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Case Report

Relieving Bowel Obstruction with EUS and Stenting

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Abstract

A 61-year-old female with post-Whipple obstruction was treated successfully with EUS-guided stenting, resulting in rapid symptom relief and discharge. Using Endoscopic Ultrasound (EUS), a trans-gastric Self-Expanding Metal Stent (SEMS) was placed between the stomach and pancreatico-biliary roux limb, facilitating immediate drainage and symptom resolution.

MBO affects up to 15% of patients with cancer recurrence following Whipple's procedure. Meta-analyses assessing the outcomes of resectional/bypass palliative surgery for MBO demonstrate that re-obstruction rates are high (almost 50%) and morbidity and mortality are common (up to 90% and 40%, respectively). However, more recent studies have demonstrated 90-100% success rates for EUS and stenting for relief of malignant biliary obstruction via choledochoduodenostomy and hepaticogastrostomy. Specialist centres have also described placement of gastroenterostomy stents to relieve malignant gastric outflow obstruction.

We propose considering EUS and stenting within the treatment algorithm of MBO patients with suitable anatomy.

Abbreviations

- OGD: Oesophago-Gastro-Duodenoscopy – A diagnostic procedure using an endoscope to examine the esophagus, stomach, and duodenum.
- VATS: Video-Assisted Thoracic Surgery – A minimally invasive surgical technique using a thoracoscope for procedures within the chest.
- MDT: Multiple Disciplinary Team – A collaborative team of healthcare professionals from various specialties working together on patient care.
- EUS: Endoscopic Ultrasound – A procedure combining endoscopy and ultrasound to obtain detailed images of internal organs.
- SEMS: Self-Expanding Metal Stent – A metal stent used to keep blocked or narrowed tubular structures open, commonly in the gastrointestinal tract.
- CT: Computed Tomography – A medical imaging technique that creates detailed cross-sectional images of body structures using X-rays.

Introduction

Pancreaticoduodenectomy, or Whipple procedure, remains the only potentially curative treatment for cancers of the pancreatic head and duodenum [1]. However, despite advances in adjuvant chemotherapy recurrence rates remain high [2,3]. Of the approximately 20% of cases that are resectable, up to 75% will develop recurrent disease within 2 years and 30% experience isolated local recurrence [4-8]. Treatment for such patients focuses on palliative strategies primarily

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via chemotherapy, chemoradiotherapy, or Stereotactic Body Radiation Therapy (SABR) [9,10]. Further surgery is only considered appropriate in a minority of cases [8]. Morbidity associated with disease recurrence is high and care of such patients should be managed using a patient-centered, Multidisciplinary Team (MDT) approach [13].

Case history

A 61-year-old female presenting with epigastric pain, and shortly after with development of jaundice, was diagnosed with duodenal adenocarcinoma in March 2019 following a barium swallow and Oesophago-gastro-Duodenoscopy (OGD). Cross-sectional imaging demonstrated tumor spread beyond the duodenum of the gallbladder and therefore, following biliary drainage and MDT review, she commenced neo-adjuvant chemotherapy (Figure 1).

A Whipple pancreaticoduodenectomy was performed three months later in June 2019 (Figure 2A). Surgical reconstruction was performed via hepatico-jejunostomy, pancreatico-jejunostomy and gastro-jejunostomy with the use of a Braun limb. Post-operatively, the patient was treated non-operatively for a bile leak, which resolved fully prior to discharge on post-operative day 17. Histology confirmed a pT4 N1 V1 R0 duodenal adenocarcinoma and the patient subsequently received adjuvant Xelox chemotherapy (Oxaliplatin and Capecitabine).

In July 2020, following worsening coughing symptoms, the patient was also diagnosed with a primary lung cancer in segment 6 of the right lobe of the lung on CT scan. A pT1b N0 R0 adenocarcinoma was surgically resected via Video Assisted Thoracic Surgery (VATS) in October 2020.

The patient was subsequently entered into annual CT surveillance for both duodenal and lung malignancies. Imaging in June 2021 demonstrated a soft tissue focus of intraabdominal disease recurrence involving the peritoneum of the right upper quadrant of the abdomen, segment 6 of the liver, and the abdominal wall. Recurrence of duodenal adenocarcinoma was pathologically confirmed via radiologically-guided biopsy. The Hepatopancreaticobiliary MDT recommended palliative chemotherapy and the patient was commenced on FOLFIRINOX (folinic acid, flurouracil, irinotecan, oxaliplatin).

However, the tumor deposit gradually enlarged in size, subsequently invading the hepatic flexure of the colon and the distal aspect of the pancreaticobiliary limb of the Whipple reconstruction, culminating in a presentation at the age of 61 years with progressive symptoms of abdominal pain that was uncontrollable at home, bloating, distension, and anorexia, but with a maintained ECOG (Easter Cooperative Oncology Group) performance status of 1. She was admitted under the Acute Oncology team and commenced on a syringe driver for symptom relief. A CT scan demonstrated complete obstruction, with commensurate vast dilatation, of the pancreatico-biliary limb of the Whipple reconstruction. The site of malignant obstruction resulted in a closed loop of obstructed small bowel between the site of peritoneal disease and the closed end of intestine utilised for post-Whipple reconstruction (Figure 2B), with the only mitigating areas for bowel decompression being the pancreatic duct and bile duct via the pancreatico-jejunostomy and hepatico-jejunostomy respectively. In keeping with this, and although serum liver function tests remained normal, back-flow pressure had resulted in radiological evidence of significant intra- and extra-hepatic biliary dilatation.

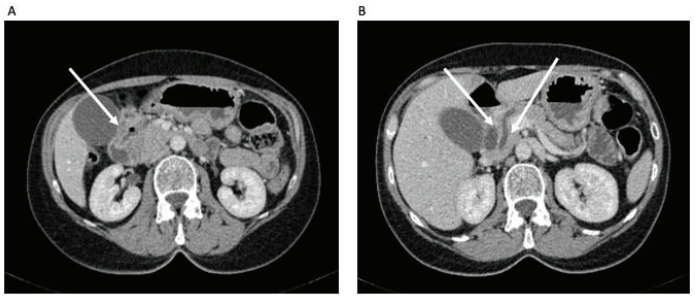

Figure 1: CT scan demonstrating A) duodenal adenocarcinoma with B) involvement of the gallbladder and biliary tree.

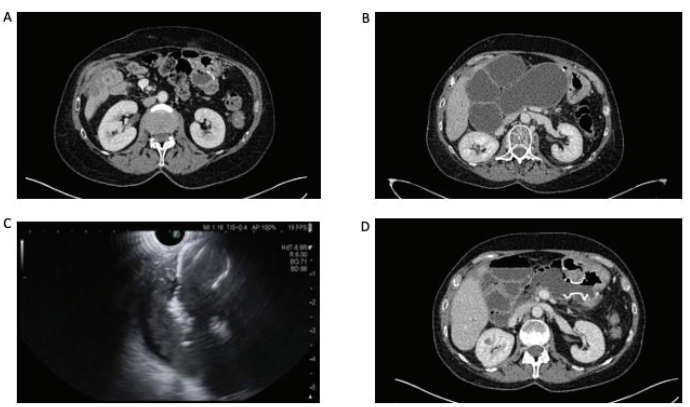

Figure 2: Computed Tomography (CT) imaging to show **A)** initial reconstruction and imaging immediately post-Whipple's procedure, **B)** local recurrence of cancer and deposit in segment 6 of the liver causing obstruction and dilation of the pancreaticobiliary limb of the Braun anastomosis and proximity of the dilated small bowel to the stomach, **C)** EUS image showing placement of a bi-flanged self-expanding metal stent (SEMS) between the stomach body and the dilated small bowel with draining fluid, and **D)** repeat CT two weeks later highlighting patency and position of the stent, remaining anatomically *in-situ*.

Due to the patient's current physiological status and the presence of other widespread metastases, major surgical intervention was considered prohibitively high-risk and not appropriate. However, CT scanning demonstrated that the obstructed small bowel limb was in close anatomical proximity to the greater curve of the stomach and following careful review of the scan and multi-disciplinary discussion between oncological, surgical, endoscopic and radiology teams an emergency Endoscopic Ultrasound (EUS) was arranged to assess whether it was possible to decompress the obstructed limb, and by extension the obstructed biliary tree, via trans-gastric endoscopic stenting under EUS-guidance.

EUS examination confirmed that the stomach and obstructed small bowel limb were in close anatomical proximity, and it was therefore possible to place a trans-gastric Self-expanding Metal Stent (SEMS) between the stomach and

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pancreaticobiliary small bowel limb. Immediate drainage of bile-stained fluid was directly visualised endoscopically and EUS images demonstrated swift decompression of the obstructed small bowel limb (Figure 2C).

Following endoscopic stent decompression, the patient's abdominal symptoms and pain resolved rapidly following the procedure, and it was possible to cease usage of the syringe driver. She was subsequently commenced on oral diet and was discharged well three days post-procedure.

After two weeks at home tolerating a normal diet, the patient re-presented to hospital following a large episode of vomiting and recurrent abdominal pain. Repeat CT scan showed right colonic inflammation and partial large bowel obstruction at the sight of disease recurrence in the right upper quadrant. The trans-gastric stent remained patent, and the pancreatico-biliary small bowel limb remained decompressed on cross-sectional imaging, (Figure 2D). A trial of steroids and a period of reduced oral intake were commenced, resulting in symptom resolution and discharge after three days.

Discussion

Despite advances in surgery and post-operative chemotherapy, life-limiting morbidity secondary to disease recurrence following resection of gastro-intestinal cancers remains common [14,15]. Malignant Bowel Obstruction (MBO) is one such complication, affecting up to 15% of patients [16]. Regardless of treatment modality, the primary goal remains quality of life improvement for MBO patients, remains to promote the maximum quality of life. However, meta-analyses assessing the outcomes of palliative surgery for MBO have demonstrated re-obstruction rates of almost 50%, morbidity and mortality rates of up to 90% and 40% respectively, and poor ratios of time spent in hospital relative to remaining life [15,17–20]. Chemotherapy has shown even less benefit in the treatment of MBO, with significant complications and contraindications [18,21].

A third of patients treated non-operatively will have a spontaneous resolution of their obstruction. However, in two thirds of patients it is neither feasible or physiologically appropriate to attempt surgical restoration of their digestive tract [20], thereby resulting in palliative medical treatment for symptomatic relief as the only available option. Selected patients may be offered parenteral nutrition or decompressive gastrostomy, in order to provide valuable additional time at home, but this is similarly only suitable in selected patients [22]. It is therefore essential to develop innovative and minimally invasive strategies for relief of MBO and promotion of quality of life.

Interventional Endoscopic Ultrasound (EUS) has evolved significantly in recent years [23,24]. The use of EUS for insertion of bi-flanged self-expanding metal stents (SEMS) is effective in the creation and maintenance of patent drainage channels with low associated infection rates [25]. Studies have shown 90-100% success rates for EUS and stenting in malignant biliary obstruction via the use of choledochoduodenostomy and hepaticogastrostomy [26-29]. Reported complications include short-term fever, stent migration, and blockage in <25% of cases, but this is reported in less than 25% of cases. Published literature from specialist endoscopic centres has also demonstrated the use of gastro-enterostomy stenting to relieve malignant gastric outflow obstruction [30-33]. Success for these procedures is reported as more than 87% with a complication rate of less than 10% and a median 15% reintervention rate. Importantly, the median time for resuming oral diet was one day post-procedure, and median time to discharge was three days. Recent case reports demonstrate the feasibility of ileocolonic decompression using EUS-guided SEMS or LAMS [34-37].

Conclusion

Current strategies for management of MBO remain limited in their appropriateness and efficacy. Emerging literature and ongoing clinical success suggest EUS may allow an innovative approach for bypass of malignant obstruction, with demonstrated use in malignant biliary obstruction via choledochoduodenostomy and malignant gastric outflow obstruction via gastroenterostomy. EUS-guided stenting should be considered as a viable palliative option in selected patients with favorable anatomy after MDT discussion and fully informed patient consent.

Ethics

Written informed consent was obtained from the patient for publication of this case and accompanying images.

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