

## Successful angioembolization of two missed true aneurysms and a traumatic pseudoaneurysm in the spleen: A case report

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### Abstract

**Introduction:** Splenic artery aneurysm is often discovered incidentally. It can be treated with non-surgical management such as angioembolization if appropriately followed up after detection. However, if not adequately treated, aneurysm can have very serious consequences. We report a case of successful treatment of a new traumatic splenic pseudoaneurysm in a patient who missed two true splenic aneurysms during eight years of breast cancer follow-up.

**Case presentation:** A 65-year-old woman visited a regional trauma center complaining of abdominal pain in both legs after a pedestrian traffic accident. The patient had a medical history of regular follow-ups at our hospital after a mastectomy for breast cancer ten years prior. The med-

ical staff found multiple splenic aneurysms without bleeding or rupture. We recognized that previous examinations also showed two true splenic aneurysms. The medical team determined that treatment for the multiple splenic aneurysms and focal splenic injury was the priority, and angiographic embolization was performed as an emergency. Angiographic images revealed two true splenic aneurysms and one pseudoaneurysm. Embolization was thus performed on the two true splenic aneurysms by coiling, and hemostasis was achieved through embolization of the traumatic splenic pseudoaneurysm.

**Conclusion:** Splenic artery aneurysms are sometimes detected incidentally during examinations for other purposes; thus, medical staff should always carefully examine imaging results.

**Key words:** Case report, splenic artery aneurysm, embolization, computed tomography.

### Introduction

A splenic artery aneurysm (SAA) is often discovered incidentally. It can be treated with non-surgical management such as angioembolization if appropri-

ately followed up after detection. However, if missed during follow-up, SAA can have very serious consequences. Arterial aneurysms are classified as fusiform or saccular based on their morphology and dimensions and as true or pseudoaneurysms. True splenic artery aneurysms are rare, occurring in 0.04%-0.1% of cases. (1) However, if an aneurysm rupture occurs, the mortality rate is high, ranging from 25%-75%. (2) Most cases are asymptomatic, and studies have shown a clinical risk based on the location of the aneurysm and risk factors for rupture, such as aneurysm size, growth, and associated rupture conditions. (3) Therefore, regular surveillance with imaging before and after interventions is critical to guide treatment. We report a case of successful treatment of a newly developed traumatic splenic pseudoaneurysm, where two true splenic aneurysms were missed in a 65-year-old woman who had undergone regular radiologic examinations for over eight years during breast cancer follow-up. We also reviewed the literature on optimal monitoring and treatment guidelines for true splenic aneurysms.

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## Case presentation

First, consent was obtained from the patient, and the Institutional Review Board provided approval. A 65-year-old woman visited a regional trauma center complaining of abdominal pain in both legs after a pedestrian traffic accident. Multiple abrasions were observed on both legs, deep lacerations on the left ankle, and vehicle wheel marks on the abdomen. The patient had a medical history of regular follow-ups at our hospital after a mastectomy for breast cancer ten years prior. The medical staff performed a radiological examination and found multiple splenic aneurysms without bleeding or rupture (**Figure 1**). An intra-abdominal hemorrhage was observed due to focal splenic injury (**Figure 2**). Associated injuries included multiple rib fractures, sacral fractures, S1 joint injuries, multiple lumbar transverse process fractures (right, L1-4), left tibia fractures, and left fibular head fractures. We performed abdominal computed tomography (CT) scans of the patient at our hospital over the last eight years. Compared with the abdominal CT scan performed after trauma, we recognized that previous examinations also showed two true splenic aneurysms (**Figure 3**). However, there was no mention of true splenic aneurysms in past CT scan readings and no record of follow-up or treatment for the true splenic aneurysms in the medical records. The medical team determined that treatment for the multiple splenic aneurysms and focal splenic injury was the priority, and angiographic embolization was performed as an emergency intervention. Angiographic images revealed two true splenic aneurysms and one pseudoaneurysm (**Figure 4A**). Fortunately, there was no rupture or aneurysmal bleeding; therefore, embolization was performed on the two true splenic aneurysms by coiling, and hemostasis was achieved through embolization of the traumatic splenic pseudoaneurysm (**Figure 4B**). Subsequently, the patient was admitted to the trauma intensive care unit, observed for abdominal pain and symptom changes, and discharged after her symptoms ameliorated.

## Discussion

As medical quality improves and imaging tests using axial imaging techniques continue to increase, the proportion of incidentally discovered visceral aneurysms is also growing. (4) Splenic artery aneurysms, accounting for approximately 60% of visceral aneurysms, are often diagnosed incidentally. (3,5,6) In the present case, SAA was observed on an abdominal CT for the long-term follow-up of previously diagnosed breast cancer. If the SAA was diagnosed at that time, it would have been classified as an incidentally discovered aneurysm. In several

studies involving autopsies, the incidence of SAA was relatively low (0.01%-0.2%). (7) However, there has been an approximately 10% increase in the incidence of portal hypertension in patients >60 years old. (4) Various risk factors that may increase the occurrence of SAA include portal hypertension, liver transplantation, multiple pregnancies, hypertension, atherosclerosis, trauma, diabetes, smoking, and being female. (1,8,9) Most splenic aneurysms are asymptomatic and can be diagnosed by imaging; however, in some cases, rupture may be accompanied by bleeding. Portal hypertension, pregnancy, and liver transplantation increase the risk of aneurysm rupture. (5,10) At Cleveland Clinic, which studied 128 SAAs over 15 years, serial imaging was performed in 94% of patients. Over a follow-up period of 3.1 years, the average increase in aneurysm size was 0.2 mm/year. (11) Even in asymptomatic patients, rupture can progress abruptly in 20%-25% of cases; therefore, continuous follow-up is necessary, and treatment is recommended for true aneurysms >2 cm in size. (6,12,13) For pseudoaneurysms, treatment is recommended regardless of size. (3) In this report, we describe the case of a 65-year-old woman who was receiving medication for hypertension, had experienced two births, and had a risk factor for SAA before the trauma. In this patient, two true aneurysms and one pseudoaneurysm were confirmed on abdominal CT for trauma evaluation. Two true aneurysms were already present on abdominal CT performed for follow-up over the past eight years, and the pseudoaneurysm was thought to be a new lesion caused by the trauma. There was no increase in the size of the two true aneurysms over the past eight years; however, the medical team performed embolization by coiling for multiple SAAs, including the pseudoaneurysm. Treatment of SAA using angiography is considered the gold standard and has the advantage of simultaneous treatment and diagnosis. (14) However, in cases of SAA with rupture, the possibility of angiography is low, and surgical treatment is required because it is accompanied by hemodynamic instability and poses a fatal risk to patients. (15) Particularly, SAA with rupture is reported to be a critical emergency condition, with a 25%-75% mortality rate. (2,16,17) Fortunately, in this case, only serial imaging was performed for the past eight years because the increase in the size of the aneurysm or the possibility of rupture was low. However, if the size of the two true aneurysms that had been overlooked increased, or if a rupture occurred due to trauma, the outcome may have been different. As in this case, even if an imaging test is performed for a different purpose and the risk factors for SAA are accompa-

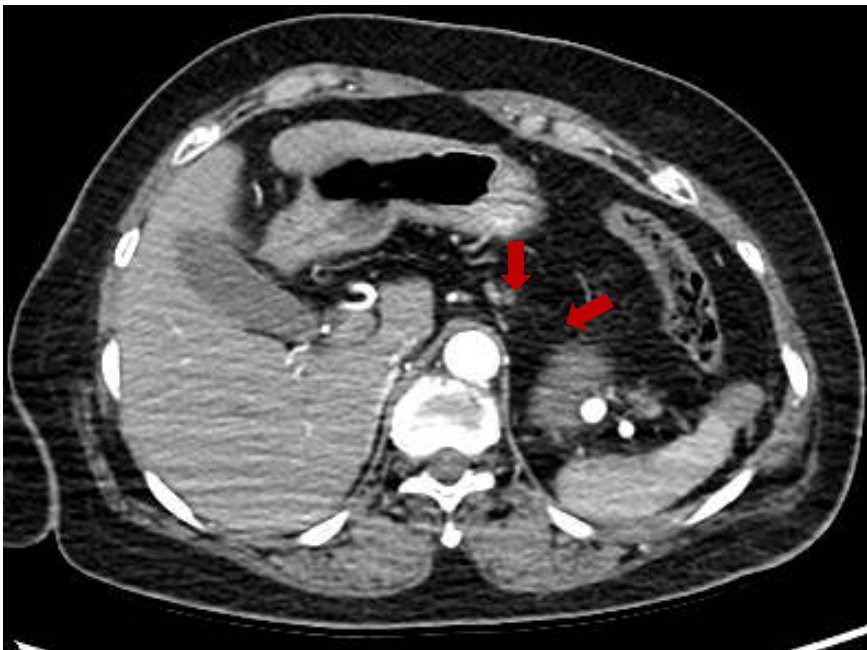
nied by a more detailed review of the results, it will be possible to manage accidentally discovered SAA actively.

### **Conclusion**

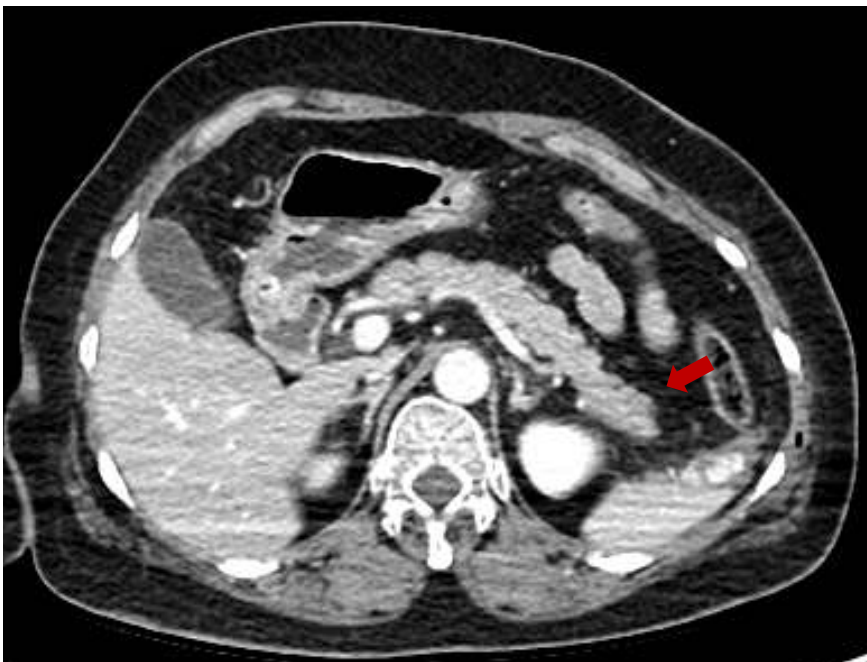
Splenic artery aneurysms without rupture can be

treated adequately with angioembolization. However, if left unnoticed, they can lead to fatal results. Since SAAs are sometimes detected incidentally during examinations for other purposes, medical staff should always carefully examine imaging results.

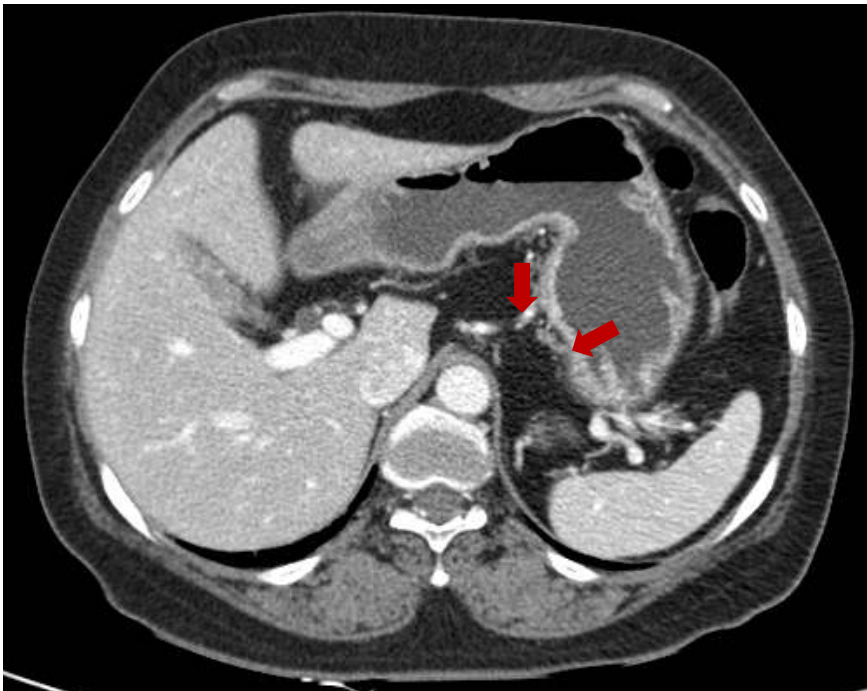
**Figure 1.** Multiple splenic aneurysms were observed on computed tomography during trauma evaluation (red arrows indicate the splenic aneurysm)



**Figure 2.** Intra-abdominal hemorrhage due to focal spleen injury with bleeding (the red arrow indicates intra-abdominal bleeding due to a focal traumatic splenic injury)



**Figure 3.** Multiple splenic aneurysms were observed on abdominal computed tomography performed eight years prior (red arrows indicate the splenic aneurysm)



**Figure 4.** Multiple aneurysms were confirmed by angiography



**Legend:** A) Two true aneurysms and one pseudoaneurysm; B) Angiographic image after embolization using coiling.

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