENTION	None	28701.1	14912.4	23879.0	15939.0	41829.0	0.196
		Yes	39699.3	13351.1	40093.5	32884.0	49525.0	
	RECURRENCE	Yes	27270.0	16639.5	19493.0	17483.0	31028.0	0.502
		No	32786.1	15017.0	33932.0	17389.0	48292.0	

Those patients who had a high drain fluid amylase level were found to have a high failure rate and a significant increase in the incidence of bleeding, infection and fistula formation (p values <0.05).

DISCUSSION:

This is a prospective observational study conducted at Government Wenlock Hospital, KMC Hospital Attavar & KMC Hospital Ambedkar Circle from October 2019 to September 2021. Total of 66 subjects with pancreatic pseudocysts were managed with image guided percutaneous drainage.

The initial pathological duct disruption triggers the formation of pancreatic pseudocyst in case of pancreatic inflammation or trauma to the pancreas. The extravasation of amylase rich fluid forms a pancreatic or peripancreatic collection that eventually leads to formation of an encapsulated mass lined by epithelium and surrounded by granulation and fibrous tissue. This process takes anywhere from 2-6 weeks and is usually amenable to spontaneous resolution.
For many years, surgery in the form of internal drainage was the preferred treatment option but with the evolving technology and development of minimally invasive procedures such as image guided percutaneous drainage has been found to be an accepted and efficient method by which these entities can be treated.

Our study showed that 29 pseudocysts that were treated through percutaneous drainage showed complete resolution. This study allowed only one attempt at drainage of the pseudocyst after which failure due to complications or recurrence were subjected to further intervention in the form of a surgical procedure.

There was a male predominance (90.9%) and a mean age of 42.86 years (range 18-66 years) with respect to demographic factors.
The need for percutaneous drainage was most indicated in patients who presented with pain (54.5%) followed by fever (22.7%). This is in line with similar studies that state that percutaneous drainage is more often required in the drainage of infected pancreatic pseudocysts which can present with the above mentioned complaints.

These cysts ranged from 9.1-1.1 cm in size and most patients were found to have a single pseudocyst that was more often located in the head and body of the pancreas.
The most common complications noted was infection (21.2%) in the group of patients were successful drainage was achieved and hemorrhage into the cyst (87.9%) and fistula formation and recurrence (86.4% and 86.4% respectively) were found to hinder the treatment in the group of patients where percutaneous catheter failed to achieve resolution of the cyst.

Measuring the drain fluid amylase levels at the start of the procedure predicted the risk of failure of the procedure and development of complications such as bleeding into the cyst, infection, and fistula formation. Similarly, higher amylase values measured at the time of removal of the drain showed that these patients, had a higher chance of developing a recurrence of the cyst and need for alternate methods of intervention.

Percutaneous drainage is accepted as an efficient and cost effective method of treatment of pancreatic pseudocysts with cure rates as high as 70-90% [12]. The overall rate of failure that has been reported ranges from 0 to 33% which is less compared to our study where there was a failure rate of 56.1%. The principal limitation of this method involves the risk of a pancreatic cutaneous fistula and the superinfection of a sterile collection. But in such cases, catheter

manipulation along with analysis and procurement of the cystic contents is easier in percutaneous drainage compared to an endoscopic approach.

Continuous vacuum drainage system was shown to be more effective because the content of the cyst continuously evacuated,, thereby preventing the obliteration of the cyst cavity die to the lytic action of the pancreatic enzymes. However, despite this the, recurrence vary widely and range anywhere from 4-60% in various studies.

Osama Al Saeed et. al [11] conducted a 5 year retrospective study where 37 patients with pancreatic pseudocyst underwent percutaneous drainage out of which 35 of these patients had a successful outcome. The presence or absence of a ductal communication did not affect the outcome and the study showed that it had percutaneous drainage was a safe and effective method of treatment.

Percutaneous drainage of 30 patients with infected pancreatic pseudocysts carried out by Murat Cantasdemir et. al [12] which took into consideration the duration of catheter placement, length of hospital stay, amount of fluid drained and the WBC count. 29 out of the 30 patients (96%) were successfully managed with no recurrences within a follow up period that ranged from 2 to 58 months.

Enver Zerem et. al [13] carried out a retrospective analysis in a single center that involved 128 patients who were treated with percutaneous drainage of pancreatic pseudocysts in a single center that studied the long term results in terms of rates of conversion to surgery, length of hospital stay and the duration of catheter in situ. 42 out of the 140 patients (30%) developed recurrence and a total of 9 patients (7%) had to undergo surgery to relieve the pseudocyst. The study was conducted over a period of 9 years with a follow up period of 12 months and showed that there was a low recurrence and complication rate associated with this mode of treatment.
There have been multiple studies that compare the efficacy of percutaneous drainage with various minimally invasive methods of treatment of pancreatic pseudocysts. The majority of them state that although percutaneous drainage is a simple and cost effective method of initial management of a symptomatic pancreatic pseudocyst, it is found to have a higher rates of recurrence and need for reintervention.

STUDY	YEAR/TYPE	COMPARISON	FINAL RESULTS
Heider et.al [14]	1999/Retrospective	SD vs PD	PD had greater morbidity, mortality rates and increased length of hospital stay
Morton et. Al [15]	2005/Retrospective	SD vs PD	SD had lesser complications and less hospital mortality and duration of hospital stay
Akshintala et.al [16]	2014/Retrospective	ED vs PD	PD has a greater risk of reintervention and longer hospital stay and similar rates of clinical success.
Keane et. Al [17]	2016/Retrospective	ED vs PD	ED had better success rates with reduced need for reintervention and hospital stay.
Lajos Szako et. Al [18]	2018/Meta-analysis	ED and Surgical drainage vs PD	ED and Surgical drainage showed better outcomes in terms of recurrence rates and length of hospital stay.

The average duration of hospital stay varied between 7 and 22 (range 4–27) days and the catheter in situ dwell time was between 8 and 27 (range 2–95) days The median duration of catheter dwell time corresponded to other similar studies but in our study the hospital stay was prolonged [19].

Our findings show that despite the high failure rate and various complications associated with this procedure, it can be successful in patients who have fulfill certain criteria that favor the successful outcomes of this procedure. Moreover, it is an ideal method to use in patients who are not fit for a surgical procedure. Serial imaging and testing of the cyst contents can be done to track the progression of the cyst making it easier to identify signs that show improvement as well as allow early intervention in those who develop complications. Our research shows that percutaneous drainage has mixed outcomes, with regards to the success rates and the secondary outcomes such as morbidity of the procedure. There is a therapeutic dilemma when it comes to the management of pancreatic pseudocyst owing to the multiple access routes when it comes to treating these pancreatic fluid collections.

CONCLUSION:

The study shows that despite image guided percutaneous drainage of pancreatic pseudocyst is a safe and cost effective method of treatment, despite its association with increased rates of recurrence and complications. Our study shows that analyzing the drain fluid amylase levels along with careful patient selection can help optimize the outcomes of this procedure.

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