

## Spontaneous True Gastroduodenal Artery Aneurysm Rupture after an Inguinal Hernia Operation

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### Rezumat

#### *Ruptura spontană a aneurismul aortic abdominal după intervenția chirurgicală pentru hernie inghinală*

Aneurismul aortic abdominal este un subtip rar de aneurism al arterelor viscerale. Acesta se clasifică în două categorii: aneurismul adevărat și pseudoaneurismul. Pseudoaneurismul aortic abdominal, care apare după pancreatită, este întâlnit mai frecvent, în timp ce aneurismul adevărat este rar întâlnit. Ruptura spontană poate fi fatală. Indiciile clinice cele mai importante sunt durere abdominală cu debut brusc și hipotensiunea. Intervențiile endovasculare sunt standardul de aur pentru acest diagnostic. Indiferent de mărimea lor, aneurismele aortice abdominale trebuie tratate de urgență. La pacienții diagnosticați cu ruptură de aneurism aortic abdominal se recomandă embolizarea endovasculară dacă pacientul este stabil hemodinamic; în caz contrar, se recomandă tratament chirurgical. Rupturile de aneurism, în special în sfera aortei abdominale, sunt localizate adânc în parenchimul pancreatic, așadar sunt dificil de detectat în timpul intervenției chirurgicale. În aceste cazuri, existența unui diagnostic postoperator rapid în urma intervenției endovasculare cu embolizare poate salva viața pacientului. Scopul acestui studiu este de a prezenta un caz de ruptură de aneurism aortic abdominal, care cauzează șoc hemoragic după intervenția chirurgicală pentru hernie inghinală, diagnosticat prin intervenție endovasculară după explorare chirurgicală de urgență.

**Cuvinte cheie:** arteră aortică abdominală, aneurism, ruptură, embolizare endovasculară

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## Abstract

Gastroduodenal artery aneurysms are a very rare subtype of visceral artery aneurysms. These are divided into two groups as true and pseudoaneurysms. Pseudogastroduodenal artery aneurysms, which develops secondary to pancreatitis, is seen more frequently, whereas the true aneurysms are much less common. Spontaneous rupture may be fatal. Sudden onset of abdominal pain and hypotension are the most important clinical findings. Endovascular interventions are the gold standard for diagnosis. Regardless of their sizes, GDA aneurysms should be treated as soon as possible. In patients diagnosed with gastroduodenal artery aneurysm rupture, endovascular embolization is recommended if the hemodynamics is stable and surgical treatment, if not. Aneurysm ruptures, especially from the GDA divisions, are deeply localized in the pancreas parenchyma and are difficult to detect during the operation. In such cases, the earliest post-operative diagnosis with endovascular intervention and applying embolization are life-saving. The purpose of this study to present a true rupture of gastroduodenal artery aneurysm case causing hemorrhagic shock after the inguinal hernia operation and diagnosed by endovascular intervention after emergency surgical exploration.

**Key words:** gastroduodenal artery, aneurysms, rupture, coil embolization

## Introduction

Visceral artery aneurysms (VAA) are rare clinical manifestations which are reported with an incidence between 0.01% and 0.2% in autopsies. Such aneurysms have the risk of rupture at the rate of 25%. The mortality rate in ruptured cases is of 70% (1-3). Gastroduodenal artery aneurysms (GDAA) are a very rare subtype of VAA at the rate of 1.5% (2,4). These are divided into two groups true and pseudoaneurysms. Pseudo-GDAA, which develops secondary to pancreatitis, is seen more frequently and has a higher chance of diagnosis. True aneurysms are much rare and difficult to diagnose, so they are more likely to be ruptured (5,6). The aim of this study is, to present a true rupture of GDA aneurysm case causing hemorrhagic a shock after the inguinal hernia operation, diagnosed by endovascular intervention after emergency surgical exploration.

## Case Report

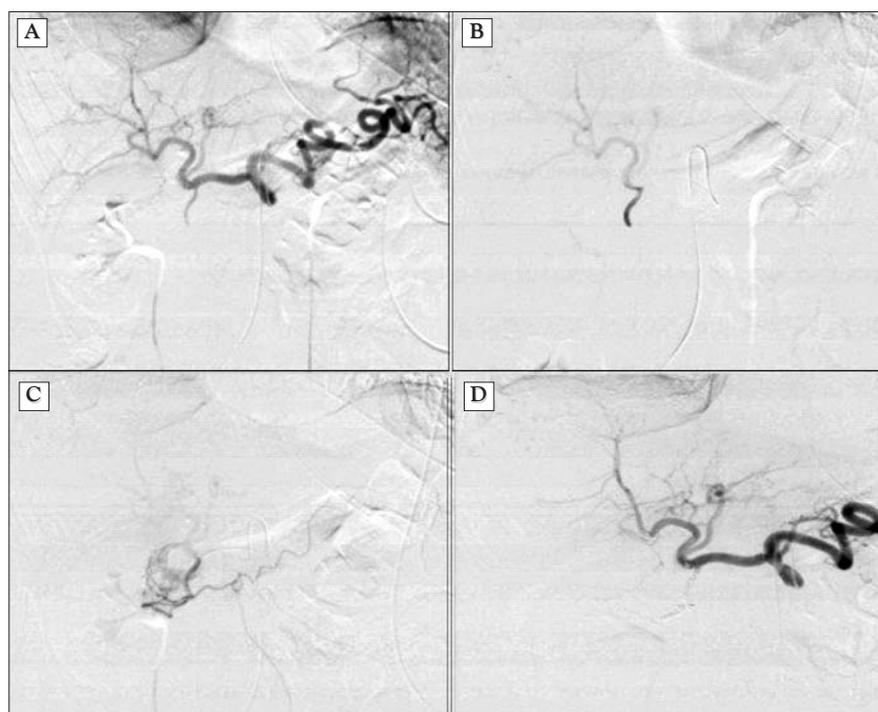
A 60-year-old male patient was admitted to the hospital with a left inguinal hernia. The patient never underwent surgery and he was not aware of any additional disease except for a known

allergy history. He underwent Lichtenstein hernia repair under spinal anaesthesia and was discharged without any problem on the first postoperative day. The same night, the patient was brought to the emergency department with a syncope attack after having abdominal pain. The symptoms were a blood pressure of 80/50 mmHg, pulse of 120 beats/min, pale skin, cold sweat and superficial respiration. The physical examination showed distension in the abdomen and sensitivity in the right upper quadrant of abdomen. No active haemorrhage or hematoma was observed in the inguinal incision line. Laboratory investigation revealed Hb 10.1 gr/dl, Wbc 25000 K/l, Plt 224000 K/l, and creatinine 1.34 mg/dl. On the unenhanced computerized tomography (CT) scan of the patient, a retroperitoneal 20 x12 cm hematoma and intraabdominal free fluid were seen (*Fig. 1*). The patient underwent an emergency operation following the second syncope attack. During the exploration, approximately two units of free hemorrhagic fluid were detected in the abdomen. A giant pulsatile hematoma was observed posteriorly pushing the duodenum, transverse and right colon, and proximal small intestine. The hematoma was discharged. No pathology was observed in the



**Figure 1.** Abdominal CT showing retroperitoneal hematoma localized in the right upper quadrant

main vascular structures. Bleeding was observed from the area limited by the pancreas head, duodenum third area, and transverse mesocolon. The operation was completed by packing this area. The hemodynamic stability of the patient followed up in intensive care unit was ensured. On the second postoperative day, the selective angiography of the celiac artery revealed the gastroduodenal artery originating from the common hepatic artery was acutely obstructed after a short segment. Angiography of the obstructed gastroduodenal artery distal resulted in contrast leakage from the gastroduodenal artery at the pancreas head. Coil embolization was performed from the distal where there is contrast leakage of the gastroduodenal artery, up to the exit point. Post-embolization control angiography showed that the artery was completely occluded (*Fig. 2*). No



**Figure 2.** (A) The selective angiography of the celiac artery revealed the gastroduodenal artery originating from the common hepatic artery was acutely obstructed after a short segment. (B) After selective catheterization of the gastroduodenal artery, acute occlusion is seen. (C) Angiography of the obstructed gastroduodenal artery distal resulted in contrast leakage from the gastroduodenal artery at the pancreas head. (D) Coil embolization was performed from the distal where there is contrast leakage of the gastroduodenal artery, up to the exit point

obstructive lesions were observed in celiac and superior mesenteric trunks. The hemodynamics of the unpacked patient was stable during the follow-up period. He was discharged with full recovery.

## Discussion

The true aneurysms of the gastroduodenal artery and pancreaticoduodenal artery are very rare and constitute 3.5% of all visceral artery aneurysms. These are usually seen between the ages of 50-58. The female/male ratio is 1/4.5 and the mean diameter is 3.6 cm (3,4).

Although its pathophysiology is not fully understood, GDA is divided into two groups as true and pseudoaneurysms according to its formation mechanism. Hypertension, atherosclerosis and autoimmune diseases such as systemic lupus erythematosus, Wegener's granulomatosis and polyarteritis nodosa are possible etiologic factors of true GDA aneurysms (4). Pseudoaneurysms occur after vessel injury or erosion like trauma and inflammation. The most common cause of pseudoaneurysms is vascular wall destruction caused by proteolytic enzymes released from pancreatitis (4,5). Pancreaticoduodenal and gastroduodenal arteries are the major collateral pathways between the celiac and superior mesenteric arteries. It was suggested that stenosis or occlusion in the celiac and superior mesenteric arteries may cause increased blood flow to the collateral vessels followed by aneurysms (2,4). In the case, it was observed that both trunks were open in angiography. It is also interesting because it is the second case in the literature where spontaneous GDA aneurysm rupture occurs after the inguinal hernia operation (7).

At the time of admission, the most important complaint of the patients with or without aneurysm rupture is usually the abdominal pain (1). The most important clinical finding is rupture-dependent hypotension. The initial findings may also include hematemesis, melena, shock, gastric outlet obstruction, vomiting, diarrhoea, and hepatitis. It is important to

identify the presence of a pulsatile abdominal mass in the abdomen examination (4,8). In asymptomatic patients, diagnosis is made incidentally during the imaging tests performed with a different indication. In symptomatic patients, the primarily preferred diagnostic procedures are ultrasonography and CT because they are non-invasive, and their sensitivity is 50% and 67%, respectively (4). The gold standard for diagnosis is catheter angiography. The sensitivity of this procedure is 100%. The most important advantage is that it can be used for therapeutic purposes (4,5). In the present case, the pre-operative CT did not give any information on the focus of bleeding due to the lack of contrast.

Regardless of their sizes, GDA aneurysms should be treated as soon as possible (1). Surgical treatment and endovascular embolization are the procedures applied in the treatment of GDA aneurysms. Patients without stable hemodynamics and those who are admitted in a state of shock and/or those without successful endovascular interventions undergo surgical interventions, while patients with stable hemodynamics, with or without rupture, are primarily recommended endovascular intervention (coil embolization, stent placement) (4,5). Surgically, the ligation or resection of the aneurysm can be performed. Vascular reconstruction may also be required depending on the influence area of the vascular network (2). VAA ruptures should be considered if there is no pathology in the main vascular structures during intraoperative exploration in acute hemorrhagic shock cases where the preoperative bleeding centre is unknown. Aneurysm ruptures, especially from the GDA divisions, are deeply localized in the pancreas parenchyma and are difficult to detect during the operation (1). In such cases, the earliest postoperative diagnosis with endovascular intervention and applying embolization are life-saving. In the present case, there was haemorrhage in the pancreatic head in the form of a leakage, but no aneurysmatic vascular structure was observed. The operation was completed by applying packing to this area. As soon as the hemodynamic stability of the patient is ensured in the intensive care unit, extravasation was

detected in the GDA divisions during the selective celiac angiography and haemostasis was ensured by making coil embolization to this area.

### Conclusion

True GDA aneurysms are very rare aneurysms with a high risk of rupture and mortality. GDA ruptures should be kept in mind in the differential diagnosis in retroperitoneal hematomas located in the right upper quadrant of the abdomen, particularly in patients who are taken into operation with hemorrhagic shock. The earliest postoperative endovascular interventions are life-saving in cases where no intraoperative haemorrhage localization could be detected.

### Conflict of Interests

The authors declare no conflict of interests.

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