Case Report

Endoscopic Ultrasound-Guided Pancreatic Pseudocyst Drainage in Children: A Case Series

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Over the last one-decade, endoscopic ultrasound (EUS)-guided drainage has evolved as a preferred modality for treating pseudocyst over conventional surgical or radiological procedures among adults using plastic stents or lumen opposing stents; however, studies on EUS-guided pancreatic of pseudocyst among children are mainly in the form of case reports or small case series. Therefore, we aimed to describe four pediatric cases of the pseudo-pancreatic cyst treated successfully with EUS-guided cysto-gastrostomy using plastic stents. In all four cases, EUS-guided drainage was successful using plastic stent with no major complications, and none of them required any follow-up endoscopic or surgical intervention. EUS-guided cysto-gastrostomy offers an excellent and safe alternative to surgery for treating pancreatic pseudocysts in children.

Keywords: Acute pancreatitis, cysto-gastrostomy, double pigtail plastic stents, endoscopic ultrasound, paediatric acute pancreatitis, pancreatic pseudocyst

INTRODUCTION

The development of pancreatic pseudocyst following acute pancreatitis (AP) is one of the most significant complications among adults and children. The natural course of pseudocyst is variable, with the majority showing spontaneous resolution. However, in a small percentage, it either persists or sometimes increases in size along with the appearance of symptoms requiring drainage.[1] The conventional management of pancreatic pseudocyst involves surgery or percutaneous drainage.[2] In the last 10 years, the use of endoscopy to drain pancreatic fluid collections (PFCs) is becoming increasingly popular among adults. Randomized trials have demonstrated that endoscopic ultrasound (EUS) guided drainage is superior to conventional endoscopy in terms of technical success and significantly decreased rates of procedural complications.[3] However, the same is restricted to a few case reports and series only among children.[4] There is still no clarity whether a single plastic stent is good enough among children or needs multiple plastic stents for effective drainage. We describe four pediatric cases of the pancreatic pseudocyst treated successfully with EUS guided cysto-gastrostomy using a single plastic stent in three.

Case Report

Four children who had AP in the past presented to us with symptoms varying from upper abdominal pain, upper abdominal distension, early satiety, and vomiting. The demographic profile and clinical details of all cases are given in Table 1. The contrast-enhanced computed tomography scan in all cases revealed a large pancreatic pseudocyst with compression on the stomach. EUS-guided cysto-gastrostomy was done in all, given the cyst is the reason for symptoms. The endoscopic procedure was done using a linear echo-endoscope GF UCT 180, (Olympus Optical, Tokyo, Japan), a co-axial cystotome 8.5FR (Wilson-Cook, Winston-Salem, NC, USA), and 0.035-inch Jag-wire (length 450 cm; Microvasive Endoscopy, Boston Scientific, Natick, USA). Under EUS guidance, the pancreatic pseudocyst was punctured from the stomach using cystotome [Figure 1], followed by placement of the guidewire within the cyst.

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under fluoroscopy guidance. After securing the guidewire within the cyst by looping it, the cystotome was removed. A double pigtail (DPT) plastic stent was placed over the guidewire, which drained clear fluid within the stomach cavity. In three cases, only a single DPT plastic stent was placed [Figure 2], but in case three, two DPT stents were placed. None of the cases showed any recurrence or complications over 2–6 months of follow-up.

**Discussion**

AP is commonly complicated by the occurrence of PFCs. These collections may evolve into either pseudocyst or walled of necrosis. In a study including 101 children, 61.4% developed PFCs. However, drainage was required in only 31% (12 of 39) of persisting collections. Another study showed the PFC in 58.6% of children with AP, but pseudocyst developed in 38%, and drainage was required in 26.4% of these patients. Drainage of pseudocyst can be performed by open laparotomy, laparoscopy, percutaneous drainage, or endoscopically with or without EUS guidance. Advances in surgical techniques led to open laparotomy, an almost obsolete surgery for the pseudo-pancreatic cyst. Laparoscopic drainage of PFCs is an established effective modality, however in the last two decades, with advances in endoscopic techniques and instrumentation, laparoscopic cysto-gastrostomy is getting replaced by endoscopic cysto-gastrostomy. Percutaneous drainage has a high risk of recurrence and pancreatic fistula formation, thus less preferred. In recent years, EUS-guided internal drainage of PFCs, including pseudocysts, is standard of care among adults because of its ease, safety, and daycare procedure. The EUS-guided cystic drainage is done under real-time imaging; thus, rupture of intervening vessels can be avoided. Based on the experience among adults, EUS-guided pancreato-biliary procedures are now being increasingly used in children. Jazrawi et al., in their series of ten children, showed

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**Table 1: Demographic and clinical profile of patients**

| Case | Age (years)/sex | History of pancreatitis | Size of pseudo-pancreatic cyst on CT scan | Presence of Symptoms | Number and size of DPT stents | Time of stent removal (weeks) | Follow up after stent removal (months) |
|------|----------------|-------------------------|------------------------------------------|---------------------|-----------------------------|-------------------------------|---------------------------------------|
| 1    | 15/male        | Yes                     | 8.2×6.5×6.0 cm, in the lesser sac         | Epigastric pain, Abdominal distension | Single DPT stent 7Fr. × 5 cm | 6                             | 6                                     |
| 2    | 9/male         | Yes                     | 6.5×4.8×5.2 cm, in lesser sac             | Abdominal distension, Early satiety    | Single DPT stent 7Fr. × 5 cm | 4                             | 5                                     |
| 3    | 16/male        | Yes                     | 6.3×7×6.5 cm, in the lesser sac           | Upper abdominal pain, abdominal, distension, and, vomiting | Two, DPT stents 7Fr. × 5 cm | 12                            | 2                                     |
| 4    | 15/male        | Acute pancreatitis      | 6.8×5.6×6.2 cm, in lesser sac             | Lump in abdomen               | Single DPT stent 7Fr. × 5 cm | 6                             | 4                                     |

CT: Computerized tomography, DPT: Double pigtail
the technical success of EUS guided drainage in all without any complication. Similar success was reported by Lakhtakia et al.\textsuperscript{[3]} except for bleeding in one patient. EUS-guided procedure has been reported in as young as 4 years old kid. All pseudocyst which are in close approximation of stomach or duodenum can be done with EUS however children having multiple pseudocysts or those which are away from stomach and duodenum, are not suitable for EUS-guided cysto-gastrostomy. In most EUS guided drainage, plastic stents are preferred if the solid debris component is significantly less. However, there is no consensus whether to use a single plastic stent or multiple plastic stents for pseudocyst drainage among children. All four children had clear fluid with minimal solid debris within the pseudo-pancreatic cyst in this case series. There was complete resolution of the cyst with a single plastic stent in three children and two plastic stents in one child. This highlights that if contents of PFCs are without significant solid debris, as demonstrated on imaging, they can be drained by a single plastic stent. We encountered minor complications only in one patient who developed a pneumoperitoneum due to a leak of air during the procedure and was managed conservatively. No recurrence of pseudocyst or fluid collections around the pancreas or within the abdominal cavity was observed in any patients over a 2–6-month follow-up following removal of plastic stents, ruling out the possibility of disrupted duct syndrome. Overall, EUS-guided drainage of the pancreatic pseudocyst appears to be a very effective and safe treatment modality in children. Second, based on our experience in this series, single plastic stent is safe and effective. However, larger prospective studies are required in pediatric patients to establish these findings.

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Conflicts of interest
There are no conflicts of interest.

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