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Hemosuccus Pancreaticus- A Concise Summary on Current Knowledge of this Rare Cause of Upper GI Bleed

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Abstract

Hemosuccus pancreaticus (HP) is a rare but potentially life-threatening condition characterized by bleeding from the pancreatic duct into the gastrointestinal tract. The etiopathogenesis of HP includes various causes, such as pancreatic inflammation, tumours, trauma, and vascular lesions. Clinical presentation can be intermittent and challenging to diagnose, often leading to misdiagnosis. Imaging modalities, including endoscopy, contrast-enhanced CT, angiography, endoscopic ultrasound (EUS), and MRI, play a crucial role in diagnosis. Management and treatment of HP aim to eradicate the source of bleeding to prevent repeat or continued bleeding. Two main approaches are surgical management and interventional radiology-based endovascular embolization. Embolization has a success rate of 79%-100%, while surgery has a success rate of 70%-80%. Novel therapies using endoscopic-guided ultrasound with or without cystogastrostomy using fibrin glue and adhesives are emerging as promising options for management. Complications of HP can include chronic anaemia, hypovolemic shock, gastrointestinal bleeding, and organ rupture. Interventional radiology and surgical interventions may lead to complications such as allergic reactions, re-bleeding, and arterial wall damage. The overall mortality rate of HP is around 9.6%, but it can be higher in cases of massive bleeding or underlying malignancy. Early diagnosis and appropriate management are crucial for improving outcomes and reducing mortality. Further research is needed to explore the efficacy and safety of novel therapies in the treatment of HP.

Keywords: Hemosuccus pancreaticus; pseudoaneurysm; Upper GI Bleed; Angiography; Embolization; Chronic Pancreatitis

Abbreviations: HP: Hemosuccus Pancreatitis; CT: Computed Tomography; MRI: Magnetic Resonance Imaging; EUS: Endoscopic Ultrasound; AKI: Acute Kidney Injury

Introduction

Hemosuccus pancreaticus (HP) is essentially a condition where there is bleeding from the pancreatic duct into the gastrointestinal tract through the ampulla of Vater. It is a rare but possible a life threatening major but poorly understood cause of upper gastrointestinal bleeding. The bleeding can range from being mild to severe, causing hypovolemic shock and sometimes even death Its rare occurrence and difficult anatomical location make it a hard diagnosis via conventional methods of esophagogastroduodenoscopy [1]. The source of bleed may be directly from the pancreatic duct, pancreas itself, or any of the surrounding structures like the gastric or splenic artery. The most common location of blood drainage is into the second part of the duodenum. In rarer circumstances where instead of the main pancreatic duct, the accessory pancreatic duct involvement is seen, the bleed is directed towards the minor duodenal papillae. In literature, the very first case of hemosuccus pancreaticus was reported by Lower and Farell wherein a patient presented with rupture of the primary splenic artery into the main pancreatic duct causing a subsequent intestinal bleed. In 1970, Philip Sandholm after reporting three cases of pseudoaneurysm ruptures into the pancreatic duct, coined the term and described this condition [2]. It has been described using various other nomenclature terms like wirsungorrhaghia and pseudohemobilia. Due to the lack of cases reported, HP remains an unfamiliar and challenging diagnosis to physicians. As per a review done by Tarar et al., only 123 cases have been reported so far in literature [3].

Etiopathogenesis

The main causes of HP include pancreatic inflammation, pancreatic tumours (pancreatic carcinoma, Neuroendocrine tumours, Serous neoplasms etc), pancreatic divisum, surgical trauma, blunt force trauma, iatrogenic, and vascular lesions. 2 cases of iatrogenic HP were reported after and EUS- fine

needle aspiration procedure. The leading cause remains chronic pancreatitis which leads to a continuous state of inflammation. Peripancreatic pseudoaneurysms also occur in around 10% - 17% of all patients with chronic pancreatitis which can lead to HP [4]. An aneurysm is generally caused by atheroma, congenital connective tissue disorder (Marfan syndrome and Ehler-Danlos syndrome), fibromuscular dysplasia, vasculitis, and α-1 anti-trypsin deficiency [5]. HP is a rare entity of acute alimentary tract hemorrhage. Estimates to occur in about 1/1,500 GI bleeding cases have a strong male predilection (about 7:1).

Because it is rare, it is missed easily. The mean age of onset is between 50-60 years old. It is highly correlated with alcohol exposure and other risk factors that are attributed to chronic pancreatitis development. No study or research shows any race or ethnicity superior to each other in terms of prevalence and incidence [6]. Possible mechanism proposed is that during pancreatic inflammation progression, pancreatic enzymes like elastase erode the pancreatic blood vessels and surrounding tissues by the process of proteolysis which causes vasculature to rupture. This process can also lead to cyst formations. Then, the resulting communication between the cyst and the artery forms a pseudoaneurysm. Soon, the aneurysm ruptures into the main or accessory pancreatic duct to cause a pancreatic haemorrhage and manifests as an upper GI bleed when the blood drains into the duodenum [4]. A case of HP has been reported in a patient with Glanzmann thrombasthenia [7].

Clinical Presentation

Characteristic manifestations of HP are intermittent abdominal pain and intermittent upper GI bleeding which can manifest as malena/hematochezia or sometimes hematemesis. A possible mechanism-based reasoning of this presentation is the presence of blood clots which block the pancreatic duct and causing increased ductal pressure. As a result, bleeding is stopped, but abdominal pain may persist. After a period of time (minutes to days), the blood clots dissolve and pass, hence the pressure in the pancreatic duct is relieved. At that time, the abdominal pain is also reduced/relieved, but the gastrointestinal bleeding begins again due to absence of the clot [6].

Presentation of symptoms may vary among patients and are not typical in many cases. Thus, the disease is very easily missed or misdiagnosed. Other possible clinical signs include hyperamylasemia, jaundice, nausea, vomiting, weight loss, anorexia and a palpable upper abdominal pulsating mass in case of an aneurysm present [6,8,9]. The exact cause of hyperamylasemia is still uncertain, and a topic not studied enough. mechanism of hyperamylasemia remains unclear Galanakis et al [10]. proposed two explanations. On, is that the formation of blood clots in the pancreatic duct causes partial or full obstruction, which manifests as transient hyperamylasemia or hyperbilirubinemia. The other explanation is that due to the anatomical proximity of the gastroduodenal artery and the pancreaticobiliary drainage system, an aneurysm or a closed hematoma may cause exogenous compression of the common bile duct and main pancreatic duct Clay et al [11]. emphasized the fact that the characteristic crescendo-decrescendo intermittent nature of pain is found in approximately half of the patients, as a result of sequential distension and decompression of the pancreatic duct by blood clots. Increased levels of serum bilirubin can be attributed to pancreaticobiliary reflux It is interesting to also note that gastroduodenal artery pseudoaneurysms can also lead to sequential compression of the pancreatic duct and lead to the signs and symptoms stated before. In a meta-analysis study done on the 123 patients reported to have HP, 58% presented with malena, 50% with abdominal pain, 28% with hematemesis, 15% had haematochezia and 13% had an obscure GI bleed [12].

Diagnosis

The diagnosis of HP is an extremely challenging workup due to its rarity, difficult anatomical site, intermittent clinical signs of abdominal pain/bleeding, and several other differential pathological causes which could present in similar ways. As stated, prior, the laboratory values are all normal except for elevated serum bilirubin in pancreaticobiliary reflux and serum amylase and lipase if the cause is due to pancreatitis. Hence, diagnosis is mainly through utilisation of imaging modalities, as laboratory tests are generally normal and nonconclusive. The most common modalities used currently in practise are Esophagogastroduodenoscopy, contrast-enhanced CT, angiography, endoscopic ultrasound (EUS), and ERCP. The initial evaluation of any patient with suspected UGIB begins with a thorough history and physical examination. The chronicity, onset, description, and intensity of symptoms should be elicited because these may help clinicians understand the severity of the bleed. Patients should be asked about previous episodes of UGIB because a similar lesion may be involved. Upper endoscopy remains the imaging investigation of choice in cases with upper gastrointestinal bleeding and through it, blood can be seen oozing from the ampulla of Vater. However, initial endoscopic evaluation can many a times be negative for an active bleed considering its intermittent nature. Endoscopy also plays a key role in ruling out other common and rare differentials such as Erosive gastritis, esophageal varices, Dieulafoy's lesions, peptic ulcer disease, atypical inflammatory bowel disease, Gi primary or secondary neoplasms. [13-17]. Due to this, a negative endoscope does not rule out the possibility of HP. However, a side viewing endoscope such as ERCP can help visualize and localize the pancreatic duct and the source of bleeding. The presence of Intraductal clots in the form of filling defects suggests a diagnosis of HP [18].

CT scans have also become a popular choice for the evaluation of gastrointestinal hemorrhage. They can be of 2 types- multiphase CT angiography or CT enterography. CT angiography is commonly employed in patients with hemosuccus pancreaticus, with a sensitivity of 96% [19,20]. Angiography reveals the parent blood vessels that are bleeding and can delineate and clearly

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show the target blood vessel anatomy. However, angiography has limitations, as it cannot accurately locate the diseased blood vessel in cases with minor or intermittent bleeding. In such cases, the diagnosis of HP usually requires the use of other methods. A Contrast-enhanced ultrasound can be used to diagnose this condition if angiograms fail to differentiate the feeding artery from the pseudoaneurysm [21]. MRI can be used as an alternative modality in patients allergic to contrast/ iodine. It can show even small amounts of blood in the pancreatic duct and duodenum and can also be used to distinguish pseudocysts from abscesses [22]. Koizumi et al [23]. reported that MRI could successfully identify the bleed source in patients with HP.

It is imperative to remember that if patients present with an unclear/ obscure source of repeated/intermittent upper gastrointestinal bleeding, especially with an underlying chronic pancreatitis also present, repeated examinations and careful observations should be performed to not miss HP as a diagnosis differential [24].

Management/ Treatment

The management and treatment of hemosuccus pancreaticus must aim to eradicate the source of bleeding in its entirety to avoid repeat bleeding and continued bleeding which could prove to be fatal. The 2 types of broad categories we can divide treatment into are: - Surgical management and Interventional Radiology management. If the source of haemorrhage is found by arteriography, interventional radiological therapy should be done following this examination. At present, the preferred treatment method is interventional radiology based endovascular embolization. This technique is minimally invasive and quite reliable with a success rate of approximately 79%-100%. The overall success rate of this method about 67% [25-28]. IR methods are often performed in patients who are hemodynamically stable.

Techniques include angiography with embolization via prosthetic material, balloon tamponade, or stent placement. Coil embolization is the most commonly used method which induces thrombosis within the aneurysmal vessels. Balloon tamponade and stent placement can be put as a bridge to perform elective surgery. No major complication has been seen with IR interventions other than femoral artery cellulitis which is very rare 0.5%. Failure of embolization may result from a failure to isolate the causative artery, spasm of the bleeding vessel, or the bleeding vessel's misidentification. Benz et al also described for the first time the successful implantation of an uncoated metal Palmaz stent across the aneurysmal segment of the splenic artery [26,29].

Surgical treatment is used in most hemodynamically unstable patients who have major or uncontrolled bleeding, persistent shock, failure of embolization, rebleeding after embolization, or when initial angiography shows no abnormal findings. The various surgical procedures are distal pancreatectomy and splenectomy, central pancreatectomy, intracystic ligation of the blood vessel, aneurysm ligation and bypass grafts [26,30]. In cases of the pseudocyst's poor anatomical position and if the resection is unfeasible, it is recommended to ligate the artery proximal and distal to the bleeding source. Alternatively, through cutting the drainage to the pseudocyst that enters the GI tract. Intraoperative ultrasound may be used to determine the source of bleeding and the extent of resection. Surgery has a success rate of 70% to 80%, with a risk of 10% to 50% mortality and a risk of recurrent bleeding to be 0% to 5% [31].

Surgical treatment has shown a success rate of up to 85%, with operative mortality rates ranging from 10% to 50%. The rebleeding rate after surgical intervention is considerably low at 0% to 5% [32]. End-arterial ligation is not recommended for gastroduodenal and pancreaticoduodenal arteries due to increased risk of recurrent bleeding [33]. Certain newer novel therapies include the endoscopic-guided US with or without doing cystogastrostomy using fibrin glue and histoacryl adhesives. These approaches are proving to be a promising tool for management. The recurrence rate of bleeding remained low after this effective treatment. This approach gives a promising outcome, particularly in patients who do not show angiographic evidence and are allergic to contrast contraindication. Those who are poor candidates for surgery. The benefits and the safety still need to be studied [2].

Complications

Certain common HP complications include Chronic anaemia due to blood loss, major bleeding causing hypovolemic shock, Upper/Lower GI bleed, Visceral organ rupture, Retroperitoneal hematoma, Multiorgan failure, Sepsis and finally death. Complications associated with Interventional radiology-based management include AKI due to contrast, Allergic reactions to dye, anaesthetics or sedatives, Re-bleeding/ failure in few cases, Access site arterial bleeds/hematoma, Arterial wall mechanical damage/trauma due to manipulation by guide wires etc [33]. Complications associated with surgical interventions include re-bleeding, major abdominal bleed (Internal), Bowel damage and obstruction, Peritonitis/abscess/sepsis, Deep vein thrombosis and subsequent Pulmonary embolism, Death in 20-25% cases [34].

Prognosis

The overall mortality of HP is said to be 9.6%. In cases of massive bleeding, complicated HP and malignancy causes the mortality rates are higher. In absence of any interventions, the mortality rate with simply supportive measures reaches up to 90% [22,35].

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