

Percutaneous Catheter Drainage as Treatment of Necrotizing Pancreatitis

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Abstract

Objective: The purpose of this study was to evaluate the role of percutaneous catheter drainage (PCD) as treatment of necrotizing pancreatitis.

Results: There were 23 male and 7 female patients with mean age of 42 (range 25 - 65 years). 14 (46%) were cured with percutaneous catheter drainage. 22 (73%) patients showed significant reversal of multiorgan failure (P value < 0.05 in pre PCD and post PCD insertion serum creatinine, need of ventilation and CRP values). 3 deaths and 10% PCD related complications were observed in this study. Thus Percutaneous catheter drainage can act as primary treatment of necrotizing pancreatitis or to stabilize the critically ill patients to withstand the surgery.

Conclusion: Percutaneous Catheter Drainage is a safe and important treatment option that can be lifesaving and effective whether used alone or in adjunct to surgery and decreases the treatment cost burden to the patients.

Keywords: Percutaneous Catheter Drainage, Pancreatic/Peripancreatic Collection(s).

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Introduction

Necrotizing pancreatitis, which develops in about 20% of patients with acute pancreatitis, is associated with a mortality of 10 to 40% [1]. The most frequent complaints due to a big sized acute fluid collections are pain, compartment syndrome, and increasing abdominal pressure which can significantly worsen the efficiency of breathing. [2] In other cases they can cause symptoms due to compression of adjacent organs (obstructive biliopathy, Gastric outlet obstruction). Until recently, the first-choice intervention in infected necrotizing pancreatitis has been surgical

necrosectomy by laparotomy with the aim of removing all infected necrosis. This approach is associated with considerable morbidity (34%–95%) and mortality (11%–39%). [3] Some patients with sterile necrosis also eventually undergo surgical necrosectomy in the event of clinical deterioration (multiple organ failure) despite maximal supportive therapy when infection is suspected. Others undergo necrosectomy because of persistent symptomatic external hepatobiliary or duodenal compression by peripancreatic collections. [4] In addition, PCD seems technically feasible in the vast majority of

patients with necrotizing pancreatitis. This study was focused on PCD as primary treatment of necrotizing pancreatitis. The primary aim was to determine the proportion of patients who can be treated with PCD without the need for additional surgery.

Material and Methods

The study was conducted in Guru Gobind Singh medical college and Hospital, Faridkot from January 2021 to November 2022 and 30 patients were enrolled who were diagnosed on CECT abdomen to have Necrotizing Pancreatitis after taking the approval from ethical committee. An ultrasound/CT-guided drainage was instituted with 12 Fr catheters using the Seldinger technique via the most direct transperitoneal route, using 0.45 mm guide wire avoiding involvement of the bowel and solid organs. Malecot loop catheters were used depending upon the approach followed. PCDs were placed for gravity drainage and were routinely flushed with 20 mL normal saline every 12 hours. After catheter placement, radiological assessment was carried out periodically to check the efficacy of the drainage, need for flushing and repositioning. Repeat CECT/USG abdomen was performed as and when required and clinical and

laboratory markers were monitored to evaluate the need for surgical intervention. The PCDs were removed when drainage was less than 10 ml for two consecutive days. Surgical intervention was undertaken either when clinical deterioration or locoregional complications occurred.

Results

The youngest patient was of 25 years and the oldest was of 65 years, there were 20 (66%) patients of alcohol induced, 8 (26%) of gall stone, 1 (3%) traumatic and 1 (3%) drug induced pancreatitis. Comparing the pre PCD and post PCD (i.e. one week after the insertion of PCD) serum creatinine levels (Table 1) there was significant improvement in renal functions, P value < 0.05. Pre PCD there were 22 (73%) of patients having renal failure which reduced to 9 (30%) after the PCD. 20 (66%) of patients were on ventilatory support prior to PCD, whereas only 8 (26%) of patients were on ventilatory support after the insertion of PCD (Table 2). The P value < 0.05 was significant on comparing pre and post PCD need of ventilatory support. Similarly, there was significant fall in CRP levels (P value < 0.05) on comparing pre PCD (Mean 366 SD 4.1155) and post PCD CRP values (Mean 215 with SD of 33.9534).

Table 1: Distribution of subjects according to pre PCD and post PCD serum creatinine levels

Serum creatinine(mg/dl)	Pre PCD	Post PCD
≤ 1.5	8(26%)	21 (70%)
>1.5	22(73%)	9(30%)
P value	0.01224	

Table 2: Distribution of subjects according to pre PCD and post PCD ventilatory support.

Pt. on ventilatory support	Pre PCD	Post PCD
On ventilatory support	20 (66%)	8(26%)
Without ventilatory support	10(33%)	22(73%)
Total	30(100%)	30(100%)
P value	0.0284	

Only 3 (10%) patients had PCD related complication, 1 (3%) patient had mild inflammation at insertion site which was

managed conservatively while 2 (6%) patient had external pancreatic fistula. In 27 (90%) patients no complications were

noted.14 (46%) out of 30 patients did not require any further intervention after PCD. 16 (53%) of patients required additional surgical procedures after PCD because of persistent sepsis and no clinical improvement in these patients. 12 patients required necrosectomy and 4 (13%) patient

underwent distal pancreatectomy. The mean time for surgery after PCD was 14.75 with SD of 3.18 and range was 10-21 days. All of the 30 patients needed ICU care and monitoring with mean ICU stay of 15 days with SD of 5 days.

Table 3: Distribution of subjects according to final outcome

Final Outcome	Only PCD	PCD + necrosectomy	PCD + distal pancreatectomy	Total
Expired	0	2	1	3
Recovered	14	10	3	27
Total	14	12	4	30

14 (46%) patients out of 30 patients recovered with PCD insertion and there was no mortality in this group.12 (40%) out of 30 patients underwent subsequent necrosectomy after the PCD and there was 2 (6%) mortality in this group of patients while 10 (33%) of patients recovered. Out of 30 patients, 4 patient underwent distal pancreatectomy and 1 patient expired.

Discussion

In a systematic review by van Baal MC and colleagues, [3] a pooled analysis of eleven studies revealed that surgery was obviated in as many as 214 (55.7%) of 384 patients. In another study by Jai Dev Wig and colleagues [5] twenty-four patients (48.0%) underwent image guided drainage of the pancreatic/peripancreatic collections. Nine of these patients (37.5%) were successfully managed by radiological intervention only. Our results are in accordance with the above observations i.e.46% of our patients recovered with PCD alone. Freeny et al [6] reported that 47% of patients were cured with PCD alone and only 24% of patients' required surgical necrosectomy. Navalho *et al* [7] reported a cure rate of 63% following percutaneous catheter drainage with 33% of their patients requiring surgery after failure to show clinical improvement following PCD. Moertle et al [8] have shown that PCD could act as a bridge to surgery in 7 of their 13 patients with infected pancreatic necrosis, similarly in our study 46% patients did not require any

surgery and in the rest 53% patients percutaneous catheter drainage postponed surgery. [9] Furthermore, PCD stabilizes critically ill patients to facilitate later intervention in a less sick condition [3,10,11] which is suggested by the observation in our study that in 73 % patients who underwent percutaneous drainage before surgery showed significant improvement in renal & respiratory functions and fall in CRP values.

In our study the youngest patient was of 25 years and the oldest was of 65 years. out of 30, 66% patients were of alcohol induced, 26% of gall stone, 3% traumatic 3% drug induced pancreatitis. Markus W. Buchler et al [12] found alcohol as cause in 37% of patients, gall stone in 44% and other causes in 19% of patients in acute necrotizing pancreatitis. In our study 35% of patients were having multiorgan failure, 25% were having single organ failure at the time of admission. Buckler MW et al [12] noted pulmonary failure in 63% of necrotizing pancreatitis patients, renal failure in 13% of patients and cardiovascular failure in 23% of patients and MOF in 35% of patients. In a study by Tenner S et al [13] organ failure was present in 26 of 51 patients (51%).50% of patients had 21-30 days total hospital stay, 40% of patients stayed more than 30 days in hospital. The mean hospital stay was 29.85 with SD of 9.1667 and range of 15-55 days.

Patients who were managed with PCD alone had shorter hospital stay than those required surgery after PCD. This helped in preventing surgery and surgery associated complications, less hospital acquired infections due to shorter hospital stay and overall decreasing the treatment cost burden. In the study done by K M Pal and P M Kasi et al [14] mean hospital stay was 23.2 days with SD of 21.5 and range being 3-106 days. In study done by Jai Dev Wig et al [5] the mean hospital stay was 26.9 with SD 8.4 of and range of 15-42 days in patients managed with PCD alone and mean of 50.9 with SD 17.1 and range of 18-77 days in patients managed with surgery without PCD.

All the patients were initially managed with fluid resuscitation, organ system support, pain alleviation and antibiotics as and when required and nutritional support. Patients who had pancreatic/peripancreatic collection(s) with persistent infection, infected necrosis, persistent organ failure or clinical deterioration (even with sterile collection) were considered for imaging guided percutaneous catheter drainage. In 95% of the patients indication of PCD insertion was pancreatic/peripancreatic collection(s) with multiorgan failure/clinical deterioration with conservative treatment and in 5% patient PCD was inserted due to gastric outlet obstruction. In a study by Jai Dev Wig et al [5] PCD was done in patients who had persistent organ failure or clinical deterioration irrespective of sterile/infected pancreatitis/peripancreatic collection(s) of > 5cm in size. Similarly Zerem E et al also reported PCD is more effective for management of recurrent sterile fluid collections of acute pancreatitis than with conservative management. Conservative management is successful for patients with small fluid collections. [15]

On comparing the pre PCD and post PCD (after one week) serum creatinine levels, there was significant improvement in renal

functions (P value < 0.05). Pre PCD 55% of the patients were having renal failure which reduced to 20% after the PCD insertion. So with the improvement in renal functions adequate dose of drugs could be administered and the need for renal replacement therapy was reduced. With the improvement in renal functions there were better clinical outcomes. 85 % patients were on ventilatory support prior to the PCD whereas only 55% remained on ventilatory support after PCD. So, with PCD there was significant improvement in respiratory functions (P value < 0.05). 95% patients were having raised TLC prior to PCD, after PCD there was fall in TLC. The P value was > 0.05 i.e. was not significant in this group. Although the P value is not significant but there was a trend towards fall in TLC as compared to pre PCD. There was significant fall in CRP levels with the PCD as pre PCD the mean value of 267.3 and SD of 4.1155 whereas post PCD insertion the mean CRP value was 222.1 with SD of 33.9534 (P value < 0.05). In our study only one patient had gastric outlet obstruction symptoms prior to PCD that recovered after PCD. PCD reduces the markers of inflammation and improvement in organ failure is possibly attributed to the improvement in the indices of the inflammation.

In this study 20% patients had infected necrosis and 80% patients had sterile pancreatic collections. 10% patients had E Coli and 10% patients had mixed bacterial growth. Bruennler et al [12] in their study evaluated the material which was obtained during the placement of the first drainage, fifty two patients (65%) showed positive microbiological results and 35% were sterile fluid collections.

The complication rate was very low this is because of the proper patient selection, expert treating faculty, proper care of PCD, multidisciplinary team approach. Only 2 out of 20 patients had PCD related complication, 1 patient had mild cellulitis at insertion site which was managed

conservatively while 1 patient had external pancreatic fistula for which distal pancreatectomy was done. In our study total 55% patients underwent additional surgery after PCD. Mean time for surgery after PCD was 14.75 with SD of 3.1768. Freeny *et al* [6] the mean time between PCD insertion and additional surgery was 32 days with range of 6–78 days and in Navalho *et al* [7] study the mean was 18 days. In this study PCD upfront avoids surgery in 45% of patients with necrotizing pancreatitis and was helpful by delaying surgery and facilitating subsequent debridement in 55% of patients. PCD helped reversal of organ failure in significant number of patients, decreased the need of ventilatory support and total hospital and ICU stay, thus decreased the treatment cost burden to the patients.

Thus with PCD there was significant improvement in organ failure and 95% of patients recovered and were discharged from the hospital. There were only 5% deaths in our study which underwent necrosectomy after PCD insertion, hence PCD has a good role in managing the patients with necrotizing pancreatitis, as it acts as primary treatment or act as a bridge to surgery in the critically ill patients. There were few limitations in our study like the number of patients was small and there was no control group for comparison.

Conclusions

With PCD insertion there is significant improvement in respiratory and renal functions, significant fall in CRP levels on comparing with the pre PCD status. With PCD there was reversal of organ failure in significant number of patients which decreased the need of ventilatory support, renal replacement therapy and total hospital and ICU stay, thus PCD not only helps in improving the clinical outcome of patients but also decreases the treatment cost burden to the patients.

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