ULTRASOUND GUIDED PERCUTANEOUS DRAINAGE OF PANCREATIC PSEUDOCYSTS USING P.D. CATHETER

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ABSTRACT

OBJECTIVE
The purpose of the study is to report the drainage of pancreatic pseudocysts by percutaneous insertion of P.D. catheter under US guidance.

PATIENTS & METHODS
Between January 1999 and December 2003, 44 patients (28 male, 16 female) with abdominal fluid collection from complicated acute pancreatitis underwent percutaneous ultrasound guided drainage using adult (12 F) or pediatric (10 F) peritoneal drainage catheter.

RESULTS
Simple cysts found in 07 patients, haemorrhagic in 20 and infected in 17 patients. Etiology varied from trauma in 09 patients, gallstone in 19 patients, post ERCP 05 patients, biliary ascariasis in 03 and alcohol consumption in 01 patient to idiopathic 07 patients. The tube was kept for drainage from 2 weeks to 11 weeks. The success rate was 84% whereas 12% patients did not improve and required open drainage and lavage. No major complications occurred.

CONCLUSION
The study shows that complicated peripancreatic fluid collections can be safely and effectively treated in most patients with percutaneous P.D. catheter insertion under real time US guidance.

KEY WORDS: - Pancreatic pseudocyst, Percutaneous drainage.

INTRODUCTION
Pancreatic pseudocyst is a collection of pancreatic juices, enclosed by a wall of fibrous or granulation tissue, arising as a result of acute pancreatitis, pancreatic trauma or chronic pancreatitis. A number of consequences can result from pancreatitis such as acute fluid collections, pseudocysts, pancreatic abscesses, pancreatic necrosis and phlegmon pancreatitis. Complications are responsible for a significant proportion of the morbidity and mortality. However, if detected early, they can often be treated appropriately without sequelae9. Pseudocyst formation is the commonest complication and its frontline treatment includes drainage. Indications for drainage are, more than 6.0 cm size of pseudocyst, presence of symptoms, complications and a suspicion of malignancy. However, interventional radiology has now been shown to be a valuable addition for both the diagnosis and therapy of these disorders9.

Pancreatic pseudocysts may be drained using a variety of approaches such as endoscopic ultrasound (EUS) guided drainage, endoscopic transpapillary drainage and
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percutaneous US or C.T. guided drainage. External drainage using C.T./US guidance is the most common approach\(^4\). Three-dimensional sonography has been reported useful for the guidance of catheters into cyst cavities and avoiding vessels\(^5\). The reported success rates for ultrasound-guided pseudocyst drainage vary from 50 % to 90 %\(^1,10,12\). Large ductal leaks or obstruction of the main pancreatic duct usually cause unsuccessful drainage\(^1\).

Commonly used tubes for percutaneous drainage are chest tubes 12 to 24 F or PCN set pediatric 10 F or adult 12 F. To our knowledge, no one has reported the use of peritoneal drainage (P.D.) catheters 10 F and 12 F for drainage of pseudocysts. We decided to use P.D. catheter in our study. Its low cost, wide availability, numerous small holes in the tube and insertion by trocar technique were the reasons to use the tube.

**PATIENTS AND METHODS**

Between January, 1999, and December, 2003, at J.P.M.C. and K.A.H., 44 patients, ranging in age from 6 to 52 years, with pancreatic pseudocysts, underwent ultrasound-guided percutaneous drainage using peritoneal drainage (P.D.) catheter. Patients selected from both the sexes and all age groups having a pancreatic pseudocyst more than 6 cm in size, abutting the anterior abdominal wall, displacing the bowel loops and providing at least a 1.0 cm window for the insertion of the drainage tube. The cyst symptomatic/complicated and located anywhere within the abdomen. All patients had normal or corrected bleeding profiles.

The equipment used was Just Vision, Eccocee or Nemio Power Color Doppler of Toshiba with 3.5 MHz (variable frequency) convex transducers. Consent was taken after informing the patients of the benefits and risks associated with the intervention and other alternatives. They were educated on how their co-operation would help in the successful placement of the catheter. Patients were placed in the supine position. Under aseptic conditions and local anesthesia, the catheter was introduced under real time guidance into the pseudocyst cavity (Figure 1) through the anterior abdominal wall i.e. through the linea alba or through the lateral margin of left rectus muscle. Immediately after catheter placement close to the pancreatic tail under real time US guidance, position of the catheter was secured to the skin by 2.0 silk sutures. A small ball at the drainage end was used to secure the level / position of the tube. Diagnostic aspiration sample was saved for routine examination, cytology and culture / sensitivity. A drainage bag was connected to the catheter and dressing was applied. Broad-spectrum systemic antibiotics were started before the drainage procedure and subsequently altered depending on the results of the culture and antibiotic sensitivities. Follow-up care consisted of daily bedside inspection in admitted cases to assess the clinical parameters (fever, white blood cell count) and daily monitoring of the amount of catheter drainage. Subsequent follow-up ultrasound was done in all cases and C.T. scan was performed in some cases where fever did not settle, fever recurred or if abdominal pain or discomfort developed / persisted, and also before removal of the drain tube in some patients.

The catheters were left in place until drainage stopped (<10-mL/24 hrs). After the drainage ceased, a contrast study (fluoroscopy) with the use of a 76 % water-soluble iodinated contrast was performed to assess catheter patency and cavity size. If the catheter was patent and the

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**Fig 1:** (a) Ultrasound image of the abdomen showing the sagittal section of the left upper quadrant. There is a large pancreatic cyst showing internal echoes consistent with blood. P.D. catheter passed under US guidance having numerous holes seen insitu. Film (b) shows axial image of the left upper abdomen, after resolution of the pseudocyst, with a drain tube insitu (arrow) adjacent to the pancreatic tail.
cavity had collapsed, the tube was capped and left in place for 1-2 days after which, if no pain, fever or fluid accumulation occurred, the catheter was removed. If a post-procedure US scan did not show adequate decompression or a second cavity was seen, an additional catheter was placed. Catheter manipulation (i.e., change of catheter) was performed if there was clinical evidence of catheter clogging or if injection of the contrast material into the cavity showed that a single catheter had not adequately drained a large cavity.

RESULTS

The size of pancreatic pseudocysts ranged from 6.0 to 24.0 cm. In 7 patients, it was simple cyst while in 20 patient hemorrhagic fluid was found. Seventeen patients had infected cyst. In 9 patients there was history of trauma, in 19 patients there were stones in biliary tree, 3 patients had biliary ascariasis, while 5 patients had history of undergoing ERCP. One patients was alcoholic, no cause found in 7 patients.

The tubes were kept for drainage from 2 weeks to 11 weeks. The amount of fluid aspirated varied from 750-ml to 8,800-ml. Transient hemorrhage was noted in 24 cases, mainly in those who came with the history of trauma Tube blockages were cleared with irrigation, using 20-ml normal saline mixed with injection gentamicin or with 0.35-G guide wire. Adult P.D. catheter 12 F was used in 12 cases and pediatric P.D. catheter 10 F was used in 32 cases.

Spontaneous dislodgment of catheter occurred in 04 patients. In one patient, 5 P.D. catheters were passed because of multiple cysts, spontaneous dislodgment, and re-accumulation after few days. Four out of nine patients who came with trauma required more than one tubes and six required blood transfusions.

Complete recovery took place in 13 – 70 days with a hospitalization period ranging from 1 day to 4 weeks depending upon the etiology. Successful drainage was seen in 37 (84%) patients whereas 07 patients did not improve and fluid re-accumulated due to which they finally underwent open drainage and lavage. Three patients died due to complications of open surgery.

DISCUSSION

Percutaneous drainage has become an acceptable treatment of pancreatic pseudocysts, having as high as a 90% cure rate reported in some series. Contraindications to percutaneous catheter drainage include the presence of pancreatic necrosis or a solid non-drainable pancreatic mass, lack of safe access route, and active pseudocyst hemorrhage. Abdominal fluid collections complicated with pancreatitis are frequently multi-locular or multi-septated, extensive and poorly defined. They may be associated with fistulae and necrotic tissue. Percutaneous drainage of infected peri-pancreatic fluid collections is one of the formidable challenges being faced by the interventional radiologist. Other important factors include precise anatomic definition and localization of the fluid collections, a safe percutaneous access route, use of appropriate catheters and attentive post-procedural management of the catheters. It is believed that they can be accomplished with ultrasound in most patients.

Accurate localization of the collections is critical for the diagnosis as well as for planning catheter placement. Fluid collections could be located in areas remote from the pancreas, including the pelvis, para-colic gutters and mesentery, even the suprapubic region. Therefore, it is important to scan the entire abdomen and pelvis. Multiple collections are common, and they may be contiguous to or remote from one another. Identification of a window in the peritoneum beneath the anterior abdominal wall, for the site of insertion and placement of the catheter close to the pancreatic tail, under true real-time guidance, is best possible with US. Color Doppler mapping of the pseudocyst and deciding about the areas of insertion before puncture, also provides the required confidence. Fine needle insertion into the cyst must be done before the insertion of the drain tube.

Repeated ultrasound or C.T. scanning is frequently required to follow-up patients with infected pancreatic fluid collections. The follow-up scans may indicate the need to alter therapy (i.e., use of more or larger catheters, catheter re-positioning, or surgery). Altimeter and Alexander emphasize that early diagnosis and early percutaneous drainage reduce mortality. Our patients were cured and significant temporary improvement was achieved, even in all the seven patients who ultimately underwent surgery. A combined approach of percutaneous drainage and surgery is sometimes essential. Even if percutaneous drainage is not curative, a beneficial temporary effect should be achieved in almost all patients.

Common causes of failure of catheter drainage are incomplete evacuation of fluid collection because of unrecognized loculation, undetected and undrained remote collections and subsequent development of unrecognized new collections. The use of pre-drainage C.T. and C.T. performed within 24-48 hours after catheter drainage can avoid such problems. If the patients respond to treatment, no additional scans are needed until catheter removal is planned or unless new symptoms or signs (pain, fever, rising white blood cell count) develop.

Catheter drainage time in the previously reported series spanned, on an average, about 15 days (range 2 days to
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01 month) for infected fluid collections or pseudocysts and 20 days (range 7-41 days) for pancreatic abscesses. Catheters were capped prior to their removal, and the patients were studied with C.T. within two to seven days to detect any evidence of fluid reaccumulation. The above-mentioned technique has been described previously by Torres et al. and van Sonnenberg et al. and is believed to be important, since fluid reaccumulation after catheter removal would likely become infected, and thus, lead to abscess formation. In previous reports, the incidence of fluid re-accumulation after catheter removal was 9.4%. In our study, we used relatively small-bore catheters but they were drain tubes kept from 13 up to 70 days. Since the tubes had numerous small holes, these were less frequently blocked by necrotic material, which could not easily enter, and the fluid component kept on draining for a longer period / probably took a longer time to resolve. No catheter kinked or broke down. Tube stiffness caused slight discomfort to some patients but it was better secured to skin by a small ball at the tail end of the catheter. This tube is easy to pass by a small skin nick and deep incision, that is required for a chest tube, can be avoided. This tube doesn't roll over on the trocar, which might happen with a chest tube while insertion through abdominal muscles without incision in the muscles. Simple trocar technique makes it an ideal tube to be passed under real time guidance, as it can be seen throughout the procedure.

Percutaneous management of complicated pancreatitis involves substantial time, effort and cost. Catheter exchange is more common in such cases than in other types of abscesses. In addition, follow-up US/C.T. examinations are frequent. The results of percutaneous management of complicated pancreatitis, while not as good as percutaneous management of other abscesses, remain comparable with surgery, a cure rate of almost 84% and temporary beneficial effects in patients who were not cured, make it the method of choice in the management of complicated pancreatitis, providing either a temporary effect until surgery can be performed or a cure.

Interventional radiology procedures benefit surgeons by expediting accurate diagnosis, determining the need for operation, facilitating surgery by draining abscesses and improving the patient's condition and obviating the need for general anesthesia and major surgery in high-risk or post-operative patients.

REFERENCES