Stenting of Gastroduodenal Artery Pseudoaneurysm Threatened Rupture: Report of a Case

Do Kim Que[1], Tran Quy Tuong[2], Do Cao Duy Anh[3]*

ABSTRACT

Gastroduodenal artery (GDA) aneurysm is a rare surgical entity that causes various symptoms. In the case of rupture, it usually presents an ominous prognosis and mortality rate of up to 40%. Although open surgical procedure is a mainstay, endovascular intervention is emerging as a promising treatment in recent years, due to its advantages and safety. We present a case of upper gastrointestinal bleeding caused by GDA pseudoaneurysm threatened rupture in a 72-year-old woman, with medical episodes of acute pancreatitis, a pancreatic body tumor removal surgery was performed, and now the tumor is relapsing and metastasizing. The treatment approach is blocking off the pseudoaneurysm by a covered stent. The procedure was successful and the patient is asymptomatic. Two months later, the pseudoaneurysm reduces its size and is completely excluded from the preservation of the blood flow in the artery. Endovascular interventional treatment in the case of GDA aneurysms is considered a promising alternative not only to open surgery but also to an effective emerging technique even in the acute setting.

Keywords: *Gastroduodenal artery – Covered stent – Aneurysm*

INTRODUCTION

Visceral artery aneurysm is a rare surgical entity (0.01 – 0.2% population) with a mortality rate of up 40%, usually presenting in the celiac trunk, hepatic and splenic arteries [1-2]. GDA aneurysms are rare, accounting for approximately 1.5% of all visceral artery aneurysms [3]. The etiology of aneurysms is unclear, almost cases rising while pancreatitis, trauma, post-surgery, arterial hypertension,… [1,2,4]

Visceral artery aneurysm is usually asymptomatic or may cause vague symptoms until rupture, severe abdominal pain, gastrointestinal bleeding, hemodynamic instability predominate, and threaten life. The urgent surgical management is the mainstay; however, it is an invasive technique so it increases risks and severe post-surgical complications. With medical advantages in recent years, visceral aneurysms may be treated by endovascular intervention, which is less invasive, embolism aneurysms with intravascular coils or covered stents, and almost current studies all around the world show good consequence [2,4,5].

[1] *Thong Nhat hospital, HCMC.*
[2] *Nhan dan Gia Dinh hospital, HCMC.*
[3] *University Medical Center in HCMC*
**Corresponding author: Do Kim Que,*
Tel: 0913977628 - Email: dokimque@gmail.com
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In this article, we present a rare case of GDA pseudoaneurysm threatened rupture which is treated by endovascular intervention with a covered stent.

CASE REPORT

A 72-year-old woman was admitted to the emergency room (ER) with hematemesis on February 12th, 2020 . Three months pre-hospitalization, she has complained about dull pains in the epigastric area. One day before hospitalization, she got an intensified epigastric pain associated with nausea. On the day of hospitalization, she was admitted to Thong Nhat hospital's ER with hematemesis, an undetectable amount of blood and associated with an intensified epigastric pain.About her medical history, she has a pancreatic tumor that was removed 2 years ago, 3 episodes of pancreatitis pre- and post-surgery. After the procedure, she was diagnosed with an aneurysm in the epigastric area but no treatment was performed. In the last one year, she had two gastrointestinal bleeding episodes needed to hospitalize but she rejected surgical management for removing her aneurysm.

Her clinical examination includes an average general state, anemia's signs, da niêm nhạt, abdominal examination: a mass in the pulsation epigastric area.

A complete blood count (CBC): White Blood Cell (WBC) 12.2 k/uL, Red Blood Cell (RBC) 2.25 M/uL, Hemoglobin (HCG) 5.6 g/dL, Hematocrit (Hct) 18.3%, Platelet (PLT) 215 k/uL.

Upper Gastrointestinal (GI) endoscopy findings include old blood in the stomach, no detection of the bleeding area after cleaning by water.

Computerized tomography (CT) angiography's findings demonstrate a pseudoaneurysm in the hepatic hilar area which originates from a GastroDuodenal Artery (GDA)'s branch, enhancement in the artery phase, size 71x72mm, neck 4mm, distance to the origin of GDA 12mm, the adjacent adipose tissue infiltrates and hematoma surrounded aneurysm evoke a threatened rupture.

Recurrent pancreatic tumor in the pancreatic cutting position invades the small intestinal mesenteric root. Metastasing's findings in the base of both lungs with metastasized nodes.

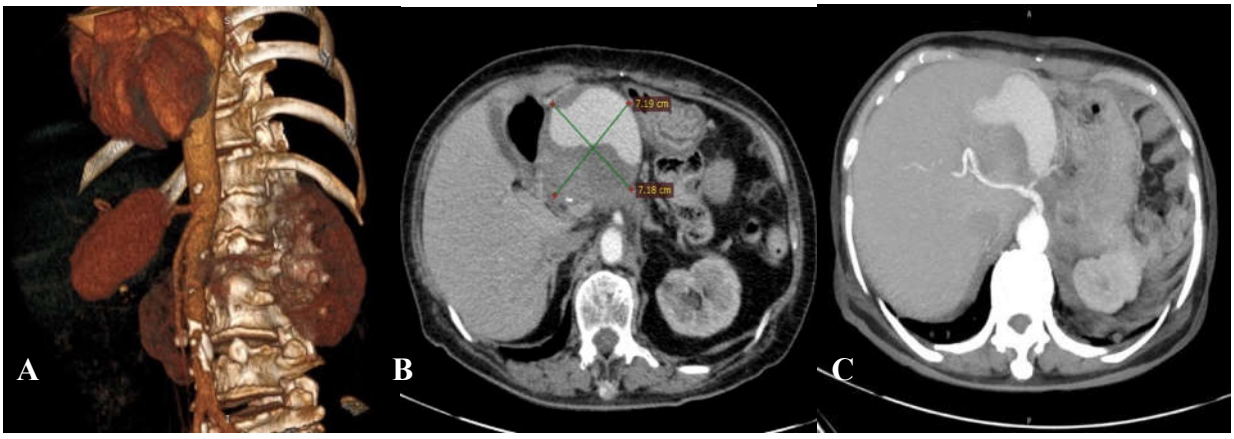

Figure 1: CT contrast enhancement pre-procedure. **A:** MIP findings demonstrate a massive pseudoaneurysm, enhance contrast in the arterial phase, narrow-neck, and originate from the GDA.

B: The sac of pseudoaneurysm is really close to the D2-duodenum, size #71x72mm, containing a bit of old blood and adjacent hematoma. **C:** 3D VR findings demonstrate the correlation of the pseudoaneurysm and other visceral arteries, strongly enhancing contrast in the arterial phase.

After doing a general examination and checking her underlying conditions, we perform an urgent endovascular intervention to block the pseudoaneurysm by a covered stent. Technique: Local anesthesia, inserting through the right common femoral artery, 6F sheath, hydrophilic guide wire 0.035/150mm (Terumo, Japan), and Yashimoto guiding catheter (Terumo, Japan) to select the celiac trunk. DSA demonstrates a pseudoaneurysm of the GDA, distance #70mm, narrow-neck, distance from the neck to the origin of the GDA is enough to perform a covered stent. The procedure was performed by using the interventional 6F sheath (Cordis, US) to set in the celiac trunk, after that, using a guidewire 0.014/180mm (Terumo, Japan) to set in the GDA through the pseudoaneurysm. A covered stent PK Papyrus 4x20mm (Biotronik, Germany) was inserted into GDA by a guiding catheter. Using a Roadmap to localize the mouth of the pseudoaneurysm and the origin of the GDA, carefully confirm the exact position, then expand the covered stent under careful DSA observation. After the expansion of the stent, the pseudoaneurysm's neck is completely covered by the stent, no leak of contrast material outside the stent and it's completely isolated from the blood flow, as demonstrated by angiography.

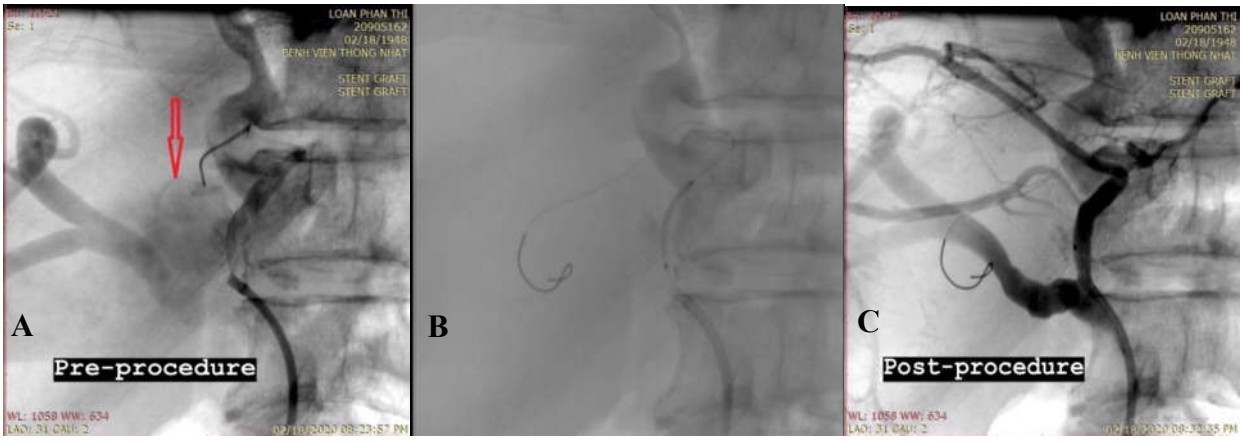

Figure 2: DSA findings. **A:** In the pre-procedure stage, 6F, guide wire 0.014 in the GDA and the pseudoaneurysm (red arrow). **B:** Guiding catheter, guidewire, and unexpanded covered stent in the location of the GDA's pseudoaneurysm. **C:** In the post-procedure stage, the covered stent is successfully expanded in the right position, the sac of the pseudoaneurysm is completely isolated from the blood flow (no blood inflow) and no negative effects on other arteries.

The procedure was successful and the patient left the hospital three days later. She remains well, with no more abdominal pain and gastrointestinal bleeding. After 4 months, the sac reduces to 19x35mm, completely liquefying, no more contrast enhancement, no signs of ischemia, or infraction

of adjacent organs. The abdominal sonography shows that the right position of the covered stent was successfully set in the GDA, clear border of the sac, and no blood inflow.

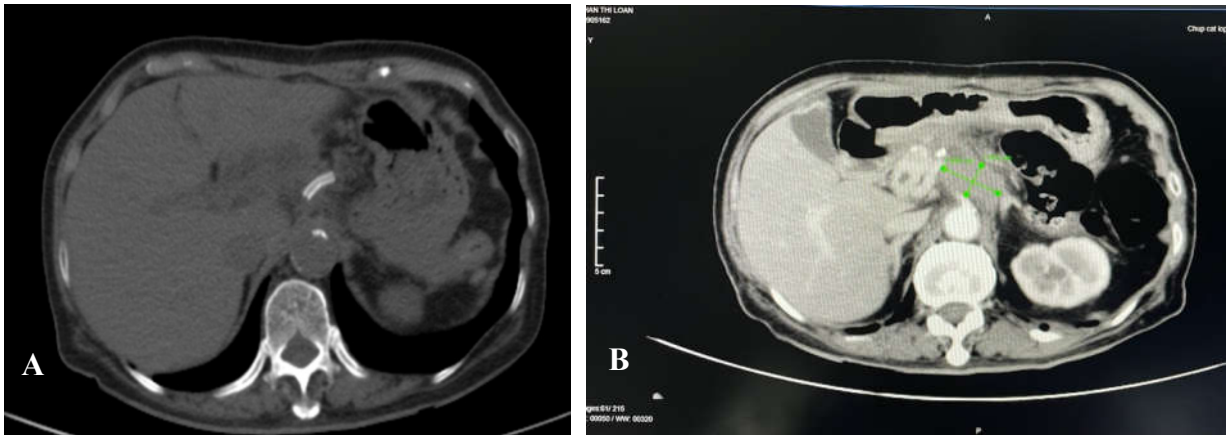

Figure 3: CT contrast enhancement 4 months later. **A:** On the CT plain findings demonstrate the right position of the stent in the GDA. **B:** The pseudoaneurysm's size decreases significantly, inside fluid is iso-density, no more contrast enhancement or blood flow.

DISCUSSION

GDA aneurysm is really rare, accounting for approximately 1.5% of the visceral aneurysm [1,2,6]. Pancreatitis, trauma, post-surgery, ulcer, atherosclerosis, and stenosis of the SMA are also a few common etiologies [1,7]. Pancreatitis accompanies 80% of almost aneurysm cases and erosion of the adjacent arteries is the reason why aneurysm is established. There are other uncommon etiologies such as autoimmune diseases and the absence of the celiac axis.

In general, the aneurysm is asymptomatic and presents as an incidental finding on imaging studies or complication events. However, its complications are various and severe. Based on medical reports, 35% of GDA aneurysms, regardless of size, present with rupture causing abdominal pain, hypotension, hypovolemic shock, and mortality rate of up to 21% [1,3].

Erosion of the adjacent anatomical structures may be manifested with intraperitoneal or gastrointestinal bleeding and hemobilia if the aneurysm ruptures towards the common bile duct and the pancreatic duct [9].

Interestingly, in our case, the pseudoaneurysm was identified before, and the reason may be due to post-surgery of removing pancreatic tumor and pancreatitis, which may cause abdominal dull pain associating with 3 times of gastrointestinal, indicating that the pseudoaneurysm has threatened rupture at least 3 times.

Almost all recommendations advocate treatment of visceral aneurysm which size above 2 cm. However, the GDA aneurysm should be treated as soon as possible, because some reports show an unclear correlation between ruptured complication and aneurysm's size [5]. Some authors advocate early treatment of visceral aneurysm with an aggressive surgical approach, even if they are asymptomatic, due to high mortality rates in case of rupture. Others support the use of endovascular techniques, either coil embolization or covered stent, with a success rate

of 98%, and suggest that open surgery should be reserved for complicated cases or not selected for endovascular intervention [4-5]. However, there are many underlying conditions on our patient, with a complicated medical history of removal pancreatic tumor surgery which is relapsing and distance metastasis, the sac is massive and signs of threatened rupture, which are high risks if we perform an open surgical approach thus we chose endovascular intervention to approach.

The classic interventional methods and commonly used to treat the aneurysms are coil embolization, gelatin foam, PVA particles, or onyx [10]. After the procedure, recanalization with incidence rates from 9% to 43% and organ infraction is the most important long-term complication of this technique [11]. Using a covered stent, the sac of aneurysm could be completely excluded and still preserve the blood flow in the artery. This technique demonstrates its advantages and safety as no complication of ischemia, or also no increase of the pressure inside the sack which is vulnerable by coils and may cause aneurysm's rupture. Ishibashi, et al. demonstrated a stent graft is used not only for asymptomatic visceral aneurysm, but also for ruptured, leaking, or dissecting ones. Rossi, et al [4]. reported 3 cases of aneurysm stenting in the splenic artery and one of pseudoaneurysm stenting in the common hepatic artery. The procedure was successful in all cases and one patient progressed splenic infarction that was attributed to manipulation of the devices. Tsai, et al. treated effectively a 53-year-old patient with a spontaneously dissecting wide-neck pseudoaneurysm of the SMA with a covered stent.

Currently, there are no accepted universal guidelines for the GDA aneurysm and the treatment has been individualized based on the patient's state, surgeon's selection, techniques, and types of equipment of the hospital. Nevertheless, endovascular intervention should be considered a promising alternative to open surgery, due to less aggressive and lower mortality.

CONCLUSION

GDA aneurysms are rare accompanied with various clinical symptoms. Interventional technique for treating GDA aneurysm by covered stent is emerging as an effective technique even in the acute setting and especially in those patients who have high risks of open surgery.

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