Endoscopic Treatment of Pancreatic Fluid Collections

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ABSTRACT

Acute pancreatitis is frequently complicated by pancreatic fluid collections (PFCs), which usually resolve spontaneously but some can mature forming large cysts filled with fluid or necrotic debris. Historically, they have been surgically removed but with the advancement of endoscopic procedures, endoscopic drainage has emerged as a safe first-line treatment of PFCs. Furthermore, the development of plastic stents and lumen apposing metal stents (LAMS) has replaced not only open surgery but also the percutaneous drainage due to fewer adverse events. In particular, the LAMS has gained favour recently as large meta-analysis suggested their advantages over plastic stents in the treatment of PFCs, however, data regarding their use in the drainage of PFCs are still scarce.

Introduction

Pancreatic fluid collections (PFCs) are common complications of acute pancreatitis in over 40% of patients [1]. Revised Atlanta criteria categorize PFCs as acute (<4 weeks after episode of pancreatitis) or chronic (>4 weeks after episode of pancreatitis), which are further subdivided by the presence or absence of necrosis in the fluid collection. Acute PFCs are acute peripancreatic fluid collections (APFCs) that do not have a defined wall and are reabsorbed spontaneously within several weeks. The remainder form acute necrotic collections (ANCs) consist of a combination of necrotic tissue and variable amount of fluid.

Differentiation between the two is difficult sequential imaging is often required. These PFCs can mature and form a capsule leading to creation of pancreatic pseudocysts (PP) and walled-off pancreatic necrosis (WOPN) respectively [2]. Traditionally, large PP, WOPN or infected necrotic pancreatitis can be treated with open necrosectomy with a recent tendency towards step up surgical approach based on percutaneous or endoscopic drainage. These minimally invasive procedures are associated with decreased mortality, multiorgan failures, and long term pancreatic endocrine and exocrine insufficiency [3,4]. Studies also attempted to compare the outcomes of percutaneous and endoscopic drainedifference
in major complications or mortality between the two methods demonstrated, however, the percutaneous approach was complicated with an increased inflammatory response, higher rate of pancreatic fistulas and longer hospital stay [5,6]. With further advances in endoscopic procedures and the development of plastic stents (PS) and more recently, lumen aposing metal stents (LAMS), endoscopic drainage has become widely regarded as a safe first-line therapy for patient with necrotic or infected PFC, symptomatic PP that are anatomically amenable to drainage.

PS were the first utilized in transmural endoscopic drainage of PFCs. Initially gastroscopic evaluation performed to identify PFCs by extrinsic bulging compressing the gastric lumen. Afterwards multiple PS could be positioned transmurally with placement with endoscopic and fluoroscopic guidance. This approach has evolved with the development of endoscopic ultrasound (EUS) as the PFCs could be directly visualised allowing for more precise stent placement, thereby associated with decreased number of complications. PS have been proven effective for drainage of PP with complete resolution of the PFCs in 82-93% of cases with cyst reoccurrence [7-10]. Nevertheless, EUS assisted PFCs drainage with the use of PS is associated with multiple complications including acute bleeding episodes, stent occlusions or migration, infection and perforation that occur in 240% of patients [11]. Although intervention with PS have proven to be effective in the treatment of fluidfilled cysts, WOPN cavities with more solid debris have lead to increased risk of stent obstruction due to small diameter of PS [12].

Monumental advances to endoscopic intervention of PFCs arrived with the development of LAMS. These stents are similarly placed across luminal structures to create gastro-pancreatic connection. LAMS are tubular-shaped biflanged which allows proper anchoragedecreases the risk of migration (Figure 1). Placement of LAMS has allowed for more efficient drainage of PFCs due to the larger diameter size while allowing direct interrogation of the cyst cavity through the stent and subsequent intervention such as necrosectomy. This is usually performed in WOPN with large necrotic component, in infected necroses or infected fluid collections [13].

There are multiple LAMS currently available on the market Axios (Boston Scientific, USA) Hanaro (M.I Tech, South Korea), Nagi and Spaxus (Taewong Medical, South Korea), Aix PPS (Leufen Medical, Germany), that vary in length (from 5 mm to 30 mm) and diameter (from 8 mm to 16 mm) (Figure 2). Initial studies have not shown benefits of LAMS over PS in PP and LAMS were believed to have more indications in the setting of WOPN, yet many studies revealed contradict results. However, large metaanalysis of Yoon (PP 250 patients, WOPN 555 patients) provided data the more frequent use of LAMS as they demonstrated higher technical and clinical success rate with adverse events after LAMS placement compared to PS.

Recent large meta-analysis of 14 studies from 2012 to 2016 that included 812 patients (608 WOPN, 204 PP) demonstrated high technical and clinical success rate of LAMS in the treatment of PFCs. LAMS were successfully placed in 98.9% and resolution of patient symptoms with at least 50% size reduction of PFCs was accomplished in over 90% of patients with WOPN. In the treatment of PP the technical and clinical success was even higher, respectively in 97% and 98% of patients. Unfortunately, 10.1% of patients developed complications occurred early and included infections (3.6%), bleeding (3.3%) or stent migration (1.9%). Fortunately, major events as perforations occurred in 0.6% of patients [14]. Our data also demonstrated promising outcomes, as none of the 43 patients with PFCs treated with LAMS developed any major complications and adverse events were mostly limited to minor acute bleeding episodes resolving after cauteri (4.7%) or stent migrations (7.0%) [15].
The newest modification, adopted by advanced endoscopists in 2015, led to integration of LAMS with electrocautery enhanced delivery system that enables advancement of the stent using cautery instead of prior dilation. This has resulted in reduced risk of malposition, leakage and is very cost [16].

In conclusion, with the advancements of endoscopic procedures, this minimally invasive approach using PS and LAMS become mainstay of treatment of PFCs. The endoscopic approach associated with decreased mortality and morbidity over a surgical approachadverse events the percutaneous drainage. The development of LAMS approach as recent data suggests advantages over PS in the treatment of PFCs but further random controlled trials are needed.

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Conflict of interest statement
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Figure 2. Currently available LAMS

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