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Gastro-Duodenal Artery Aneurysm Rupture – Case Report

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Abstract
Background
The definition of an aneurysm is a dilation of an artery more than 1.5 to 2 times its normal diameter. Visceral (or splanchnic) artery aneurysms include those concerning the celiac truncus, superior mesenteric artery, inferior mesenteric artery, and their branches. This classification does not include aortic and renal artery aneurysms. It is a rare, but clinically significant pathology because of the high mortality risk. Despite this rarity, cases have been accumulated and this pathology is better understood. Novel techniques for the management of aneurysms have been developed with the advent of interventional radiology. However, our case concerns the emergent surgical repair of a ruptured aneurysm, rather than the elective repair.
Case presentation
The 61-year-old female patient complains of diffuse, intermittent abdominal pain lasting for almost one week. On the last day the patient suffers from excruciating abdominal pain and is brought to the emergency department. Objective evaluation shows pallor, diaphoresis, low blood pressure, tachycardia and abdominal guarding in all quadrants. An abdominal ultrasound spots the presence of free fluid in all recesses. A diagnostic peritoneal needle aspiration shows pure blood. AB0 and Rhesus blood type is identified and the patient is prepared for the operating theatre. Following a laparotomy, peritoneal lavage, a rupture of gastro-duodenal aneurysm is identified and the artery is ligated in its origin. The patient tolerated the procedure well and was discharged in good health.
Discussion
Rare case reports in literature have reported Gastro-duodenal artery aneurysms. Because of this rarity in incidence there is no clear protocol on how to diagnose and manage it. Possible risk factors and associated conditions include: chronic pancreatitis, liver cirrhosis, vascular abnormalities as fibromuscular dysplasia and polyarteritis nodosa. Other events and diseases such as trauma, septic emboli, hypertension and atherosclerosis are also mentioned. The main symptoms of visceral artery aneurysms, with or without rupture are abdominal pain, hypotension, gastric emptying delay and other non-specific manifestations such as vomiting, diarrhoea, jaundice, upper gastro-intestinal tract haemorrhage (which occurs in about 50% of the cases with gastro-duodenal artery aneurysms) and retro and intra-peritoneal bleeding.
Conclusion
The rupture of gastro-duodenal artery is a serious fatal presentation of a rare condition. It requires high alertness and decisive action, as warning signs and symptoms may be dull or absent. Quick diagnosis before rupture can change the course of this disease and prevent lethal complications. As this disorder is so uncommon, there are no specific screening or follow-up recommendations. Treatment and diagnostic options should be decided on a case basis.
Keywords: General Surgery, Visceral Artery Aneurysm, VAA, Splanchnic Aneurysm, Aneurysm Rupture.
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1. Introduction

Visceral arteries comprise a list of major arteries that branch off the aorta, supplying blood to the abdominal organs such as intestines, liver, pancreas, kidneys, spleen and stomach. An aneurysm of visceral arteries is a rare, but clinically significant pathology because of the high mortality risk. Such lesions started appearing in medical literature more than 200 years ago, as case reports for emergency surgeries for haemorrhagic shock from rupture. Since then, more cases have been accumulated and this pathology is better understood. Novel techniques for the management of aneurysms have been developed with the advent of interventional radiology. However, our case concerns the emergent surgical repair of a ruptured aneurysm, rather than the elective repair. Several diagnostic instruments can be of use in vascular aneurysms, such as ultrasound, CT, MRI and diagnostic angiography. The latter can be combined with a percutaneous intervention for embolization.

The definition of an aneurysm is a dilation of an artery more than 1.5 to 2 times its normal diameter. Visceral (or splanchnic) artery aneurysms include those concerning the celiac truncus, superior mesenteric artery, inferior mesenteric artery, and their branches. This classification does not include aortic and renal artery aneurysms, despite the fact that they account for nearly all intra-abdominal aneurysms (95 %).

Table 1. Relative incidence in percentage of splanchnic artery aneurysms:

Visceral artery aneurysm	Incidence
Splenic artery	**60 %**
Hepatic artery	**20 %**
Superior mesenteric artery	**6 %**
Gastric artery	**4 %**
Jejunal, ileal and colic arteries	**4 %**
Pancreatico-duodenal artery	**2 %**
Gastro-duodenal artery	**1.5 %**
Inferior mesenteric artery	**< 1 %**

After a literature review, we can mention several causes of visceral aneurysm formation. General causes include atherosclerosis, tunica media degeneration, collagen vascular diseases and fibromuscular dysplasia. Other factors for superior mesenteric artery aneurysms include multiparity, portal hypertension and post-transplant status. Celiac artery disease has been involved in gastro-duodenal and pancreatico-duodenal arteries aneurysms. Infectious diseases and inflammatory conditions such as vasculitis, surgical or medical intervention and trauma can cause splanchnic aneurysms.

1.1 Gastro-duodenal artery aneurysms

Gastro-duodenal aneurysm is an extremely rare entity representing 1.5 % of all visceral aneurysms. Distinguishing from a true or a pseudoaneurysm is clinically significant due to different etiologies and prognoses. Gastro-duodenal pseudoaneurysms are mostly related to pancreatic pathology, celiac occlusion or stenosis, abdominal trauma or iatrogenic injuries. A male to female predominance is noted, with a ratio of 4 to 1 and an average age of diagnosis in the ages 60 – 70. The greater ratio in relatively younger men can be attributed to alcoholic pancreatitis.

Symptoms from GDA aneurysms can be vague, including epigastric pain, with possible radiation to the back. Other signs include gastro-intestinal tract bleeding, hypotension, vomiting, diarrhoea and jaundice.

Rupture may occur in the gastro-intestinal tract in 65 % of the cases, and in the retroperitoneal space in 35 % of cases. When rupture occurs, there is a significant mortality rate of 30 – 40 % even with emergent surgical procedure.

2. Case presentation

2.1 History of present illness

Our patient is a 61 years old female with the following medical history and presentation:

The patient complains of diffuse, intermittent abdominal pain lasting for almost one week. General examination and laboratory studies result normal. On the last day the patient suffers from excruciating abdominal pain and is brought to the emergency department. Objective evaluation shows pallor, diaphoresis, low blood pressure, tachycardia and abdominal guarding in all quadrants. An abdominal ultrasound spots the presence of free fluid in all recesses. A diagnostic peritoneal needle aspiration shows pure blood.

On such conditions, AB0 and Rhesus blood type is identified and the patient is prepared for the operating theatre.

2.2 Details of the surgical procedure

The procedure begins with a general endotracheal anaesthesia. A superior and inferior midline incision is made, when immediately we aspirate a great amount of blood and clots (Fig. 1).

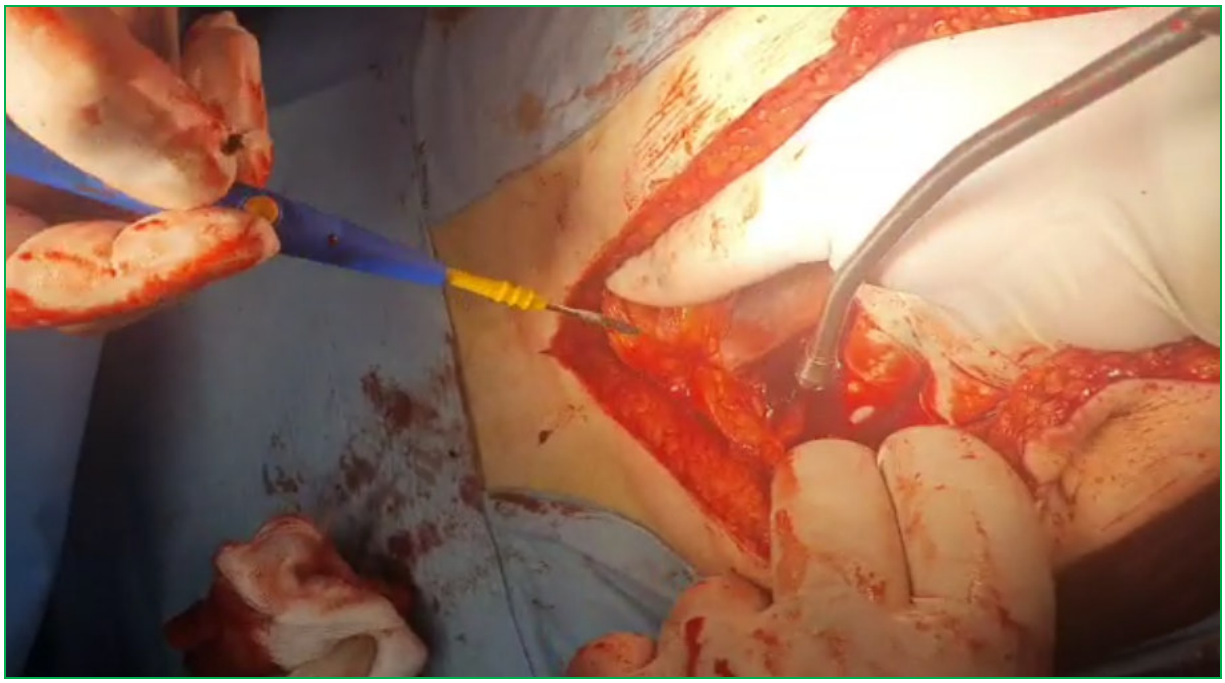

Figure 1. Encountering massive hemoperitoeum upon incision.

A thorough control of the whole peritoneal cavity and all organs is made. A hematoma at the level of transverse mesocolon and Treitz ligament still persists (Fig. 2). In these conditions, we conclude that there is a problem with the retro-pancreatic, retro-duodenal cardinal vessels.

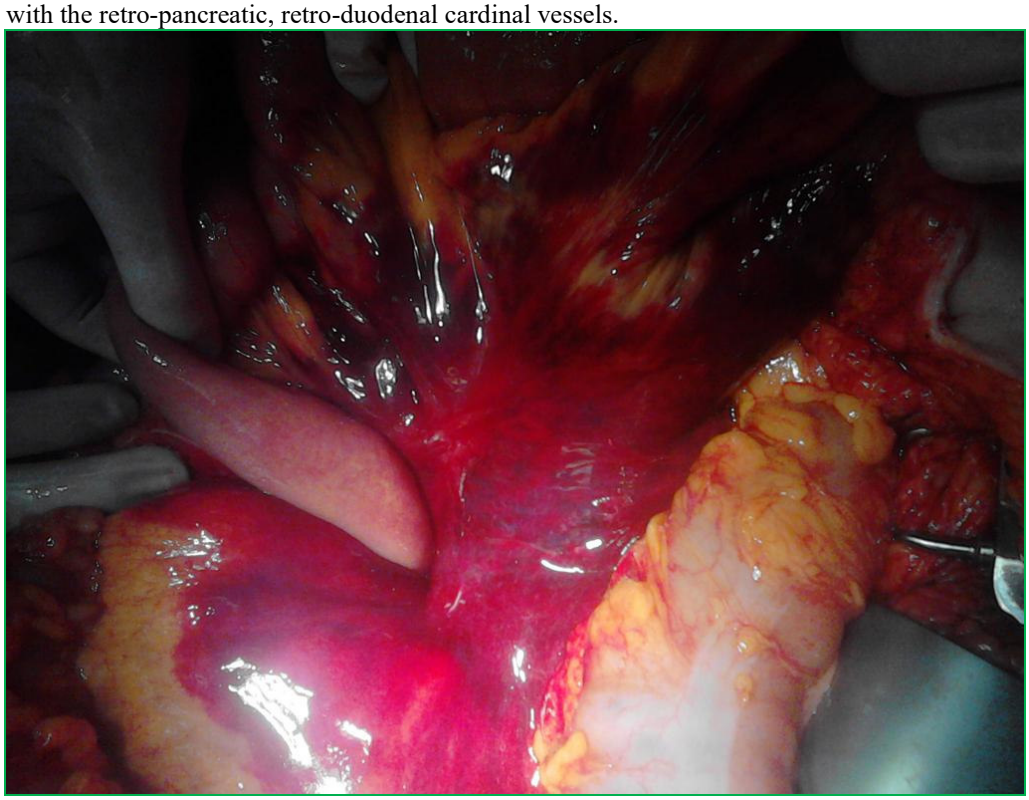

Figure 2. Transverse mesocolon and Treitz ligament hematoma.

Immediately after the peritoneal cavity is aspirated and cleared, we begin preparing the hepatoduodenal ligament, where the proper hepatic artery is separated with a rubber loop (Fig. 3).

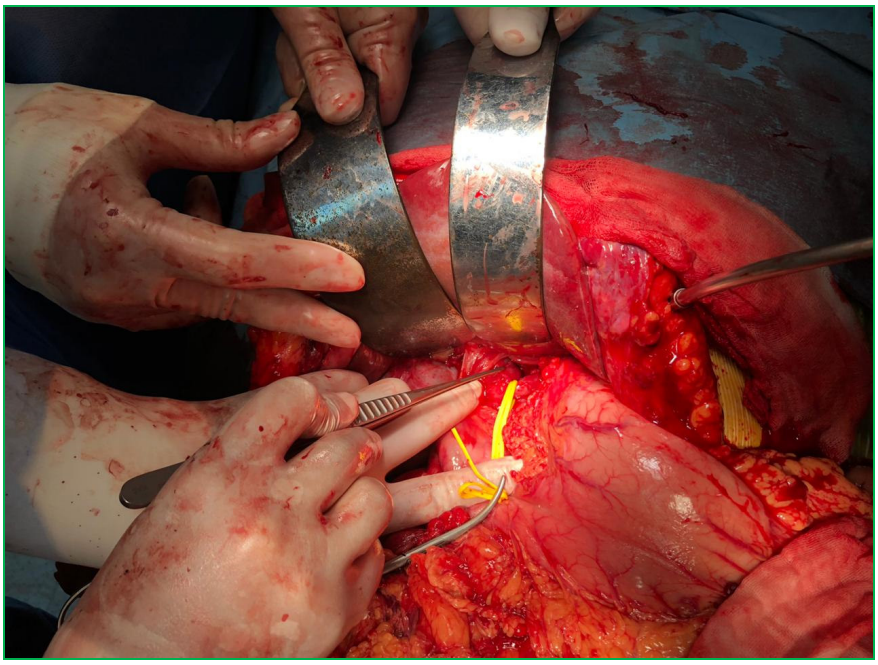

Figure 3. Dissection at the hepatoduodenal ligament. Rubber loop passed around proper hepatic artery.

The lesser omental bursa is accessed. Rubber bands are passed on the common bile duct, dividing it from portal vein, on which a rubber lasso is also passed (Fig. 4).

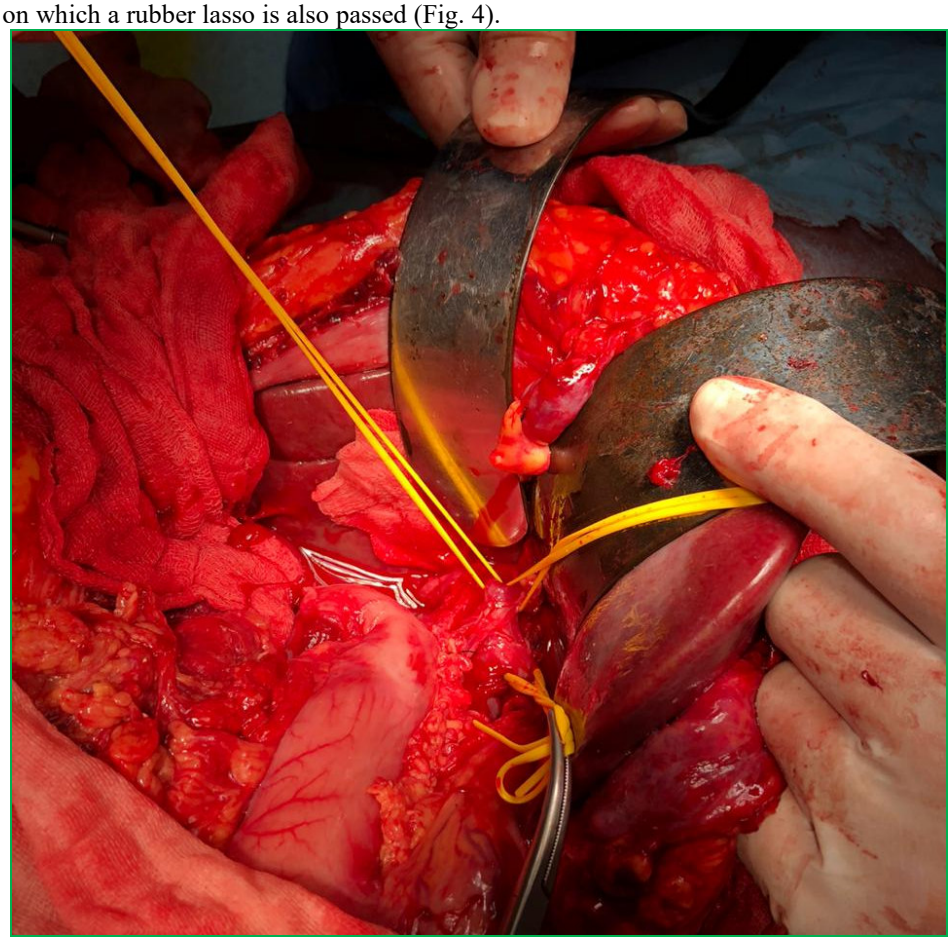

Figure 4. Dividing the common bile duct and portal vein.

The major omental bursa is opened, where blood clots come out. We continue with saline lavage until no more haemorrhage is present. We prepare close to the duodenum and the retro-gastric level (Fig. 5). A ruptured aneurysm of gastro-duodenal artery is evidenced.

We dissect the whole trajectory of hepatic artery, and the gastro-duodenal artery is doubly-ligated at its

origin. The distal end is also suture-ligated. A final check for haemostasis is performed.

The procedure ends with lavage and the insertion of drains.

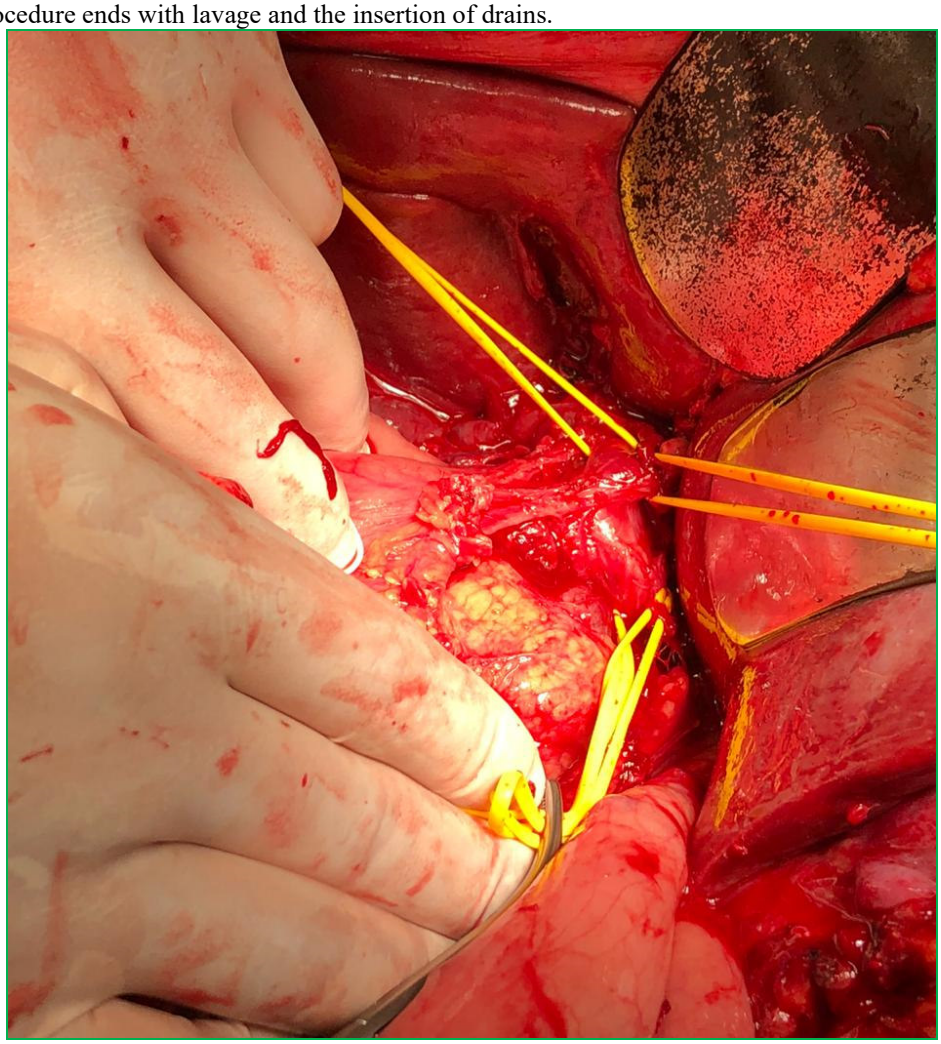

Figure 5. Continuing dissection at the duodenal and retrogastric level.

2.3 Post-operative period

The patient tolerated the procedure well, with uneventful post-operative course. She received a total of 6 whole blood transfusion units during the treatment. She was discharged in good health in the 6th day after surgery.

3. Discussion

Rare case reports in literature have reported Gastro-duodenal artery aneurysms. Because of this rarity in incidence there is no clear protocol on how to diagnose and manage it.

Possible risk factors and associated conditions include: chronic pancreatitis, liver cirrhosis, vascular abnormalities as fibromuscular dysplasia and polyarteritis nodosa. Other events and diseases such as trauma, septic emboli, hypertension and atherosclerosis are also mentioned.

The main symptoms of visceral artery aneurysms, with or without rupture are abdominal pain, hypotension, gastric emptying delay and other non-specific manifestations such as vomiting, diarrhea, jaundice, upper gastro-intestinal tract haemorrhage (which occurs in about 50% of the cases with gastro-duodenal artery aneurysms) and retro and intra-peritoneal bleeding.

A pulsatile abdominal mass could be a dangerous warning sign of imminent rupture (75% risk).

Some diagnostic modalities include: visceral angiography (high sensitivity – 100%), computerized tomography (67% – sensitivity) and ultrasonography (50% – sensitivity).

Recent developments such as Pulse Doppler US and three-dimensional CT have increased the diagnostic accuracy and offer a greater role in describing the adjacency to other structures and vessels. Their advantage is in being less invasive than the Gold Standard – Angiography.

However, our case demanded immediate laparotomy because of the deteriorating clinical parameters and the confirmation of haemoperitoneum.

4. Conclusion

Visceral aneurysms are a rare finding in clinical surgical practise, as studies suggest. Most of the cases remain asymptomatic and undetected until incidentally found from imaging reports or from acute cases of rupture intra-operatively or in an autopsy.

A rather unclear and difficult distinction has to be made for true aneurysms and pseudoaneurysms of visceral arteries. A true aneurysm is even less likely to be symptomatic, but a lower risk of presenting with rupture.

In conclusion, the rupture of gastro-duodenal artery is a serious fatal presentation of a rare condition. It requires high alertness and decisive action, as warning signs and symptoms may be dull or absent.

Quick diagnosis before rupture can change the course of this disease and prevent lethal complications. The definitive treatment of cases before rupture, generally makes for good prognosis. As this disorder is so uncommon, there are no specific screening or follow-up recommendations. Treatment and diagnostic options should be decided on a case basis.

Conflict of interest

The author(s) declare(s) that there is no conflict of interest. The authors alone are responsible for the content and writing of the paper.

Financial disclosure

There is no financial support to this study.

Ethical aspect

Informed consent was obtained from all participants in the study and all procedures were conducted in accordance with the Declaration of Helsinki.

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