



# Post-traumatic Pancreatic Pseudocyst in a Nigerian boy – Case Report and Review of Literature

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**ABSTRACT:** Pancreatic pseudocyst is a benign pathology of the pancreas. It is not common. Though it occurs mostly in adult, it does occur in the paediatric age group. It could be post traumatic (especially in children). Management strategies include medical therapy, percutaneous drainage, Laparoscopic drainage, Endoscopic drainage, Endoscopic ultrasound- guided drainage (EUS) and Surgical drainage procedures. A case of pancreatic pseudocyst secondary to a blunt abdominal trauma in a 13- year old Nigerian is reported. The literature on the clinical, diagnostic methods and management options is reviewed.

**Keywords:** *Posttraumatic, pancreatic pseudocysts, paediatric, management, literature review*

## INTRODUCTION

Pancreatic Pseudocysts (PP) are localised collections of fluid with high concentrations of pancreatic enzymes (Howard A 1999) occurring within the pancreas or the peri pancreatic spaces lacking a true epithelium (Gumatase, 1996), having walls that consist of fibrous and granulation tissue derived from peritoneum, retroperitoneal tissue or the serosal surface of adjacent viscera (Ratnner1996) .

The average age of presentation is 45 years with a male to female ratio of 2:1. Most cases are sequel to blunt abdominal trauma. It may also be an intraoperative finding. Treatment modalities include surgical drainage procedures. Prognosis is usually good with a recurrent rate that depends on the aetiology

## CASE REPORT

JL, a 13-year-old primary 6 pupil was brought to the Accident and Emergency Unit of University College

Hospital, Ibadan, Nigeria with five-day history of persistent abdominal pain and progressive abdominal distension, postprandial vomiting and frequent passage of mucoid stool.

Nine days earlier, he was hit at the epigastrium by the hand bar of a bicycle when he fell off the bicycle. Examination revealed an acutely ill looking young boy anicteric and febrile. The abdomen was uniformly distended with generalised tenderness and guarding, there was also rebound tenderness. Bowel sounds were hypoactive, rectal examination was normal. A tentative diagnosis of Generalised Peritonitis secondary to blunt abdominal injury was made. Laboratory investigations done included serum electrolyte & urea {K<sup>+</sup>4.1 mmol/L, Na<sup>+</sup> 130 mmol/L, HCO<sub>3</sub><sup>-</sup> 22 mmol/L, Urea 35 mg/dl and hematocrit (pcv)-31%. Plain abdominal x-ray and abdominal ultrasonography were not done due to financial constraint.

He was commenced on parenteral metronidazole and ciprofloxacin (ciprotab.) He had exploratory Laparotomy about 28 hours after presentation. Significant operative findings are:

(i) A very thin -walled, transparent sac, located in the omental bursa displacing the stomach anteriorly, containing approximately 1 litre (1000 mls) of odourless, colourless fluid.

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- (ii) Collapsed stomach.
- (iii) Pancreas firm, with sloughy surface.
- (iv) Spleen and other viscera were intact and normal.

These anatomic intraoperative findings are in conformity with the diagnosis of pancreatic pseudocyst. The cystic fluid was drained and a passive tube drain was placed in the lesser sac (omental bursa) for continuous postoperative drainage. Postoperatively the output of wound drain was charted noting the quantity and appearance. Drain was removed on 16<sup>th</sup> day post operation, sequel to scanty output for three consecutive days. The result of pancreatic fluid analysis is - Total protein 3.6mg/dl; Urea 32mg/dl; Albumin 0.2g/ dl; Creatinine 0.5mg/dl; Calcium 10.9mg/dl; phosphate 3.1mg/dl; Na<sup>+</sup> 140mmol/l; K<sup>+</sup> 4.2mmol/l; Cl<sup>-</sup> 106; HCO<sub>3</sub><sup>-</sup> 24 mmol/L, Serum Amylase (no reagent). The anatomic description of the findings was discrete enough to obviate need to consider other anatomic diagnosis.

On post operation day 21, he had abdominal USS- which revealed a rounded thick, walled sonolucent mass with lower level echoes anterior to and arising from the pancreas extending from the pancreatic head to the tail and measures 75mm x 93mm in keeping with a pancreatic pseudocyst (Plate 1)



Plate 1:

The liver, the biliary tree and other viscera were normal. He remained asymptomatic, was discharged despite the abdominal USS finding due to strike action by some segments of the health sector and for follow up at the clinic and to be re-admitted later for definitive internal drainage procedure.

He was re-admitted on 5/11/01 i.e. 44days-post discharge with features of re-accumulation of the pancreatic pseudocyst fluid. A repeat abdominal ultrasound scan done revealed a thick-walled pancreatic pseudocyst measuring 13.1cm by 17.4 cm extending from the epigastrium to the lower abdomen and compressing the gall bladder and the abdominal aorta. Other viscera were normal. He was planned for the definitive internal drainage procedure, which he did not have until 28 days later due to logistic reasons. At the second Laparotomy, he had Cystogastrostomy. Main operative findings were (i) Fibrous adhesions, (ii) anteriorly displaced and collapsed stomach and (iii) a well formed thick walled pancreatic pseudocyst adherent to the posterior wall of the stomach and extending distally to the upper border of the transverse colon. It contained about 900 mls of clear and odourless fluid.

A passive tube drain was placed in the supracolic compartment. Postoperative recovery was rapid and satisfactory. The wound drain was removed 3<sup>rd</sup> day post operation. He was discharged on 8<sup>th</sup> day post operation. He was seen 4 months post discharge and a repeat abdominal USS did not reveal any pancreatic pseudocyst.

## DISCUSSION

### Historical Perspective

Pancreatic Pseudocyst was first described by Morgagni in 1761 (Grace 1993, Morgagni 1821). The first successful management was reported in 1882 by Bozeman, (Morgagni 1821, Bozeman 1882) who removed a 10- kilogramme pseudocyst from the 41-year old wife of a Texas Physician. The first external drainage of pancreatic pseudocyst was by Gussenbauer in 1883. Transgastric Pseudocystogastrostomy was described in 1921, (Jedlica 1923); pseudocystoduodenostomy in 1928, (Hahn 1928) and pseudocystojejunostomy in 1931 (Juasz).

### Aetiopathogenesis

Although it occurs mostly in adult, it has been reported amongst children (Holland 1999, Jobst et al 1991, Kirska). In most series, aetiological factors that are

associated with acute pancreatitis such as alcohol abuse, biliary pathologies and blunt abdominal trauma are more often associated with pancreatic pseudocyst. It may also be a rare complication of surgical procedures such as ventriculoperitoneal shunt (Horikawa M 1999)

#### *Pathogenesis*

During an acute attack of pancreatitis, there is extravasation fluid from the pancreas, this is walled off by surrounding structures and is normally absorbed as the inflammation resolves. However failure of absorption results in the formation of pseudocyst. In patients with chronic pancreatitis, ductal strictures or stone may obstruct the pancreatic duct or its branches and produce localised ductal dilatations. These coalesce and lose their epithelial lining as they enlarge to form a Pseudocyst. Posttraumatic pseudocyst is either due to pancreatitis or ductal disruption with direct leakage of fluid from the gland.

#### *Diagnosis*

This may be an incidental finding at Laparotomy as in the index case. Clinical diagnosis of Pancreatic Pseudocyst (PP) has to be with a high index of suspicion in a patient with any of the aetiologic factors that subsequently developed either abdominal distension or features of acute abdomen (Yang et al 1999). Thus in a patient with acute pancreatitis, who either fails to recover after five to seven days or starts to deteriorate after an initial clinical improvement, PP should be suspected. Also patients may present with features of gastric or duodenal compression such as nausea, vomiting and weight loss. About 90% of patients with pancreatic pseudocysts have persistent abdominal pain (Becker et al 1968, Crass 1981) and up to half have nausea and vomiting and weight loss (Rattner et al 1990). An abdominal mass is palpable in 43-56% (Grace 1976). Biliary tree compression will manifest as jaundice.

Abdominal ultrasound scan (USS) and Computerised Tomography (CT) scan are the most useful investigative tools in the diagnosis of Pancreatic Pseudocyst. Although, CT scan has higher sensitivity and specificity than USS, however it is more expensive, less readily available and also exposes patients to ionising radiations. Radiological diagnosis may be inaccurate in about 20% of patients (Pitchumoni 1999).

Endoscopic Retrograde Cholangiopancreatography (ERCP) should be done only in patients with jaundice to rule out biliary stricture. ERCP may introduce

bacteria into a hitherto sterile pseudocyst; hence it should be performed only when drainage procedure is being anticipated to take place within 24 hours. The biochemical analysis of the pseudocyst fluid will yield amylase, protein, calcium, phosphate and electrolytes, which are usually isomolar with those of the plasma.

The most important differential diagnosis of PP is Cystic tumours of the pancreas, these can however be differentiated from Pancreatic Pseudocyst by the following features (i) *absence of pancreatitis*, (ii) *internal septal or solid intracystic components seen on CT scan*, (iii) *calcification within the cyst or its wall*. (iv) *recurrence or persistence of the cyst after surgical drainage*.

Another differential diagnosis is pancreatic ascites, which may follow disruption of the pancreatic duct or may result from continuous leakage of pseudocyst into the abdomen. In pancreatic ascites the fluid has higher protein (> 3g/dl) and amylase levels than those of the serum.

#### *Complications*

Although quite a few cases of PP may resolve spontaneously, it may be complicated by haemorrhage into the cyst, rupture and infection of the cyst. Predictive factors for non resolution of pancreatic pseudocysts include (i) persistence for > 6 weeks, (ii) evidence of chronic pancreatitis, (iii) pancreatic duct abnormality other than communication with the pseudocyst and (iv) ultrasonographic suggestion of a thick wall (Warshaw et al 1985)

*Haemorrhage*- results from erosion of the pseudocyst into a major blood vessel such as splenic or gastroduodenal arteries and occurs in 6% with about 30% mortality.

*Rupture*-occurs in about 7% into either the gastrointestinal tract or into the abdominal cavity resulting in generalised peritonitis. Mortality is about 15%.

The cyst may be infected in 14% of PP; this is heralded by fever and leukocytosis. Other complications are gastrointestinal obstruction (3%) and common bile duct obstruction (6%)

#### *Treatment of pancreatic pseudocyst*

The available treatment options are;

- (1) Medical therapy
- (2) Percutaneous drainage (External drainage)
- (3) Internal drainage; [a] Open surgery, [b] Endoscopic and [c] Laparoscopic

**Medical therapy:** This is for asymptomatic pseudocyst with a diameter less than 6 centimetre (cm) and regressing in size within 6 weeks. The goal of medical therapy is reduction of pancreatic stimulation with consequent resolution or maturation of the PP. It entails the use of somatostatin or its analogue (Octreotide) and nutritional support. Spontaneous resolution occurs in forty percent (40%) of PP secondary to acute pancreatitis and in 20 -40 % those sequel to chronic pancreatitis (Dunkin *et al* 1998).

Mortality rate during expectant management is about 10% due primarily to haemorrhage and sepsis. It is imperative for the Surgeon to weigh the desire for spontaneous resolution against the risk of complications while waiting.

Consequently, there is the need to closely monitor those on conservative management in order to quickly intervene when they develop complications.

**Drainage Procedures:** Indications for drainage of pseudocysts are presence of symptoms, enlargement of pseudocyst, complications and suspicion of malignancy. Modalities of drainage are (i) Percutaneous, (ii) Transendoscopic, (iii) Laparoscopic and (iv) Open Surgery.

Choice of drainage procedure depends on several factors such as general condition of the patient, size, number and sites of the pseudocyst, presence or absence of communication of the pseudocyst with the main pancreatic duct and suspicion of malignancy.

The general consensus is that there should be a waiting period of a minimum of 4-6 weeks from the time of diagnosis of acute PP to allow for the wall of the cyst to become sufficiently matured for safe internal drainage. However infected pseudocyst should be drained immediately.

### **Percutaneous Drainage**

This can be done either blindly or under ultrasound or computed tomography guide. It entails the insertion of catheter into the abdominal cavity for continuous drainage. It can be done at the bedside. It is safe and cost effective. It should be the first line of drainage in poor risk patients. It can also be used to relieve abdominal discomfort in a patient awaiting internal drainage procedure. In the index patient, percutaneous drainage had to be done at the second admission while awaiting internal drainage when he developed abdominal distension with respiratory embarrassment. Percutaneous drainage is also indicated for immature cysts and infected pseudocysts.

Its contraindications are intracystic haemorrhage and pancreatic ascites.

### **Internal Drainage**

Approaches to internal drainage are Laparoscopic, Endoscopic and Surgical. Laparoscopic drainage is good for persistent retrogastric pancreatic pseudocyst. In our sub region the limitations of Laparoscopic cysto gastrostomy are cost and expertise.

#### **Endoscopic Drainage Procedures**

Endoscopic procedures available for the drainage of pseudocyst include cystoenterostomies and transpapillary drainages. If the resources are available, they are safe, effective and definitive and have a success rate of 71-83 %.(Beckingham IJ *et al*; Vitale G.C *et al*). These procedures are not effective in thick walled pseudocysts (>1cm.), cyst located in the pancreatic tail and associated necrotizing pancreatitis.

Though, transpapillary duct stent placement facilitates internal drainage, it is suitable only in patients with identifiable duct disruption. Its complications include local stenoses and side branch ectasia

Complications of endoscopic drainage are infection, arterial bleeding, septicaemia, duodenal perforation and transient cholangitis ( Cremer M *et al* 1989).

### **Surgical Drainage Procedures**

Three types of surgical drainage procedures that have been described for the treatment of PP, namely resection, external drainage and internal drainage.

**Resection** This is indicated for pseudocyst on the tail of the pancreas. Such cysts can dissect into the splenic hilum and cause fatal haemorrhage. Other indications are multiple cysts, associated painful chronic pancreatitis, haemorrhage from pseudoaneurysm, common bile duct obstruction and duodenal obstruction. Pseudocyst resection carries a mortality rate of 10 % (Becker *et al* 1968, Saubier EC *et al* 1974)

**External Drainage** This is the simplest surgical drainage but it carries a mortality rate of 6 % and recurrence rate of 22% (Bradley EL 1985) It is suitable for pseudocysts whose walls are not sufficiently thickened to allow anastomosis to the gut lumen and also for pseudocysts containing necrotic materials as this indicates an ongoing necrotizing process. It is also suitable for infected pseudocysts; those associated with haemorrhage or free rupture necessitating emergency laparotomy.

### **Internal Drainage**

The choice of surgical procedures for internal drainage depends on the local topography. Thus pseudocyst adherent to the posterior wall of the stomach should be

drained through a cystogastrostomy. Those located in the head of the pancreas impinging on the duodenum should be drained by cystoduodenostomy. Pseudocysts larger than 15 cm. in diameter should be drained into the Roux-en- Y limb of jejunum (Cystojejunostomy) such cysts if drained by cystogastrostomy will have retained materials, which will lead to infection. Obliteration of the pseudocyst cavity usually occurs within a few weeks of internal drainage.

Of the three cystoenterostomies, cystogastrostomy is the least technically difficult. Internal drainage has an overall mortality rate of 2% and recurrence rate of 5% (Bradley).

In the absence of infection internal drainage is preferred to external drainage. It has lower complication rate (32% versus 68%) and mortality rate (1% versus 11%). About 20% of patients that have external drainage will later develop pancreatic fistula. However more than 90% of these fistulae will close within three to four months.

#### Prognosis

Pseudocysts following pancreatitis have a recurrence rate of about 10 % this is due to recurrent attacks of pancreatitis .The recurrence rate approximately doubles (i.e. 20%) following external drainage. Factors that may be responsible for recurrence include (i) failure to recognise that a pseudocyst is loculated, (ii) failure to drain the most dependent part and (iii) inadequacy of the pseudocyst-enteric anastomosis.

Pavlovsky et al reviewed the current management of PP and made the following conclusions,(i)that small pseudocysts do resolve with treatment in early stages of development. (ii) surgical treatment of patients with immature pseudocyst is necessary when complications develop and (iii)internal drainage is the operation of choice for the treatment of mature pseudocysts without complications

#### Conclusion

Though post traumatic pancreatic pseudocyst is not common, it should be suspected in the Paediatric age group that develop abdominal distension and pain few days following a fall or an impact injury by the hand bar of a bicycle. Such patients are usually haemodynamically stable. If such patients do not have significant abdominal symptoms and signs, medical treatment with serial abdominal ultra sound scans to monitor maturation and or resolution of the pseudocyst should be the first line of management.

However, if the clinical features are significant and indicative of complications (Compression, Rupture,

Infection or haemorrhage) a surgical drainage should be the procedure of first choice.

#### REFERENCES

- Becker WF, Pratt HS, Ganji H. (1968):** Pseudocysts of the pancreas. *Surg Gynecol Obstet*; 127: 74-77.
- Beckingham IJ, Krige JE, Bornman PC (1999):** Terblanche J. Long term outcome of endoscopic drainage of pancreatic pseudocysts. *Am J.Gastroenterology*; 94( 1): 71-74.
- Bozeman N (1882):** Removal of a cyst of the pancreas weighing twenty and one half pounds. *Medical Record* 21:46-47.
- Bradley EL (1985):** III. Cysts and pseudocysts of the pancreas. *Surgical aspects* .In: Berk JE, Ed. *Gastroenterology*. Vol 6 London: WB Saunders 4151-7
- Crass RA, Way LW (1981):** Acute and chronic pancreatic pseudocysts are different. *Am J Surg* 142: 660-663.
- Cremer M, DeviereJ, Engholm L (1989):** Endoscopic management of cysts and pseudocysts in chronic pancreatitis: long-term follow-up after 7 years of experience. *Gastrointest Endosc*.1989; 35: 1-9
- Grace PA, Williamson RCN (1993):** Modern management of pancreatic pseudocysts. *Br J Surg*; 80:573-578
- Grace RR, Jordan PH (1976):** Unresolved problems of pancreatic pseudocysts. *Ann Surg*; 184:16-21
- Gumaste VV, Pitchumoni CS (1966):** Pancreatic pseudocysts. *Gastroenterologist* 4(1): 33-43.
- Gussenbauer C. (1883):** Zur operativen Behandlung der Pancreacysten. *Arch für Klinische Chirurgie*. 29:355-364.
- Holland AJ, Davey RB, Sparnon AL,Chapman M, LeQuesne GW (1999):** Traumatic pancreatitis: Long-term review of initial non-operative management in children. *J. of Paediatric & Child Health.*; 35 (1): 78-81
- Horikawa M, Yamada T, Tominaga K, Yoshida S (1999)** Abdominal cerebrospinal fluid pseudocyst in a severely handicapped patient with hydrocephalus. *J. Child Neurology* 14 (5): 329-331.
- Howard A, Reber. Pancreatic Pseudocysts In: Schwartz SI, Shires GT, Spencer FC, Daly JM, Fischer JF, Galloway CA. Eds. Principles of Surgery. Singapore: McGraw- Hill, 1999; 1485-1488**
- Jedlica R.** Eine neun Operationsmethode der Pancreacysten (Pancreatogastrostomie) *Zentralbl Chir* 1923; 50: 132.

- Jobst MA, Canty TG Sr, Lynch FP.** Management of pancreatic injury in paediatric blunt abdominal trauma. *J. of Paediatric Surg.* 1999; 34 (5): 818-824
- Jurasz A.** Zur Fragë der Zur operativen Behandlung der Pancreacysten. *Arch für Klinische Chirurgie.* 1931; 164:272-279
- Kisra M, Ettayebi F, Benhammou M:** Pseudocysts of the Pancreas in children in Morocco, *J. of Paediatric Surg.* 1999; 34 (9): 1327-1329
- Kozarek RA, BallTJ, Patterson DJ, Freeny PC, Ryan JA, Traverson LW.** Endoscopic transpapillary therapy for disrupted pancreatic duct and peri pancreatic fluid collections *Gastroenterology* 1991;100:1362-1370
- Lopez VB, Sala FT, Pertejo PV, Urquijo PJ, Berenguer LA.** Pancreatic trauma successfully treated by endoscopy (Spanish) *Gastroenterologia y Hepetologia* 1998; 21(8): 394-397
- Morgagni JB.** De sedibus et causis morborum per anatomen indagatis. Vol4 Paris, 1821: 86-123
- Pavlovsky M, Perejaslov A, Chooklin S, Dovgan Y** (1998): Current management of pancreatic pseudocysts. *Hepato-Gastroenterology*; 45 (21): 864-868
- Pitchumoni CS, Agarwal N. (1999):** Pancreatic pseudocysts. When and how should drainage be performed? (Review). *Gastroenterology Clinics of North America*; 28 (3): 615-639
- Rattner DW, Warshaw AL (1990):** Pancreatic cysts, pseudocysts and fistulae. In: Schwartz SI, Ellis H, Eds *Maingot's Abdominal Operations.* Norwalk, Connecticut: Appleton- Century- Crofts, 1567-1582
- Rattner D W, Warshaw A. L (1996):** Pancreatic Pseudocysts In: Bell RH, Rikkers LF, Mulolland MW: *Digestive Tract Surgery- A text and Atlas.* Lipincott-Raven. ;827-829
- Saubier EC, Partensky L, Brault A. (1974):** Les collections enkystées d'origine pancreatique (analyse de 30 observations). *Lyon Medical* 1974; 231: 587-592.
- Sjovall A, Hirsch K (1997):** Blunt abdominal trauma in children: risks of non operative treatment, *J. of Paediatric Surg.*; 32 (8): 1169-1174
- Vitale GC, Lawhon JC, Larson GM, Harell DJ, Reed DN Jr, MacLeod SI (1999):.** Endoscopic drainage of the pseudocyst. *Surgery* 126 ( 4): 616-623
- Warshaw AL, Rattner DW.** Timing of surgical drainage of pancreatic pseudocyst. *Ann Surg* 1985; 202:720-724.