



## Case Report

# Single-Session Ultrasonography Guided Fine-Needle Biopsy, Choledochoduodenostomy, and Duodenal Stenting in Advanced Pancreatic Cancer: A Case Report

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**Citation:** Valerii G, Vernia F, Longo S, Cellini C, Latella G, et al. (2024) Single-Session Ultrasonography Guided Fine-Needle Biopsy, Choledochoduodenostomy, and Duodenal Stenting in Advanced Pancreatic Cancer: A Case Report and Literature Review. Ann Case Report 09: 1641. DOI: 10.29011/2574-7754.101641.

**Received Date:** 06 February 2024; **Accepted Date:** 12 February 2024; **Published Date:** 14 February 2024

### Abstract

**Background:** Advanced pancreatic cancer is often diagnosed with local and distal extension, it can involve the common bile duct and/or duodenum. The inability to cannulate the papilla may preclude the performance of Endoscopic Retrograde Cholangiopancreatography (ERCP). Endoscopic diagnosis and treatment with duodenal stenting and Endoscopic Ultrasonography (EUS)-guided biliary drainage with specifically designed, fully covered, self-expandable (Hot-AXIOS, Boston Scientific Corp, Natick, USA) can be challenging but feasible. **Case presentation:** We report the case of a 72-year-old patient affected by obstructive jaundice due to locally advanced pancreatic cancer, determining as well gastric outlet obstruction. EUS, performed from the duodenal bulb, determined the presence of a neoplasm (42x47mm) in the pancreatic head. The lesion, infiltrating portal- and mesenteric vein, and the gastroduodenal artery. A Fine-Needle Biopsy (FNB) of the lesion was performed with a 22-Gauge needle. During the same endoscopic session through the duodenal bulb wall a 8mmX8mm Luminal Apposing Metal Stent (LAMS) Hot-AXIOS was placed under EUS guidance, leading to effective biliary drainage. A duodenal, 18x10cm partially covered Self-Expandable Metal Stent (SEMS) was subsequently positioned. No early or late complications were observed. **Conclusions:** A single-step endoscopic approach for diagnosis and palliative treatment with stenting of advanced pancreatic cancer is feasible and effective.

**Keywords:** Choledochoduodenostomy; Pancreatic Head Adenocarcinoma; Duodenal Stenting; EUS-FNB

### Introduction

Pancreatic Head Adenocarcinoma (PHAC) is a highly aggressive malignancy [1]. Being often asymptomatic, early diagnosis is uncommon and 5-year survival is low [1]. When symptoms occur, most patients are unfit for curative surgery. Obstructive jaundice (82% cases) and gastric outlet obstruction

(GOO) (10-20%) result from advanced infiltration of the Common Bile Duct (CBD) and duodenum, respectively [2-4]. Obstructive Jaundice is a condition that need endoscopic/radiological treatment. The quality of life is markedly improved by endoscopic palliation and preservation of oral feeding in patients with GOO [3,4].

Endoscopic Retrograde Cholangiopancreatography (ERCP) with stenting of the common biliary duct thus represents the first line therapeutic approach for extrahepatic obstructive jaundice. However, the access to major papilla may not be feasible whenever

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the PHAC obstructs the duodenal lumen and Endoscopic Ultrasound-Guided Biliary Drainage (EUS-BD) represents a valid alternative procedure to ERCP [5–7]. A further advantage of EUS resides in the possibility to provide histological biopsy specimens to confirm diagnosis [8].

Simultaneous duodenal stenting and EUS-BD have been reported in few cases characterized by concomitant malignant biliary and duodenal obstructions (Table1).

Author	Design	No. Patients	Biliary drainage	Type of malignancy
Iwamuro et al. [9]	Retrospective	2	7	Pancreatic, ampullary
Kanno et al. [10] (abstract)	Retrospective	6	6	NA
Khashab et al. [11]	Retrospective	3	9	Pancreatic, duodenal, other
Maluf-Filho et al. [12]	Retrospective	5	5	Pancreatic, other
Pan et al. [13]	Retrospective	1	5	Pancreatic, ampullary, bile duct, gallbladder
Tonozuka et al. [14]	Retrospective	4	8	Pancreatic
Sanchez-Ocana et al. [15]	Retrospective	9	24	Pancreatic, gastric, other
Brewer Gutierrez et al. [16]	Retrospective	7	7	Pancreatic
Matsumoto et al. [17]	Retrospective	19	19	Pancreatic, ampullary, gastric, bile duct, gallbladder, metastatic
Hamada et al. [18]	Retrospective	20	20	Pancreatic, ampullary, gastric, bile duct, gallbladder, other
Anderloni et al. [19]	Case series	4	4	Pancreatic
total		80	114	

**Table 1:** Review of literature on single-session double stenting: endoscopic ultrasound-guided biliary drainage and duodenal stent for combined biliary obstruction and Gastric Outlet Obstruction (GOO).

A single step approach helps avoiding repeated endoscopic procedures under anaesthesia, and minimizes the patient discomfort, the risk of adverse events and healthcare costs.

A case of a single-session endoscopic procedure associating EUS-FNB, EUS-guided choledochoduodenostomy, and duodenal stenting in a patient with locally advanced head pancreatic cancer is reported.

### Case Presentation

A 72-year-old man presented with jaundice, weight loss, fatigue, nausea, vomiting and abnormal liver functional tests (LFTs) with high level of amylase and lipase; kidney functional tests were normal.

The past medical history included high blood pressure, impaired glucose tolerance and benign prostatic hyperplasia, well controlled by medical treatment.

An abdomen Computed Tomography (CT) scan with intravenous contrast revealed a hypo-vascular large head pancreatic lesion (42x47mm), infiltrating portal and mesenteric veins and the celiac axis. Local lymph nodes were also involved by metastases, resulting in a stage III (T4, N2, and M0) PHAC [20]. A bilio-pancreatic EUS was performed, confirming the pancreatic lesion, with increased stiffness and reduced enhancement after endovascular EUS contrast SonoVue (Bracco Spa, Milan, Italy). The intrahepatic ducts, as well as the Common Bile Duct (CBD) and the pancreatic duct were markedly dilated (15mm and 6mm, respectively) prompting drainage.

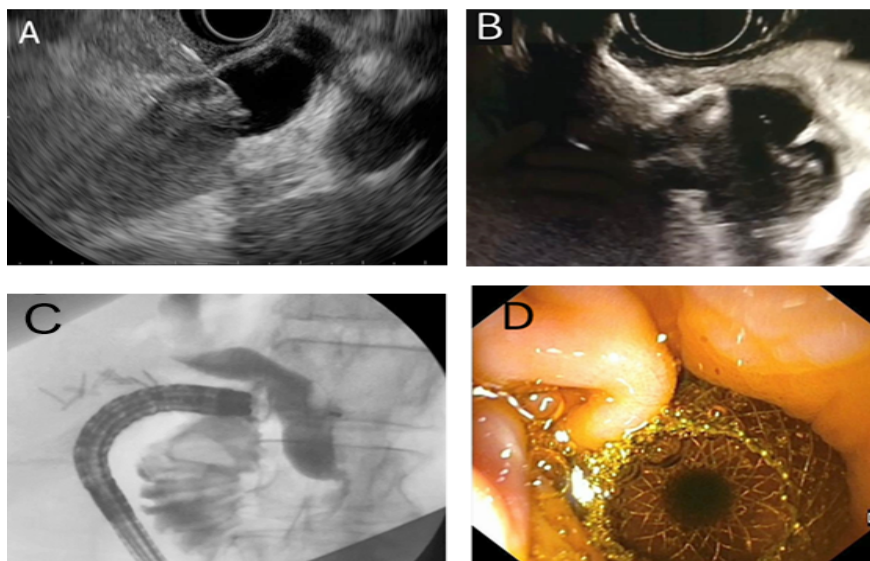
Although the imaging features were highly suggestive of PHAC, FNB (three passes) was performed with an Acquire 22 Ga needle (Boston Scientific, Natick, MA) to characterize the lesion (Figure 1). An attempt to reach the ampulla with a duodenoscope failed due to the presence of a stenosing, ulcerated mass involving the major papilla and EUS-Guided Biliary Drainage (EUS-BD) was thus carried out.



**Figure 1:** A. Endoscopic ultrasonography-guided fine-needle biopsy of pancreatic head mass. B. Histology of the biopsy shows signs of pancreatic cancer.

### Results

The EUS-BD was performed, at first, Fine Needle Aspiration (FNA) of the CBD from the duodenal bulb with a Expect 19 Ga needle (Boston Scientific, Natick, Mass) after, when bile drainage confirmed the correct positioning of the needle in the CBD, a 0.035-inch guidewire was placed in the biliary system. A lumen apposing metal stent catheter (LAMS) HOT AXIOS™ (Boston Scientific Corp., Marlborough, MA) 8X8 mm was released from the wall of the duodenal bulb, through guidewire, up to the common bile duct under EUS and fluoroscopic control (Figure 2).



**Figure 2:** Endoscopic choledochoduodenostomy. A: EUS-guided biliary drainage. B: Endoscopic Ultrasonography (EUS) image showing deployment of the distal flange of a cautery-tipped Lumen Apposing Metal Stent (LAMS) in the common bile duct under EUS guidance. C: Fluoroscopic view, showing final placement of the choledochoduodenostomy stent. D: Endoscopic views showing the proximal flange of the Lumen Apposing Metal Stent (LAMS).

Finally, an 18x10 cm, partially covered, enteric, Self-Expandable Metal Stent (SEMS) (Taewoong Medical Niti-S™) was positioned across the duodenal stenosis, avoiding any overlap with the LAMS.

Broad spectrum antibiotics (beta-lactam antibiotic of the carbapenem subgroup) were administered for five days.

The post-operative course was uneventful, and no early or late complications were observed. Blood investigations revealed a total bilirubin of 13 mg/dL (normal: 0.1–1.2 mg/dL) with direct of 11 mg/dL (normal: 0.1–0.3 mg/dL), Aspartate Transaminase (AST) of 133 U/L (normal: 0–40 U/L), Alanine Transaminase (ALT) of 112 U/L (normal: 0–42 U/L), amylase 38 U/L (normal: 13–53), two days after the procedure his total bilirubin was 7.20 mg/dL (normal: 0.1–1.2 mg/dL) with direct of 5.13 mg/dL (normal: 0.1–0.3 mg/dL).

The first clinical and serological follow-up visit was scheduled at day seven after hospital discharge, confirmed the reduction of the serum conjugated bilirubin levels to 2.8 mg/dl as well as marked improvement of the clinical conditions. Oral feeding was reintroduced on day seven with fluid and semi-solid foods.

Forty-five days later the patient was still alive, on oral feeding. Mild to moderate abdominal pain was well controlled by oral morphine.

## Discussion

EUS-BD is considered an effective and a safe technique for biliary drainage thanks to recent endoscopic technical advances and growing operator experience [21].

The present case report indicates that EUS-BD using the HOT AXIOS™ stent, with duodenal stenting associated with EUS-FNB, is a feasible diagnostic-palliative one-step procedure in selected neoplastic patients.

Three Randomized Control Trials (RCT) compared EUS-BD vs ERCP for biliary drainage in patients with malignant strictures [5,6,22]. The procedures showed comparable results in terms of effectiveness and safety [23]. Paik et al reported similar clinical success rates (90% EUS-BD vs. 94.5% ERCP), but lower rates of adverse events following EUS-BD (6.3% vs 19.7%,  $P = 0.03$ ), as well as the pancreatitis rate (0% vs 14.8%) in 115 patients. Reintervention rates were also lower following EUS-BD (15.6% vs 42.6%), but higher rates of stent patency were documented (85.1% vs 48.9%) [5]. The same was reported in a smaller RCT by Park et al with 93% clinical success rate for ERCP versus 100% for EUS-BD ( $P = 1.0$ ) [6], and by Bang et al clinical success (97 EUS-BD vs 91.2% ERCP,  $P = 0.61$ ) [22]. Adverse events

and reintervention rates (3.0 EUS-BD vs 2.9% ERCP,  $P = 0.99$ ) were comparable. Nonetheless, a trend toward more frequent mild adverse events was present in the EUS-BD arm (21.2% vs. 14.7%), while moderate adverse events were similar (6.1% vs. 5.9%) [22].

A metaanalysis of 284 cases of endoscopic ultrasound-guided biliary drainage cases using LAMS was successfully carried out in 93.8% of patients and led to biliary decompression in 95.9% of them [11]. Post-procedure adverse events, however, were not rare (22%) [11].

Five series with overall 201 patients focused on EUS-BD using the dedicated LAMS Hot AXIOS™ stent (Boston Scientific Corp., Marlborough, MA) [21]. This novel approach led to considerable reduction of post-procedure adverse events, such as bile leak and bleeding (5.6%) or recurrent jaundice (11.3%), compared to previous data [21].

Gastric outlet obstruction, associated with nausea, vomiting, regurgitation and abdominal pain is a late sign of duodenal sub-stenosis in advanced pancreaticobiliary malignancies and considerably impair the quality of life of the patients. Duodenal stent placement is the first-line procedure to prevent symptoms and improve the oral feeding and nutritional status. Good short-term outcomes are associated with an acceptable risk of perforations (1.2%) [4].

Pooled data from 1281 patients with malignant GOO treated with SEMS (partially covered in 24% and uncovered 76% of cases) were recently reported [4]. Good technical and clinical success rate (97.3% and 85.7%, respectively), was associated with low rates of stent obstruction (19.6%) and migration (4.3%) [4].

An alternative approach to improve GOO is EUS-guided Gastroenterostomy (EUS-GE) [11]. A retrospective international multicentric non-inferiority study, comparing EUS-GE with Surgical Gastrojejunostomy (SGJ), reported similar clinical success rates (SGJ 90 % vs. EUS-GE 87 %,  $P = 0.18$ , OR 0.8, 95 %CI 0.44 - 7.07). Non-significantly lower adverse event rates (25% vs 16%,  $P = 0.3$ ) and hospital stay ( $P = 0.35$ ) were reported in the EUS-GE group. Occurrence of gastric re-obstruction favoured SGJ (3 % vs. 14 % EUS-GE), but without a significant difference ( $p = 0.08$ ) [11]. These results have been subsequently confirmed by a retrospective study in 77 patients. Clinical success, defined as eating without vomiting or GOO Scoring System  $\geq 2$ , was achieved in 97.1% of patients in the EUS-GE group versus 89.2% of the laparoscopic group ( $p = 0.358$ ). Hospital stays and overall adverse events also favored the EUS-GE group (4 vs 8 days,  $p < 0.001$  and 2.7% vs 27.0%,  $p = 0.007$  respectively) [24]. Overall, the results indicate that EUS-GE is a valid, less invasive alternative to surgery.

More recently endoscopic duodenal stenting has been



retrospectively compared to EUS-GE [25]. The study reported higher clinical success rates (91% vs 75%,  $p=0.008$ ) and lower stent dysfunction (1% vs 26%,  $P < 0.001$ ) in the EUS-GE group. The adverse events were similar in the two groups (10% vs 21%,  $P=0.09$ ) [25]. Thus, despite the lack of prospective data, EUS-GE seems to be a viable option in selected cases.

Most available data report the endoscopic approach to treat either the biliary obstruction or the GOO. The two conditions, however, often coexist in the same patient. Only small series or retrospective studies report single-session double-stent placement with concomitant biliary and duodenal obstruction (Table 1).

A case of a single-session endoscopic procedure associating EUS-FNB, EUS-guided choledochoduodenostomy, and duodenal stenting in a patient with locally advanced head pancreatic cancer is reported.

A single step approach reduce the time of total procedures when the patient is under anaesthesia so minimizes the patient discomfort, the risk of adverse events and healthcare costs.

This single-step endoscopic procedure is safe and effective when performed by experienced endoscopists and should be restricted to high-volume tertiary institutions. A multidisciplinary team, including gastroenterologists, interventional radiologists, and surgeons with experience in retroperitoneal surgery, is needed to manage severe EUS-related adverse events. To our knowledge, there are no data, series or case report, in the literature reporting a single-step endoscopic sequential approach for diagnosis and palliative care of PHAC, including EUS-guided choledochoduodenostomy and duodenal stenting, following EUS-FNB. This is not surprising as the approach should be considered in an emergency setting also in the absence of histologically confirmed PHAC diagnosis.

There is no doubt, however, that the single-step procedure has some definite advantages over two/three-step methods in particularly in complicated patients. In highly selected patients this one-step procedure may be effectively and safely carried out.

## Conclusion

A 72-year-old man presented with jaundice, weight loss, fatigue, nausea, vomiting and abnormal liver functional tests (LFTs) with high level of amylase and lipase.

An abdomen Computed Tomography (CT) scan with intravenous contrast revealed a hypo-vascular large head pancreatic lesion (42x47mm), infiltrating portal and mesenteric veins and the celiac axis.

A case of a single-session endoscopic procedure associating EUS-FNB, EUS-guided choledochoduodenostomy, and duodenal

stenting in a patient with locally advanced head pancreatic cancer is reported.

This procedure is safe and effective when performed by experienced endoscopists.

**Acknowledgements:** No acknowledgments.

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