Received: 30 October 2021 | Accepted: 9 December 2021

DOI: 10.1002/ccr3.5313

CASE REPORT

Clinical Case Reports Open Access WILEY

Conservative management of spontaneous isolated superior mesenteric artery dissection: A case report

Takashi Miyata | **Yuta Sannomiya** | **Taigo Nagayama** | **Ryosuke Kin** | **Hisashi Nishiki** | **Akifumi Hashimoto** | **Yoritaka Fujii** | **Seiko Miura** | **Daisuke Kaida** | **Yasuto Tomita** | **Naohiko Nakamura** | **Tomoharu Miyashita** | **Hideto Fujita** | **Nobuhiko Ueda** | **Hiroyuki Takamura**

Department of General and Digestive Surgery, Kanazawa Medical University Hospital, Kahoku, Japan

Correspondence
Takashi Miyata, Department of General and Digestive Surgery, Kanazawa Medical University Hospital, 1-1 Daigaku, Uchinada, Kahoku, Ishikawa 920-0293, Japan.
Email: ryutami5383917@gmail.com

Funding information
No authors have direct or indirect commercial and financial incentives associated with publication of the article

Abstract

Spontaneous isolated superior mesenteric artery dissection (SISMAD) is a rare and potentially fatal cause diagnosis presenting with acute abdominal; however, because of its rarity, the pathogenic factors of SISMAD remain unknown and no clear cause has been found. Moreover, there is a lack of evidence-based treatment guidelines.

KEYWORDS

conservative therapy, spontaneous dissection, superior mesenteric artery

1 | INTRODUCTION

Spontaneous isolated superior mesenteric artery (SMA) dissection (SISMAD) is a rare but potentially fatal disease requiring emergency treatment for acute abdominal pain. SISMAD was first reported by Bauersfeld[1] in 1947, and since the widespread use of computed tomography (CT), there have been increasing numbers of reports of SISMAD.[2,3] However, the cause of this disease has not been elucidated, treatment strategies have not been established, and it is often difficult to determine the treatment method, even after diagnosis. Rapid diagnosis and treatment of SMA dissection lead to a reduced incidence and mortality of intestinal infarction. This case report highlights the use of conservative therapy based on a rapid diagnostic imaging evaluation provided for a SISMAD patient.

2 | CASE PRESENTATION

A 47-year-old Japanese man was referred to our hospital because of acute epigastric pain. His medical and family histories were unremarkable, he was not receiving any medical drugs, and he did not smoke tobacco or drink alcohol. The patient's normal systolic blood pressure was approximately 130 mmHg, and he had no history of abdominal trauma. He had been vaccinated against Coronavirus disease 2019 (COVID-19) with the Pfizer formulation 5 h prior to the onset of symptoms. On admission, his temperature was 37.9°C, with blood pressure of 173/104 mmHg and a regular heart rate of 98/min. Physical examination revealed deep tenderness in the lower abdomen. Laboratory data indicated leukocytosis (white blood cell count 18,460/μl) with a slightly elevated

creatine kinase isoenzyme level (446 U/L). Other data, including C-reactive protein, blood coagulation factor, and lactic acid levels, were within normal ranges (Table 1). A CT scan of the abdomen with contrast revealed an area, no contrast effect was observed in the pseudo-cavity with findings accompanied by true lumen stenosis. In the proximal SMA, beginning just after the bifurcation of the middle colic artery (MCA) and extending into the ileocolic artery for approximately 5 cm with no aneurysm formation, aortic dissection, or stenosis at the origin of the celiac artery (Figure 1A–C). From the above results, it was considered to be an SISMAD. Blood flow in the small intestine was maintained, probably due to the collateral circulation from the MCA (Figure 2), and no intestinal ischemia or ascites was observed. CT angiography was also considered for diagnosis but was not performed because the contrast-enhanced CT clearly showed no intestinal ischemia.

Although tenderness in the abdomen and inflammatory findings were observed by blood analysis, conservative treatment was selected first based on the imaging findings. The conservative treatment consisted of anticoagulation using heparin, bowel rest, and the control of pain and hypertension. He was monitored in the intensive care unit and his symptoms improved with the conservative measures. A follow-up CT after 7 days showed no exacerbation of SISMAD and the true lumen appeared slightly more open than in the initial CT images (Figure 3A–C). Blood pressure and blood examination confirmed improvements in inflammatory findings before resuming his diet (Figure 4). No obvious thrombotic findings were found on blood examination including fibrin degradation products (FDP) and CT; therefore, the antithrombotic drug was discontinued 7 days after admission. He had no problems during his subsequent hospitalization and was discharged 14 days after admission after confirmation by CT that there was no exacerbation. He returned to our hospital 2 weeks later—his symptoms were resolved, CT showed no exacerbation of SISMAD, and collateral circulation from the MCA showed persistent patency. He was followed up without the use of antithrombotic drugs, and no recurrence was observed 2 months after the onset. He has not received a second dose of coronavirus vaccine.

TABLE 1 Laboratory test results upon hospital admission

Variables	Laboratory tests results
WBC ($\times 10^3/\mu l$)	18.46
RBC ($\times 10^6/\mu l$)	5.01
Hemoglobin (g/dl)	16.0
Hematocrit (%)	47.0
Platelet ($\times 10^4/\mu l$)	26.5
Total protein (g/dl)	7.1
Albumin (g/dl)	4.5
CRP (mg/dl)	0.64
BUN (mg/dl)	16
Creatinine (mg/dl)	0.72
Na (mEq/L)	138
K (mEq/L)	4.2
Cl (mEq/L)	101
AST (IU/L)	27
ALT (IU/L)	24
ALP (IU/L)	199
LDH (IU/L)	192
Total bilirubin (mg/dl)	1.8
Direct bilirubin (mg/dl)	0.3
Amylase (IU/L)	107
CK (U/L)	446
T-chol (mg/dl)	223
TG (mg/dl)	88
HDL-C (mg/dl)	47
LDL-C (mg/dl)	184
BS (mg/dl)	121
HbA1c (%)	5.9
PT (INR)	1.09
PT (%)	84.2
APTT (sec)	30.4
Fibrinogen (mg/dl)	314
FDP (μg/ml)	<2.5
FDP-DD (ng/ml)	<0.5
PH	7.431
HCO3 (mmol/L)	25.1
Base Excess (mmol/L)	1.5
Lactate (mg/dl)	7

Abbreviations: ALP, alkaline phosphatase; ALT, Alanine aminotransferase; APTT, activated partial thromboplastin time; AST, aspartate aminotransferase; BS, blood sugar; BUN, blood urea nitrogen; CK, Creatinine Kinase; CRP, C-reactive protein; FDP, fibrin degradation product; FDP-DD, fibrin degradation product D-dimer; HbA1c, Hemoglobin A1c; HCO: bicarbonate; HDL-C, high-density lipoprotein cholesterol; LDH, lactate dehydrogenase; LDL-C, low-density lipoprotein cholesterol; PH, power of hydrogen; PT, prothrombin time; PT-INR, prothrombin time-international normalized ratio; RBC, red blood cell; T-chol, total cholesterol; TG, triglycerides; WBC, white blood cell.

3 | DISCUSSION

Spontaneous isolated superior mesenteric artery dissection is considered a rare condition, and clinical presentations can range from an asymptomatic incidental finding to severe or fatal abdominal pain from bowel ischemia.[4] Several causal factors of SISMAD have been postulated, including congenital connective tissue disorders,

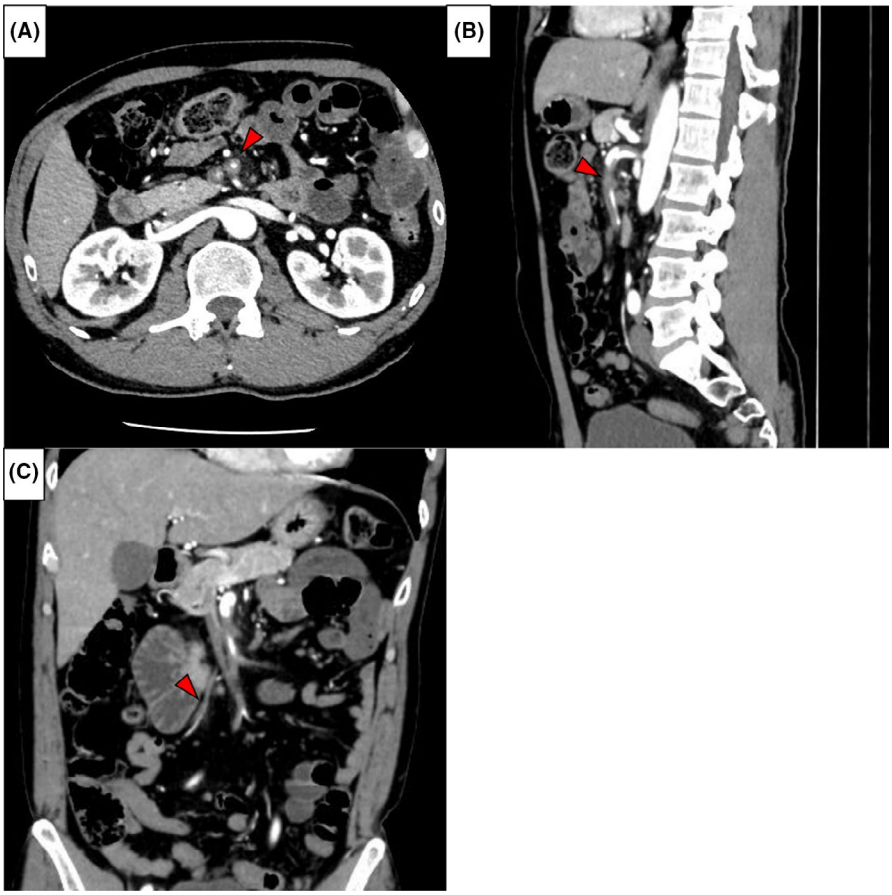

FIGURE 1 Initial imaging findings. Initial axial and sagittal imaging by enhanced abdominal computed tomography (CT) shows spontaneous isolated superior mesenteric artery (SMA) dissection (SISMAD) (A, B, red arrow) with extension into the ileocolic artery (C, red arrow)

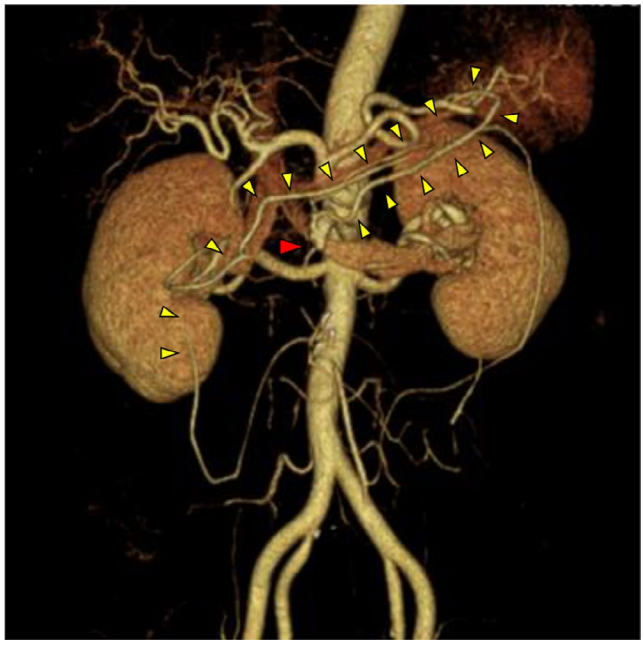

FIGURE 2 Three-dimensional CT angiogram. The arterial arcade from MCA (yellow arrows) and SISMAD (red arrow) are shown

fibromuscular dysplasia, trauma, and hypertension; however, the pathogenic mechanisms involved have yet to be fully elucidated.[5]

Although SISMAD is a rare disease and requires early diagnosis, it is possible to diagnose this disease only with contrast-enhanced CT, and catheter-based arteriography for diagnostic purposes may not be essential.[5] In particular, multidetector CT enables the rapid and accurate evaluation of blood flow in the true lumen, patency, or thrombosis of the false lumen, and enlargement or reduction of the false lumen.[6] Moreover, when checking CT images, several points such as the diameter and length of the site of arterial dissection, the patency of the false and true lumens, the entrance and reentry site of arterial dissection, the major collaterals of SMA, the mesenteric artery hematomas, signs of intestinal ischemia, and the presence of other simultaneous arterial dissections are important diagnostic points for treatment decision making.

Treatment approaches for SISMAD patients include open surgery, endovascular surgery, interventional radiology, and conservative management; however, clear guidelines for the treatment of SISMAD have not been established.[5–8] Conservative medications often include antiplatelet and anticoagulant medications that reduce the blood flow due to stenosis of the true lumen, which prevents thrombus formation in small peripheral arteries, and antihypertensive therapy reduces hemodynamic stress in the blood vessel wall, preventing the progression of dissociation.[5,9,10] However, this treatment has many

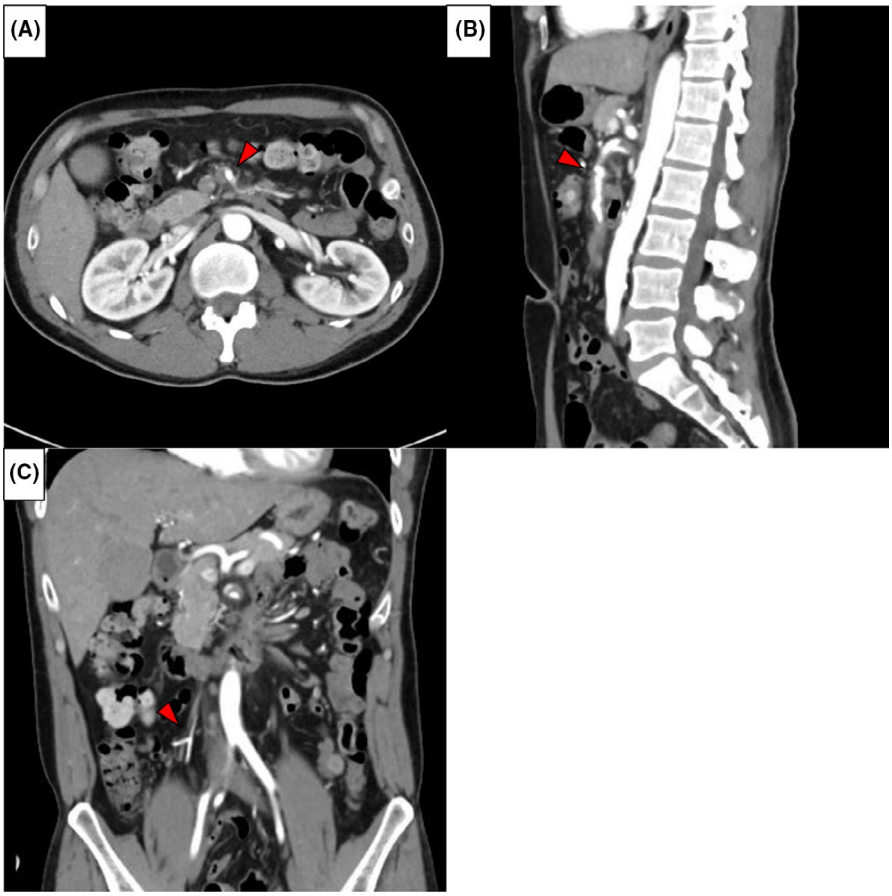

FIGURE 3 Follow-up CT after 7 days. Enhanced abdominal CT after 7 days admission shows the false lumen of the SMA (A, B, red arrow) and the ileocolic artery (C, red arrow) are smaller and the true lumen is slightly more open than in the initial CT images

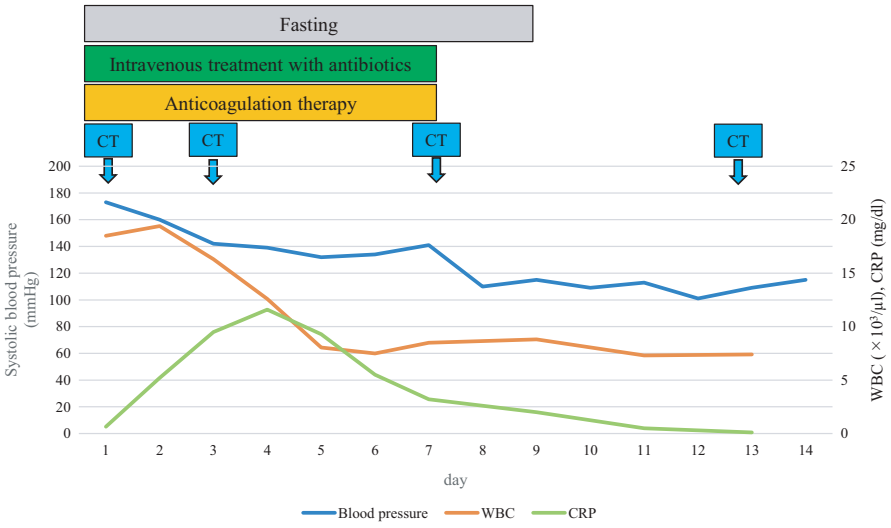

FIGURE 4 Clinical course. Systolic and diastolic blood pressure readings, and changes in blood examination during hospitalization

problems including the risk of dilation of the dissection cavity due to antiplatelet therapy, which is related to the type of drug and the administration period.[5,9,11] Several studies have reported no difference in the clinical course of SISMAD patients with and without adjuvant antithrombotic therapy.[5,12] Therefore, further cases need to be accumulated for the evaluation of the usefulness of antithrombotic therapy.

Our patient was symptomatic and had high levels of inflammation, but fortunately the collateral circulation from the MCA was well developed and the blood flow in the small intestine was maintained; therefore, conservative treatment was selected. Anticoagulation using heparin was performed initially but discontinued after 1 week because there was no consistent increase in FDP and the symptoms had improved. Furthermore, CT findings 1 week after discontinuation showed no intestinal ischemia or obvious thrombotic findings and the antithrombotic treatment was left discontinued thereafter.

Coronavirus vaccination is urgently required because of the COVID-19 pandemic. However, the Japanese media have reported the sudden death of young people without underlying disease after coronavirus vaccination, although a causal relationship has not been demonstrated. Previous reports indicated that SISMAD commonly occurs in middle-aged men,[13] as seen in our case. Although this has never been proven to be a side effect of the vaccine and is likely to be just a coincidence, our case has no underlying disease and SISMAD developed 5 h after coronavirus vaccination. Further investigation is needed on the side effects of the coronavirus vaccine, but we report as case experience that the possible side effects after coronavirus vaccination cannot be completely ruled out.

In conclusion, although the etiology and treatment information for SISMAD are rare and lacking, this case report could be accurately diagnosed by contrast-enhanced CT. Furthermore, it is a valuable case in which the treatment of SISMAD was successfully selected from conservative management based on the imaging findings. This case report provides a useful guide for the clinical diagnosis and treatment of this disease.

ACKNOWLEDGEMENT

We thank J. Ludovic Croxford, PhD, from Edanz (https://jp.edanz.com/ac) for editing a draft of this manuscript.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

T Miyata and HT performed a central role in treating this patient. T Miyata drafted the manuscript. YS, TN, RK, HN, AH, YF, SM, DK, YT, NN, TM, HF and NU also managed the patient. All authors have approved the manuscript.

ETHICAL APPROVAL

The study design was approved by the ethics committee of the Kanazawa Medical University.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

DATA AVAILABILITY STATEMENT

Not applicable.

ORCID

Takashi Miyata https://orcid.org/0000-0002-0348-2637
Naohiko Nakamura https://orcid.org/0000-0002-5542-0163

REFERENCES

1. Bauersfeld SR. Dissecting aneurysm of the aorta; a presentation of 15 cases and a review of the recent literature. *Ann Intern Med*. 1947;26:873-889.
2. Park YJ, Park KB, Kim DI, Do YS, Kim DK, Kim YW. Natural history of spontaneous isolated superior mesenteric artery dissection derived from follow-up after conservative treatment. *J Vasc Surg*. 2011;54:1727-1733.
3. Baldino G, Mortola P, Cambiaso M, Valdata A, Gori A. Endovascular treatment with flow-diverting stents of symptomatic superior mesenteric artery after dissection aneurysm. *J Vasc Surg Cases Innov Tech*. 2017;61:1867-1888.
4. Gouëffic Y, Costargent A, Dupas BB, Heymann MF, Chaillou P, Patra P. Superior mesenteric artery dissection: case report. *J Vasc Surg*. 2002;35:1003-1005.
5. Kim YW. Current understandings of spontaneous isolated superior mesenteric artery dissection. *Vasc Specialist Int*. 2016;32:37-43.
6. Luan JY, Guan X, Li X, et al. Isolated superior mesenteric artery dissection in China. *J Vasc Surg*. 2016;63:530-536.
7. Takahashi B, Nakayama Y, Shiroma S, Ido K. Three case report of spontaneous isolated dissection of the superior mesenteric artery-with an algorithm proposed for the management. *Ann Vasc Dis*. 2015;8:120-123.
8. Ko SH, Hye R, Frankel DA. Management of spontaneous isolated visceral artery dissection. *Ann Vasc Surg*. 2015;29:470-474.
9. Subhas G, Gupta A, Nawalany M, Oppat WF. Spontaneous isolated superior mesenteric artery dissection: a case report and literature review with management algorithm. *Ann Vasc Surg*. 2009;23:788-798.
10. Takayama H, Takeda S, Saitoh SK, Hayashi H, Takano T, Tanaka K. Spontaneous isolated dissection of the superior mesenteric artery. *Intern Med*. 2002;41:713-716.
11. Katsura M, Mototake H, Takara H, Matsushima K. Management of spontaneous isolated dissection of the superior mesenteric artery: case report and literature review. *World J Emerg Surg*. 2011;6:16.
12. Yun WS, Kim YW, Park KB, et al. Clinical and angiographic follow up of spontaneous isolated superior mesenteric artery dissection. *Eur J Vasc Endovasc Surg*. 2009;37:572-577.
13. Daoud H, Abugroun A, Subahi A, Khalaf H. Isolated superior mesenteric artery dissection: a case report and literature review. *Gastroenterology Res*. 2018;11:374-378.

How to cite this article: Miyata T, Sannomiya Y, Nagayama T, et al. Conservative management of spontaneous isolated superior mesenteric artery dissection: A case report. *Clin Case Rep*. 2022;10:e05313. doi:10.1002/ccr3.5313