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Small saccular aneurysms in the coronary and right epigastric arteries: A case report

Taira Yamamoto, Daisuke Endo, Akie Shimada and Atsushi Amano

Abstract

Small saccular aneurysm in the right gastroepiploic artery is a sporadic disease accounting for approximately 0.4% of abdominal visceral aneurysms rarely observed during routine examination of other illnesses; however, it has been reported following rupture. The right gastroepiploic artery is a common alternative to the internal thoracic artery in coronary artery bypass grafting. We report a case of small aneurysms in the left anterior descending artery, diagonal branch artery, and right gastroepiploic artery and a pseudoaneurysm in right gastroepiploic artery. Coronary artery bypass grafting was performed using the left internal thoracic artery and right gastroepiploic artery, and a 5-mm aneurysm was observed in the right gastroepiploic artery. The resected 5-mm right gastroepiploic artery aneurysm was saccular. Pathological investigation revealed media loss and adventitial thinning, indicating the possibility of an aneurysm rupture. Thus, preoperative three-dimensional computed tomography is beneficial for patients with coronary arterial aneurysms and preoperative evaluation of right gastroepiploic artery to help achieve good clinical outcomes in patients undergoing coronary artery bypass grafting with another arterial aneurysm.

Keywords

Coronary artery aneurysm, right epigastric artery aneurysm, CABG, three-dimensional computed tomography, preoperative examination

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Introduction

Gastroepiploic artery (GEA) aneurysms are rare, accounting for approximately 0.4% of abdominal visceral aneurysms. Many etiologies concerning abdominal visceral aneurysms and the concept of segmental arterial mediolysis (SAM), with no known cause, have been reported. A small saccular aneurysm in the GEA is exceptionally rare, and it is rarely observed during the preoperative diagnosis of coronary artery bypass grafting (CABG). Moreover, the pathological findings and causes of this saccular aneurysm are difficult to elucidate using three-dimensional computed tomography (3D-CT) imaging.

The right gastroepiploic artery (RGEA) is widely used in CABG since its conception by Pym et al.[1] and Suma et al.[2] in 1987, owing to easy harvesting and low morbidity. The RGEA is a common alternative to the internal thoracic artery in CABG, and its 5-year cumulative patency rate is 80.5%.[3] However, the RGEA may be unsuitable for CABG if it is hypoplastic or has undergone severe atherosclerotic changes.[4] Therefore, insufficient knowledge on the nature of the RGEA could result in unfavorable clinical outcomes following grafting.

Changes associated with Kawasaki disease, coronary artery fistulas, and arteriosclerosis have similarly been reported in coronary aneurysms; however, multiple aneurysms of the coronary and abdominal visceral arteries are rare. A visceral aneurysm observed in the periphery of a visceral artery is likely to rupture, and surgical treatment is desired.

We report a case of small aneurysms in the left anterior descending artery (LAD), diagonal branch artery (D), and RGEA and performed CABG using GEA graft reconstructed with aneurysmectomy.

Case

A 66-year-old man had been experiencing effort angina for 3 months, with ST depression in V5 and V6 on exercise

Department of Cardiovascular Surgery, Juntendo University, Tokyo, Japan

Corresponding Author:
Taira Yamamoto, Department of Cardiovascular Surgery, Juntendo University, 2-1-1, Bunkyo-ku, Tokyo 113-8421, Japan.
Email: tyamamo@juntendo.ac.jp

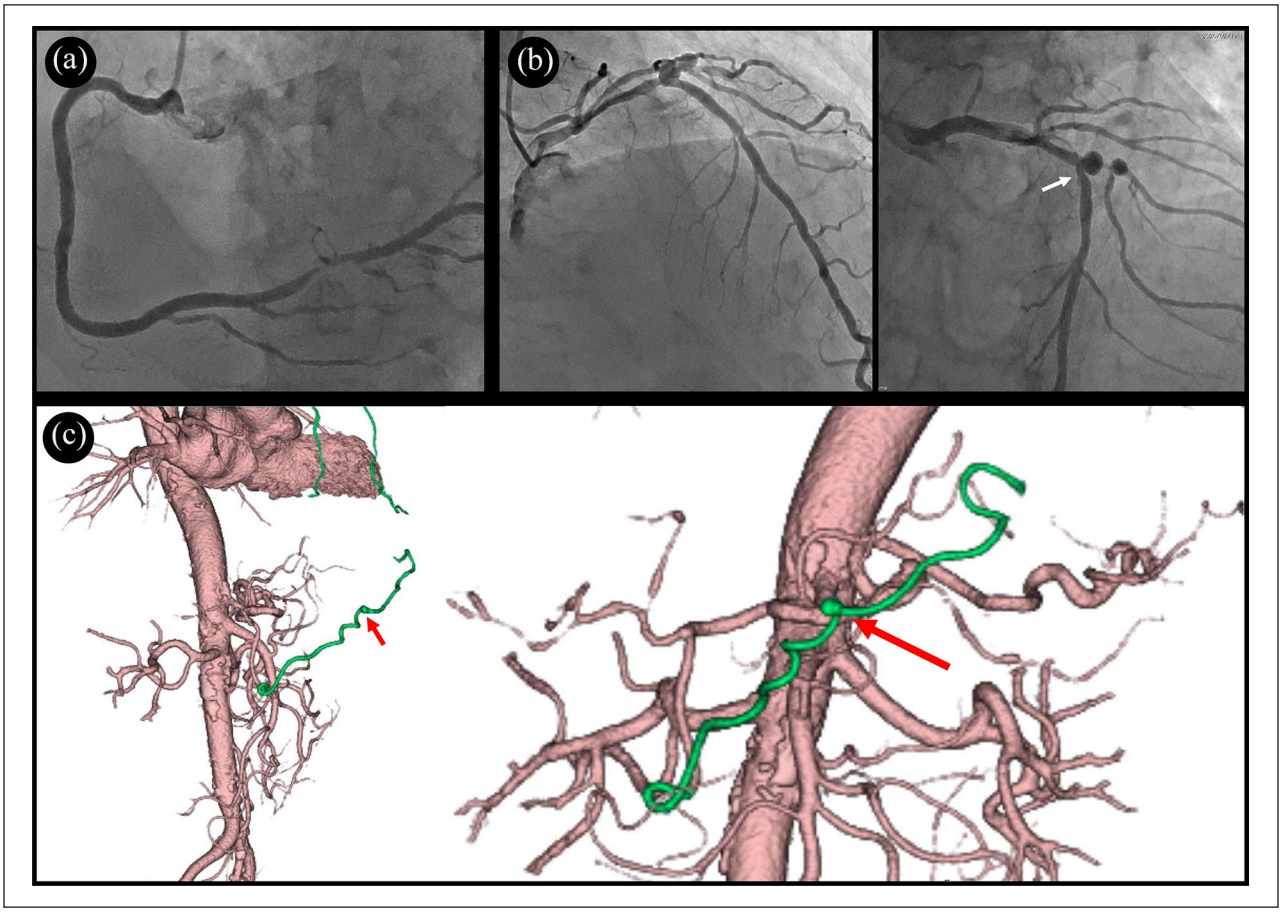

Figure 1. Preoperative images. (a) Ninety percent stenosis at the atrioventricular node branch. (b) Left coronary artery: a small aneurysm in the left anterior descending artery and first diagonal branch artery; 75% stenosis at the mid-portion of the left anterior descending artery; 99% stenosis at the diagonal branch artery. Stenosis is observed on the distal side of the coronary aneurysm, as indicated by the white arrow. (c) Preoperative three-dimensional computed tomography. A small aneurysm is observed in the right epigastric artery, as indicated by the red arrow.

electrocardiography. Cineangiography revealed 90% stenosis in the atrioventricular node branch, 75% stenosis in the proximal LAD, and a small aneurysm (4 mm) in D (Figure 1(a) and (b)). This cineangiography revealed no severe stenosis on the proximal side of the aneurysm in the LAD. The patient had a history of hypertension, diabetes mellitus (HbA1c, 6.5%), and heavy smoking; however, he had no history of pancreatitis, cholecystitis, or abdominal trauma. He had a family history of myocardial infarction.

Written informed consent was obtained from the patient for the publication of this case report. The Institutional Review Board of Juntendo University Hospital approved this study on 20 August 2020 (approval no.: JHS20-013). The study was conducted as per the principles of the Helsinki Declaration.

CABG was planned, and the RGEA was measured preoperatively for its suitability as a bypass graft to the right coronary artery using 3D-CT; a 5-mm aneurysm in the RGEA was observed (Figure 1(c)). An off-pump coronary artery bypass surgery was performed, and the left internal thoracic artery to the first diagonal branch artery (D1) and the LAD and RGEA to the atrioventricular node artery were anastomosed. The RGEA aneurysm was resected, and the artery was reconstructed with an end-to-end anastomosis (Figure 2(a)). The operative time was 249 min. The postoperative period was uneventful, and the patient was discharged without complications. The intensive care unit stay duration was 18 h, and the total hospital stay duration was 7 days. Pathological findings of the resected GEA aneurysms revealed intimal fibrous thickening, media loss, and adventitial thinning (Figure 2(b)). Postoperative contrast-enhanced CT confirmed excellent graft patency (Figure 3(a)–(c)). The patient was discharged on postoperative day 7 without complications and has been performing daily living activities with ease for 2 years postoperatively without chest and other visceral aneurysms.

Discussion

We present a patient with small LAD, D1, and RGEA aneurysms. The leading cause of visceral abdominal aneurysms is SAM, a non-inflammatory, non-arteriosclerotic disease,

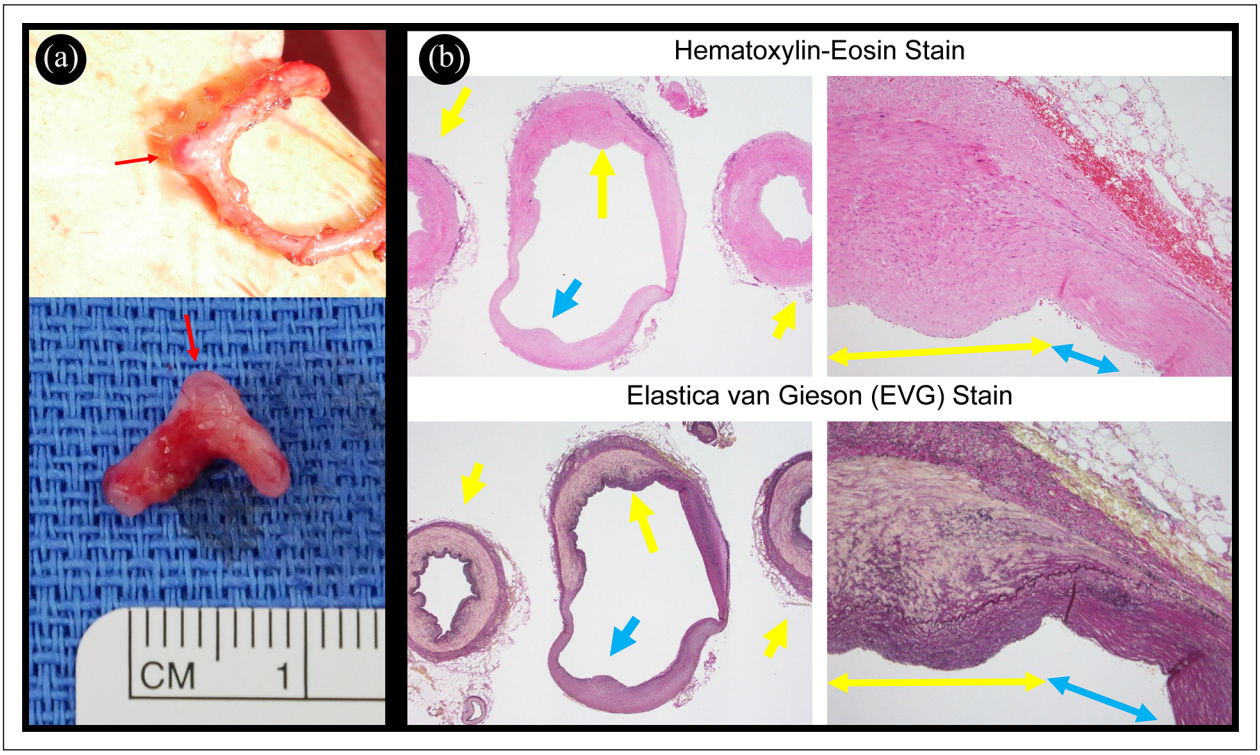

Figure 2. Operative findings and pathology. (a) Saccular right gastroepiploic artery aneurysm with a size considered small (5 mm). The red arrow points to the gastroepiploic artery (GEA) aneurysm. (b) Pathological findings of the right GEA. The yellow arrow points to the typical arterial wall, and the blue arrow points to adventitial and fibrous intimal thickening and a medial defect.

recently reported to be a visceral abdominal aneurysm prone to recurrence.[5] Here, the media disappeared; however, no other features of SAM were observed. Although the current pathology differed from that of SAM, it included a saccular aneurysm without a healthy medial layer. We suspected that this saccular uncut aneurysm was a pseudoaneurysm and might rupture spontaneously owing to its thin dome wall.

Pathological findings revealed adventitial and fibrous intimal thickening and a medial defect. We considered that intimal arteriosclerosis appeared due to hypertension and blood flow–related stress on the wall with a congenital medial defect. However, pseudoaneurysm among the pathological changes was due to inflammatory reactions, such as pancreatitis or cholecystitis and trauma. Typically, such aneurysms should be surgically repaired despite having a size of ⩽5 mm since pseudoaneurysms are more likely to rupture than true aneurysms.[6] If the native vessel diameter is 2 mm or less, 5 mm may represent a considerable dilatation and significant rupture risk. Usually, a visceral aneurysmal size of 2 cm is considered the threshold for therapy.[7] However, this only applies to the visceral arteries' main branches, where average diameters are approximately 8 mm.

For abdominal aneurysms of the gastric and intestinal arteries, surgical techniques range from simple ligation to antegrade revascularization.[8] Recently, coil embolization using a catheter and laparoscopic vessel ligation have been reported.[9,10] However, coil embolization has resulted in incomplete occlusion of the aneurysm,[11] and laparoscopic treatment complicates endovascular repair due to the meandering nature and redundancy of the internal blood vessels. Hence, simple ligation was used in this case. In cases of small isolated aneurysms at the small segment of the artery, reliable revascularization can be achieved through ligation of the artery and excision of the aneurysm with end-to-end anastomosis of the artery.[12,13] Long-term results of surgical treatment revealed high survival rates and a low incidence of aneurysm-related complications, confirming the excellent outcomes of a surgical approach in these patients.[7] Here, a small saccular aneurysm with a high risk of rupture was isolated, and since there was no other lesion, aneurysm resection and revascularization were performed. Furthermore, the GEA was selected as a bypass graft to the right coronary artery. Recently, due to advances in technology and modalities, several studies have reported small unruptured aneurysm findings.[7] In this case, we observed a small aneurysm with a diameter of 5 mm, and the preoperative evaluation was considered effective. Nevertheless, it is unclear whether multiple small aneurysms can occur in other arteries.

This report's limitation is the lack of a 5- to 10-year distant prognosis follow-up to confirm aneurysm recurrence in healthy GEA other than the resected aneurysms. Similarly, it presents inadequate data on the prevalence of Kawasaki

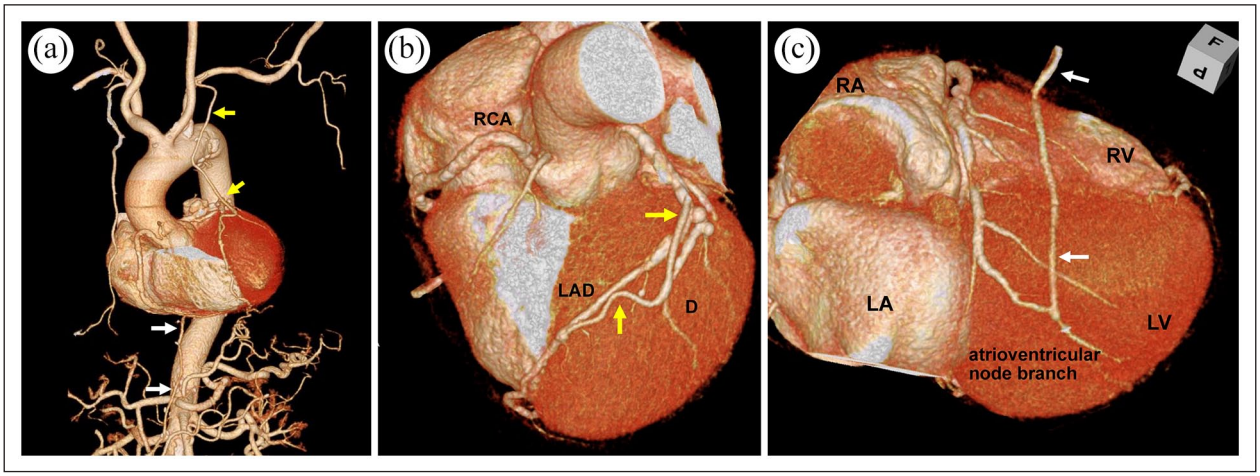

Figure 3. (a) Postoperative three-dimensional computed tomography. (b) All the bypass grafts were patent. (c) Yellow arrows indicate LITA and white arrows indicate RGEA.
RCA: right coronary artery, LAD: left anterior descending artery, D: diagonal branch

disease in coronary arteries. Besides, the coronary aneurysm appeared atherosclerotic, and the pathological findings were unknown. Coronary and GEA aneurysms were not considered multiple systemic aneurysms in this patient. Since the coronary aneurysm was 4 mm in diameter, the rupture risk was estimated to be extremely low, and the coronary aneurysm was not resected. The mechanism underlying the aneurysm in the GEA is likely different from that of the aneurysms in the coronary artery. 3D-CT was conducted to examine the performance of the grafts used for CABG; however, this is the first case of simultaneous observation of coronary and visceral aneurysms, and we have presented one surgical option that can be considered for such cases in the future.

Conclusion

This is the first report of a case of a visceral aneurysm identified on preoperative CABG in a patient with coronary aneurysms and coronary artery stenosis. Preoperative 3D-CT is beneficial for patients with coronary arterial aneurysm and for the preoperative evaluation of RGEA for achieving good clinical outcomes in patients with CABG with another arterial aneurysm.

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Data availability

Data associated with this manuscript are not publicly available but can be made available by the corresponding author upon request.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Written consent was obtained from the patients for the publication of these case reports. The Clinical Ethics Committee of Juntendo University Hospital approved this study (JHS20-013), and the study was conducted in accordance with the principles of the Helsinki Declaration.

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Informed consent

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ORCID iD

Taira Yamamoto https://orcid.org/0000-0003-2214-2539

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