

MANAGEMENT OF VISCERAL ARTERY PSEUDOANEURYSMS - AN INSTITUTIONAL EXPERIENCE

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Abstract

Background: Visceral artery pseudoaneurysm is a rare and occasionally lethal complication of trauma, infection, inflammation, and surgery. Because they carry a high risk of rupture and high mortality, early diagnosis and appropriate management are warranted. This study aims to present the various modalities of presentation and management at our institution. **Materials and Methods:** This retrospective analysis included 22 patients admitted to our institution from January 2019 to December 2024 with a diagnosis of visceral artery pseudoaneurysms, and their presentation and management details were obtained from the available records. Visceral artery pseudoaneurysm was diagnosed using contrast-enhanced computed tomography (CT) abdomen/CT angiography and, in some patients, digital subtraction angiography (DSA). The variables studied were age, sex, symptoms, aetiology, and affected vessels. **Result:** Among the 22 patients, males were predominant (20, 90.9%), with only two females (9.1%). The most common age groups were 20-40 years and above 50 years, each with eight patients (36.4%). Gastrointestinal (GI) bleeding was the most frequent presentation (13, 59.1%), with melena (11, 50%) being more common than that of haematemesis (2, 9.1%). Abdominal pain was noted in eight patients (36.4%), and haematuria in one (4.5%). Pancreatitis was the leading cause (15, 68.2%), followed by postoperative (6, 27.3%) and traumatic causes (1, 4.5%). The splenic artery was the most frequently involved vessel (9, 40.9%), followed by the gastroduodenal artery (7, 31.8%). **Conclusion:** Arterial pseudoaneurysm in visceral arteries requires a high suspicion for diagnosis, and GI bleed is the most common presentation of this condition. Embolisation is highly successful and minimally invasive; however, surgery remains the choice if embolisation fails.

INTRODUCTION

Visceral artery pseudoaneurysms are lethal vascular lesions that arise from the splanchnic circulation and renal artery due to various causes, including inflammation, infection, trauma, neoplasm, and iatrogenic causes. These lesions were described more than 200 years ago, and initial case reports mostly consisted of emergency interventions for ruptured aneurysms. Diagnosis in these cases was mostly made post-mortem.^[1] They usually present as either asymptomatic lesions or GI or Urinary tract bleeding. The first reported operative repair was performed by Kehr in 1903 which was the ligation of a proper hepatic artery aneurysm (HAA).^[2] True aneurysms have all three arterial wall layers, whereas

pseudoaneurysms develop due to disruption of the intimal and medial layers of the arterial wall and do not contain any epithelialised wall; instead, they are outlined only by thin fibrous tissue, as a result of which they carry a high risk of rupture. Due to this increased risk of rupture, treatment of these pseudoaneurysms is necessary and the mortality rate of untreated cases can go up to 100%, and the incidence of rupture is about 2-80%.^[3]

Prior imaging is crucial for the management of pseudoaneurysms. Non-invasive modalities such as ultrasonography, CT, and MRI are commonly used, while digital subtraction angiography (DSA) is reserved for specific cases.^[4,5] Ultrasonography aids in detecting superficial or solid organ pseudoaneurysms, appearing as anechoic lesions

with "yin-yang" flow on Doppler imaging.^[5,6] However, its sensitivity is limited by obesity, bowel gas, and deep locations. Multidetector CT angiography (CTA) is the most sensitive modality, requiring both arterial and venous phases for optimal detection of pseudoaneurysms. CTA identifies contrast-filled sacs, and post-processing techniques improve visualisation. Some pseudoaneurysms may thrombose spontaneously, occasionally leading to resolution.^[5]

Surgery is the initial treatment option for pseudoaneurysms, which includes ligation with or without revascularization. Since most patients are poor surgical candidates due to multiple surgeries/hostile abdomen, the endovascular approach is a good first line of management in these patients.^[7] It is minimally invasive and is associated with high success rates and low rates of complications. Endoscopic ultrasonography (EUS) is used when the endovascular approach fails, specifically for pseudoaneurysms arising from the splenic and gastroduodenal arteries. Under EUS guidance, the pseudoaneurysm is directly punctured, and an embolic agent is injected.^[8,9] Thrombin or glue may be used, with thrombin being preferred because of its safety profile. The complications are like those seen with the percutaneous approach.^[9,10]

Aim

This study aimed to present the various modalities of presentation and management of visceral artery pseudoaneurysms.

MATERIALS AND METHODS

This retrospective analysis included 22 patients with a diagnosis of visceral artery pseudoaneurysms, and their presentation and management details were obtained from the available records of patients admitted to our institution from January 2019 to December 2024.

Inclusion criteria

Patients diagnosed with visceral artery pseudoaneurysms were included in the study.

Methods

Visceral artery pseudoaneurysm was diagnosed using contrast-enhanced computed tomography (CT) abdomen/CT angiography and, in some patients, by digital subtraction angiography (DSA). The variables studied were age, sex, symptoms, aetiology, and vessels affected. Data were presented as frequencies and percentages.

RESULTS

Among the 22 patients, male patients were predominant, with 20 patients (90.9%) being male and only two patients (9.1%) being female. Regarding age distribution, most patients were between 20 and 40 years of age (8 patients, 36.4%), and 8 patients (36.4%) were above 50 years of age. The remaining six patients (27.3%) were in the 40-50 years age group [Table 1].

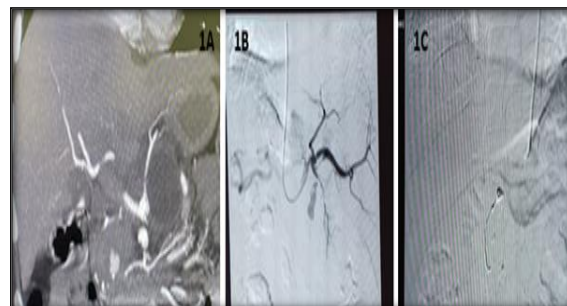


Figure 1: 1A- Gda Pseudoaneurysm In A Patient Of Pancreatitis, 1B – DSA Showing Gda Pseudoaneurysm, 1C – Coil Embolisation

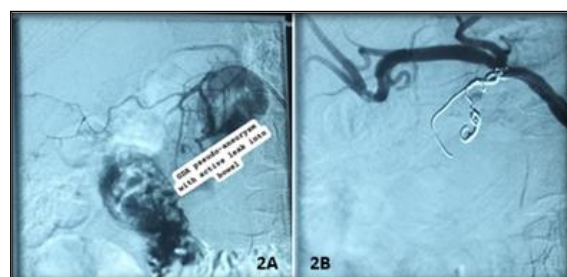


Figure 2: GDA Pseudoaneurysm with Leak Into Bowel; 2B. Coil Embolisation

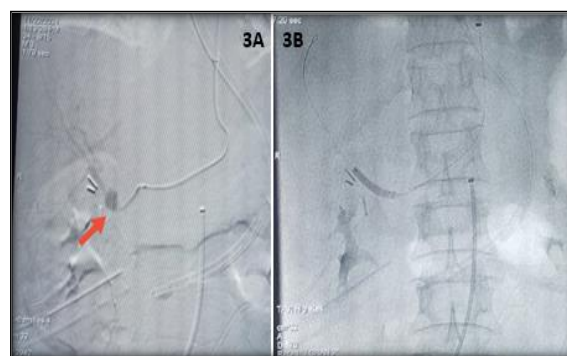


Figure 3: 3A: proper hepatic artery pseudoaneurysm, 3B: 4mm stent graft deployed

Table 1: Demographics characteristics of patients.

		N (%)
Gender	Male	20 (90.9%)
	Female	2 (9.1%)
Age	20-40 years	8 (36.4%)
	40-50 years	6 (27.3%)
	>50 years	8 (36.4%)

Among the 22 patients, gastrointestinal (GI) bleeding was the most common clinical presentation, observed

in 13 patients (59.1%). Melena was the predominant symptom, occurring in 11 patients (50%), whereas

haematemesis was observed in two patients (9.1%). Abdominal pain was the second most common presentation, reported in eight patients (36.4%).

Additionally, haematuria was noted in one patient (4.5%) [Table 2].

Table 2: Clinical presentation of patients

		Clinical Presentations N (%)
GI Bleed	Malena	11 (50%)
	Hematemesis	2 (9.1%)
Haematuria		1 (4.5%)
Abdominal Pain		8 (36.4%)

Among the 22 patients with pancreatitis, the most common underlying cause was pancreatitis (15 cases, 68.2%). Postoperative complications were the second most common aetiology, affecting six patients (27.3%). Among these, two patients (9.1%) had undergone Whipple's procedure, one patient (4.5%)

had undergone Frey's procedure, two patients (9.1%) had undergone laparoscopic cholecystectomy, and one patient (4.5%) had undergone percutaneous nephrolithotomy (PCNL). Additionally, post-traumatic causes, specifically blunt abdominal injury, were identified in one patient (4.5%) [Table 3].

Table 3: Aetiology of patients

		Aetiology N (%)
Pancreatitis		15 (68.2%)
Post-Operative	Post Whipple's Procedure	2 (9.1%)
	Post Frey's Procedure	1 (4.5%)
	Post Laparoscopic Cholecystectomy	2 (9.1%)
	Post PCNL	1 (4.5%)
Post-Traumatic (Blunt Injury Abdomen)		1 (4.5%)

Among the 22 patients, the most commonly involved vessel was the splenic artery, which was affected in nine cases (40.9%). The gastroduodenal artery (GDA) was involved in seven patients (31.8%). The superior mesenteric artery (SMA) was affected in two

cases (9.1%). Less commonly affected vessels included the proper hepatic artery, inferior pancreaticoduodenal artery (IPDA), and renal artery, each in one patient (4.5%) [Table 4].

Table 4: Vessels affected among patients

	Vessels involved N (%)
Splenic Artery	9 (40.9%)
Gastroduodenal Artery (GDA)	7 (31.8%)
Superior Mesenteric Artery (SMA)	2 (9.1%)
Proper Hepatic Artery	1 (4.5%)
Inferior Pancreaticoduodenal Artery (IPDA)	1 (4.5%)
Renal Artery	1 (4.5%)

DISCUSSION

In our study, males were predominant, with 20 patients (90.9%) being male and only two (9.1%) female. Regarding age distribution, the most affected age groups were 20-40 years and above 50 years, with eight patients (36.4%) in each group, while six patients (27.3%) were between 40 and 50 years old. A study by Bagwan et al. showed that 41 patients with a mean age of 39.73 ± 10.54 (SD) years and 40 (97.56%) were predominantly males.^[11]

In our study, GI bleeding was the most common clinical presentation, observed in 13 (59.1%) patients. Among these, melena was predominant in 11 patients (50.0%), whereas haematemesis was observed in two patients (9.1%). Bagwan et al. reported that the most common symptom was abdominal pain (n=40), followed by gastrointestinal bleeding (n=28). Fifteen patients (36.59%) had acute pancreatitis and 26 patients (63.41%) had chronic pancreatitis.^[11]

In our study, pancreatitis was the leading aetiology, identified in 15 patients (68.2%). Postoperative complications were the second most common cause, seen in six patients (27.3%). A study by Bagwan et al. reported Fifteen patients (36.59%) had acute pancreatitis and 26 patients (63.41%) had chronic pancreatitis.^[11] A study by Shera et al. Pancreatitis (8) was the most common cause, followed by previous surgery (7) and trauma (6).^[12] Studies by Regus et al., and Gabrielli et al., reported that Chronic pancreatitis, particularly due to alcohol abuse, is a prominent risk factor for VAP development.^[13,14]

In our study, the splenic artery was the most frequently affected artery, observed in nine patients (40.9%), followed by the GDA in seven patients (31.8%), and the superior mesenteric artery (SMA) in two patients (9.1%).^[11] A review by Mallick et al. showed that the splenic artery is the most common artery affected by pancreatitis because of its proximity to the pancreas. The second most common artery involved is the GDA. Inflammation and exocrine enzyme leakage lead to erosion and the

formation of pseudoaneurysms. Pseudoaneurysms can also arise from the erosion of a pancreatic pseudocyst into a nearby artery. Bagwan et al. reported that pseudocysts were found in 25 (60.98%) patients. Pseudoaneurysm arose most commonly from splenic artery (n=32; 78.04%).^[11] A study by Fankhauser et al. reported that the splenic artery is commonly affected in visceral artery pseudoaneurysms, which can be effectively treated using minimally invasive methods.^[16]

A study by Muscari et al. reported that the aneurysms involved the splenic artery in 13 patients (56%), the superior mesenteric artery in 5 patients (22%), the hepatic artery in 3 patients (13%), the gastropiploic artery in 2 patients (9%).^[17] Mortality rate in our study was 4.5% and the study by Maatman et al. reported the mortality rate from visceral artery pseudoaneurysms in necrotizing pancreatitis was 14%.^[18] A study by Fankhauser et al. shows that minimally invasive methods can effectively treat visceral artery aneurysms and pseudoaneurysms with a 3.4% 30-day mortality rate.^[16] Since open surgery carries a high mortality, the endovascular approach can be the preferred first line of approach with good outcomes.^[19]

CONCLUSION

A high index of suspicion is required for prompt diagnosis and management of arterial pseudoaneurysms in the visceral artery pseudoaneurysm. The most common presentation is GI bleeding, followed by abdominal pain. Our experience confirms a high success rate of embolisation, consistent with the literature. The endovascular approach is minimally invasive and offers the advantages of a shorter hospital stay and reduced perioperative morbidity. However, if embolisation fails, surgical management remains the treatment of choice for these patients.

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