

# Clinical characteristics of spontaneous isolated visceral artery dissection



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## ABSTRACT

**Objective:** Spontaneous isolated visceral artery dissection (SIVAD) involving the celiac artery or superior mesenteric artery is rare, but it can be fatal. Given its rare incidence, the clinical characteristics of SIVAD are not fully understood. Therefore, the aim of this study was to investigate the clinical characteristics and prognosis of SIVAD.

**Methods:** We retrospectively reviewed 39 consecutive patients diagnosed with SIVAD from January 2007 to December 2016. Demographic characteristics, symptoms, vital signs, blood examination results, and computed tomography findings were retrieved through medical record review.

**Results:** The median age of the patients was 52 years; 94.9% were male, and 64.1% were symptomatic. Median follow-up duration was 11 months. Overall, hypertension (48.7%) and smoking (79.5%) were frequently observed. There were significant differences between symptomatic and asymptomatic patients in white blood cell count and creatine kinase level but not in fibrin degradation products or D-dimer level. There was a significant correlation between symptoms and length of dissection on computed tomography ( $P < .01$ ). Conservative treatment was performed in 32 patients (82.1%), and only 7 patients required open surgery or intravascular intervention. Notably, the diameter of affected vessels decreased spontaneously with no rupture or symptom recurrence during follow-up, and mortality was 0% at both 30 days and 1 year.

**Conclusions:** The utility of blood examination, especially for fibrin degradation products and D-dimer levels, for diagnosis of SIVAD is limited. A high index of suspicion is warranted in patients presenting with persistent severe abdominal pain. Conservative treatment should be considered first-line therapy in patients without any signs of bowel ischemia or rupture. (J Vasc Surg 2018;67:1127-33.)

Spontaneous isolated visceral artery dissection (SIVAD), which mainly affects the celiac artery (CA) and superior mesenteric artery (SMA), is defined as dissection of a visceral artery without acute aortic dissection.<sup>1</sup> The true frequency of this disorder is still unknown, but 72 cases of isolated CA dissection were published between 1964 and 2011, 49 (68%) of which were reported in the last 5 years. This suggests that the increasing use of computed tomography (CT) for diagnosis of abdominal pain may be related to the increasing number of reports on this disorder.<sup>2</sup>

SIVAD is relatively rare and causes various symptoms, including acute abdominal pain, back pain, nausea, and vomiting; it can be catastrophic when it is complicated with intestinal necrosis or rupture. Given the rare

incidence of SIVAD, previous reports included small numbers of patients, and data on its etiology, clinical features, management, hospital course, and outcomes are scarce. Although one previous paper did include a substantial number of patients with SIVAD (up to 1000), its database-based report has limited utility because details of the study population were not available, especially blood examination results and CT findings.<sup>3</sup>

Conservative treatment is considered first-line therapy for SIVAD, with acceptable results,<sup>4-6</sup> but catheter intervention<sup>1</sup> and open surgery are indicated in patients experiencing uncontrollable abdominal pain or exhibiting any sign of intestinal necrosis or rupture. However, there is no consensus on optimal management of SIVAD, and treatment depends entirely on the physician's experience and preference.

Therefore, in this study, we sought to investigate the clinical features of SIVAD, including blood examination results and CT findings, as well as the midterm prognosis and morphologic changes during follow-up.

## METHODS

**Study population.** We retrospectively reviewed the database of Kanazawa University Hospital, a tertiary and referral medical center in Ishikawa Prefecture, and searched for patients diagnosed as having SIVAD from January 2007 to December 2016. Patients with traumatic or iatrogenic SIVAD, those with SIVAD associated with

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acute aortic dissection, and those without complete medical records were excluded from the study.

This study was conducted in accordance with the principles of the Declaration of Helsinki, and informed consent of the patients was not obtained because of the retrospective data analysis. The study protocol was approved by the Bioethical Committee on Medical Research of Kanazawa University School of Medicine.

**Data collection.** Data including sex, age, medical history, medications, time course, and initial symptoms were identified. Vital signs, including blood pressure and heart rate, were also recorded. Symptomatic SIVAD was defined as presence of acute abdominal pain, back pain, nausea, or vomiting that was unrelated to other causes. All asymptomatic cases were identified incidentally on enhanced CT during evaluation of other comorbidities, such as cancer. Blood examination performed on admission included whole blood cell count (white blood cell [WBC] count and hemoglobin), chemistry (liver function, creatinine, creatine kinase, total protein, total cholesterol, and triglycerides), and coagulation (fibrin degradation products [FDPs] and D-dimer). We also performed an extensive review to determine any factors suggesting connective tissue disease, such as history of rash, arthritis, or fever of unknown origin (body temperature  $>38.3^{\circ}\text{C}$  lasting  $>3$  weeks).

**Diagnosis of SIVAD.** Enhanced CT was performed and contiguous 2.5-mm axial images were obtained, which were evaluated by an experienced cardiologist who specializes in vascular disease. False lumen patency, maximum diameter of affected arteries, length of dissection, and percentage of maximum true lumen stenosis were evaluated on initial CT images with reference to Tomita's methods.<sup>7</sup> CT findings were assessed by two investigators who were blinded to the clinical data.

**Treatments.** Treatment options were determined on the basis of the patient's symptoms, general condition, and examination findings. First-line therapy was conservative treatment, including fasting, rest, and blood pressure control with antihypertensive medication. Antithrombotic and antiplatelet therapies were added at the discretion of the clinician. In cases of an absolute surgical indication, such as intestinal necrosis or progressive aneurysm dilation, open surgery was performed. In cases of arterial rupture or uncontrollable pain, endovascular treatment, such as coiling or stenting, was performed if the patient's condition was stable.

**Follow-up.** Both symptomatic and asymptomatic patients with SIVAD were followed up periodically with enhanced CT. Length of hospital stay, hospitalization due to dissection, change in aneurysm diameter, aneurysm dilation, and arterial rupture were recorded during follow-up. Change in aneurysm diameter was calculated

## ARTICLE HIGHLIGHTS

- **Type of Research:** Single-center retrospective cohort study
- **Take Home Message:** In 39 Japanese patients with spontaneous isolated visceral artery dissection, fibrin degradation products and D-dimer values were not significantly elevated. Most (82%) were managed during a median follow-up of 11 months with observation and antiplatelet or anticoagulant therapy alone.
- **Recommendation:** This study suggests that fibrin degradation products and D-dimer values are of limited value in patients with spontaneous isolated visceral artery dissection and that observation and anticoagulant or antiplatelet therapy appear to be sufficient for most patients.

by the following formula: (aneurysm diameter on follow-up CT – aneurysm diameter on initial CT)  $\times$  100/aneurysm diameter on initial CT. Complete remodeling was defined as morphologic change of the artery to its normal condition with disappearance of the aneurysm.

**Statistical analysis.** Demographic and clinical characteristics were compared according to presence or absence of symptoms. Continuous variables are shown as median and interquartile range; categorical variables are expressed as frequency and percentage. Categorical variables were compared using Fisher exact test; continuous variables were compared using the Wilcoxon rank sum test. The 30-day and 1-year mortality rates were estimated using Kaplan-Meier curve analysis. Statistical analysis was performed using JMP 12 software (SAS Institute, Cary, NC), with a *P* value of  $< .05$  considered statistically significant.

## RESULTS

A consecutive 39 patients diagnosed as having SIVAD from January 2007 to December 2016 were analyzed in this study. Characteristics of the study population are shown in Table 1. Overall, patients with SIVAD were primarily middle-aged men. Acute abdominal pain was reported in 22 (56.4%) of 39 patients. SMA dissection was more frequently observed than CA dissection (59.0% vs 41.0%). In addition, hypertension, dyslipidemia, and smoking were more prevalent than other comorbidities. Symptomatic patients were significantly younger and more frequently admitted to the hospital than asymptomatic patients ( $P < .05$ ). Prevalence of SMA dissection was significantly higher in symptomatic patients than in asymptomatic patients ( $P < .05$ ). There were no significant differences in medical history or medications between groups. Furthermore, no patients were diagnosed as having connective tissue disease.

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