

## Outcomes and Radiographic Findings of Isolated Spontaneous Superior Mesenteric Artery Dissection

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### WHAT THIS PAPER ADDS

Factors favouring complete remodelling of false lumens are the presence of symptoms that imply acute or chronic illness, and the absence of blood flow in the false lumen at diagnosis. In-hospital and intermediate-term outcomes of conservative treatment for spontaneous SMA dissection may be good regardless of the presence or absence of abdominal pain.

**Objectives:** This study aimed to investigate the features, treatments, and prognosis of patients with symptomatic and asymptomatic isolated SMA dissection.

**Methods:** Data from 35 consecutive patients in whom isolated SMA dissection was diagnosed on computed tomography angiography (CTA) between 2004 and 2015 at two general hospitals in Japan, were collected retrospectively. Nineteen symptomatic patients were compared, and 16 asymptomatic patients with incidentally revealed SMA dissection were also compared. In addition, the vascular remodelling and outcomes during follow-up were evaluated.

**Results:** The patient characteristics in the symptomatic and incidental groups were comparable except for age; mean ages were  $55.9 \pm 13.9$  and  $65.3 \pm 10.9$  years, respectively. Most of the symptomatic patients were managed conservatively (including antiplatelet therapy, anticoagulants, blood pressure control, or bowel rest). In addition, one patient was initially treated by endovascular intervention because of intestinal ischaemia, and another was switched from conservative to surgical treatment. The in-hospital outcome was good with no mortality. In the incidental group, all 16 patients were observed as outpatients without additional treatment. Complete remodelling of the false lumen was observed in 31% of patients with follow-up CTA, and was associated with the presence of symptoms and the absence of false lumen with blood flow at diagnosis. Neither recurrent or new onset abdominal pain, intervention for SMA dissection, nor SMA related death was observed in either group during the follow-up period ( $750 \pm 779$  and  $1200 \pm 951$  days).

**Conclusions:** The characteristics of asymptomatic patients with incidentally revealed SMA dissection were comparable with those of symptomatic patients, except for age. During follow-up, factors favouring complete remodelling of false lumens were the presence of symptoms, and the absence of false lumen blood flow at diagnosis.

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### INTRODUCTION

Isolated spontaneous dissection of the superior mesenteric artery (SMA) is considered to be a rare condition. However, the development of computed tomography angiography (CTA) means that isolated SMA dissection is increasingly being recognised.<sup>1,2</sup> Usually patients diagnosed with SMA

dissection present with abdominal pain, but some patients are asymptomatic and hence the diagnosis is incidental. Conservative treatment (including antiplatelet therapy, anticoagulants, blood pressure control, or bowel rest) is chosen for patients without bowel ischaemia.<sup>3,4</sup> If abdominal pain is not relieved, or signs indicative of bowel ischaemia appear, endovascular intervention or surgery is performed. Recently, some case series have reported endovascular stent placement as first choice treatment with good clinical outcomes.<sup>5,6</sup> However, the best therapeutic strategy in symptomatic patients has yet not been established.

In addition, SMA dissection in some asymptomatic patients is incidentally diagnosed on CTA performed to follow-

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up other diseases such as cancer, infection, or trauma. Because these patients are asymptomatic, most of them are observed as outpatients, and it is not yet understood whether treatment is needed for them. The characteristics of patients with asymptomatic SMA dissection are not well known because of the limited number of reported cases.

The present study sought to investigate the features, treatments, and prognosis of patients with asymptomatic and symptomatic isolated SMA dissection.

## METHODS

Data from 35 consecutive patients, in who isolated SMA dissection was diagnosed using CTA between January 2004 and December 2015 at two general hospitals in Japan—the Tazuke Kofukai Medical Research Institute, Kitano Hospital, and Osaka Red Cross Hospital, were retrospectively collected and analysed. All consecutive patients with SMA dissection were identified from the database for CT angiography interpretation. Patients with iatrogenic and traumatic SMA dissection, and those with associated abdominal aortic dissection were excluded. The characteristics of patients, risk factors, laboratory data, CTA findings, treatments, and prognoses were analysed. Vital signs (systolic and diastolic blood pressures, and heart rate) and laboratory data (white blood cell count, serum C-reactive protein, serum creatine kinase, serum LDH, and D-dimer) were collected at the time of initial diagnosis or on admission. The CTA findings were evaluated (distance from SMA ostium to the beginning of the dissection, diameter of SMA, length of the dissection, patency of false lumen, Sakamoto's classification,<sup>1</sup> and the presence of bowel ischaemia) in 32 patients only as the CTA data were not available for the remaining three patients. Sakamoto's classification categorised SMA dissection into the following four types based on imaging findings: type I, patent false lumen with both entry and re-entry, type II, "cul-de-sac" shaped false lumen without re-entry, type III, thrombosed false lumen with ulcer like projection (ULP), and type IV, completely thrombosed false lumen without ULP.<sup>1</sup> Follow-up CTA was performed 6–24 months after diagnosis. The characteristics of the false lumens on CTA were compared at diagnosis and at follow-up. Complete remodelling of the false lumen was defined as improvement and disappearance of the SMA dissection. Increase in the SMA diameter was defined as a 3 mm increase of diameter from the initial CTA. In general, surgery is considered if the diameter of SMA (normal diameter 6–8 mm) exceeds 20 mm.<sup>7</sup> However, there is no consensus on the rate of increase in SMA diameter. For this study, a 3 mm increase per 6–24 months was set as the criterion for analysis. For the abdominal aorta (normal diameter 20–30 mm), if an increase in diameter of 5 mm per 6 months occurs in patients with an abdominal aortic aneurysm measuring 50 mm in diameter; surgical intervention is considered. When a 5 mm increase was applied to an aortic diameter of 50 mm; an equivalent increase of 2–3 mm in the SMA was considered to be appropriate. The primary outcome measure comprised a composite of SMA

related death and additional interventions in hospital and during the follow-up period. The research protocol was approved by the institutional review board of Kitano Hospital according to the ethical guidelines of the 1975 Declaration of Helsinki and its amendments. As this was a retrospective study, the need to obtain written informed consent was waived and patients' records/information were anonymised before analysis.

## Statistics

Continuous variables were expressed as mean  $\pm$  standard deviation. The numbers of risk factors were expressed as median and 95% CI. In comparisons of the baseline characteristics of the study population, Pearson's chi-square test was used for categorical variables, and the Wilcoxon rank sum test was used for continuous variables when appropriate. Univariate analyses for the factors affecting complete remodelling of the false lumen, and those affecting increase in diameter of SMA in both groups were performed, and odds ratio and 95% CI were computed. The small sample size meant that multivariate regression analysis was not performed. A  $p$  value  $<.05$  was considered to be statistically significant in all analyses. Kaplan-Meier analysis was performed to estimate the event free survival rate. Statistical analyses were performed using JMP software, version 10 (SAS Corp., NC, USA) and StatsDirect software, version 3 (StatsDirect Ltd, Cheshire, UK).

## RESULTS

### Clinical characteristics

Among the 35 patients in whom the diagnosis was made based on CTA scans, 19 patients had acute onset abdominal pain (group A: symptomatic group) and 16 were incidentally diagnosed (CTA was not primarily intended to detect SMA dissection; group B: incidental group). The clinical characteristics, vital signs, and blood tests, if available, of the 35 patients in groups A and B are summarised in [Table 1](#). For groups A and B, 79% and 100% of patients were men, and the mean ages were  $55.9 \pm 13.9$  and  $65.3 \pm 10.9$  years, respectively. Patients in group B were significantly older than those in group A ( $p=.035$ ). Patients in both groups had a high prevalence of hypertension (63% in group A and 56% in group B) and smoking (72% in group A and 75% in group B).

### Findings from CTA

The distances from the SMA ostium to the beginning of the dissection, and the diameter of the SMA were not significantly different between both groups ([Table 2](#)). The length of dissection was longer in group A than in group B ( $p=.003$ ). No aneurysmal change (SMA diameter  $>20$  mm) was detected in either group. Seven patients (7/17; 41%) in group A and nine patients (9/15; 60%) in group B had continuous blood flow through the false lumen, which occurred with either partial or no thrombosis. No relationship was found between the presence of abdominal pain and the patency of the false lumen (completely

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