Evolution of Computed Tomographic Characteristics of Spontaneous Isolated Superior Mesenteric Artery Dissection During Conservative Management

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Background: Spontaneous isolated superior mesenteric artery (SMA) dissection is a rare condition, and its clinical and angiographic courses are poorly defined. We aimed to monitor the morphological characteristics of spontaneous isolated SMA dissection using computed tomography (CT) over 2 years of follow-up, including the recovery process via vascular remodeling, and identify the factors that affect vascular remodeling using univariate analysis.

Methods and Results: We retrospectively reviewed the medical records and morphological findings of 59 consecutive patients with spontaneous isolated SMA dissection between October 2007 and July 2014, which included 36 symptomatic and 23 asymptomatic patients. Surgical intervention with open laparotomy was required in 3 patients during the follow-up period; 41 patients who received conservative treatment were followed up over 2 years with regular CT. Complete remodeling was achieved in 16 of 25 symptomatic patients who were treated conservatively (64.0%). A patent false lumen and aneurysmal formation on an initial CT scan were identified as negative factors that affected remodeling in patients with spontaneous isolated SMA dissection.

Conclusions: Conservative management of spontaneous isolated SMA dissection is associated with a good prognosis, both clinically and morphologically. Surgical intervention is only required in patients with severe intestinal ischemia or rapid aneurysmal enlargement. (*Circ J* 2016; **80**: 1452–1459)

Key Words: Arterial dissection; Conservative therapy; Long-term outcome; Superior mesenteric artery; Vascular remodeling

Spontaneous isolated superior mesenteric artery (SMA) dissection is the dissection of the SMA without the occurrence of aortic dissection, and it was first described by Bauersfeld in 1947.¹ The clinical and angiographic courses of this rare condition are not well defined, although it is associated with intestinal necrosis or arterial rupture.^{2–4}

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The etiology of this rare condition is also unclear, but hypertension and smoking have been reported as possible etiologies.⁵ Moreover, arteriosclerosis, segmental arterial mediolysis,⁶ fibroelastic disease, trauma, and other causes have been con-

sidered as risk factors for spontaneous isolated SMA dissection.^{7,8} Additionally, Solis et al indicated that shear stress between the proximal and distal parts of the SMA may be a potential cause of spontaneous isolated dissection,⁹ but other reports have stated that stenosis or thrombosis of the celiac artery may lead to spontaneous isolated SMA dissection.¹⁰

Only a few studies have compared the clinical and angiographic courses of patients with spontaneous isolated SMA dissection who were treated conservatively or surgically.^{11–13} Although first-line conservative treatment is generally preferable in most patients, the factors affecting complete recovery through vascular remodeling have not been identified through an appropriate analysis.

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Using univariate analysis, we aimed to determine the vascular characteristics of spontaneous isolated SMA dissection, and identify the factors that affected the outcome of conservative treatment and the therapeutic strategy.

Methods

Study Subjects

We retrospectively examined the medical records of 59 consecutive patients who were diagnosed as having spontaneous isolated SMA dissection at the Keio University Hospital and 4 affiliated hospitals between October 2007 and July 2014. Spontaneous isolated SMA dissection was definitively diagnosed using enhanced computed tomography (CT). All asymptomatic patients were diagnosed through the incidental detection of SMA dissection on CT during an examination for other diseases. Patients with abdominal aortic dissection, SMA thrombosis, or aneurysmal formation without dissection were excluded. The institutional review boards of Keio University Hospital and the other affiliated hospitals approved our study.

Diagnosis of Spontaneous Isolated SMA Dissection by CT

CT was performed with a contrast agent. The thickness of the images was 1–5 mm, and 1–1.25-mm slices were obtained during the arterial phase. All CT images were analyzed with OsiriX® imaging software (Pixmeo, Bernex, Switzerland). The length of the dissection, site of origin, presence of a patent false lumen (FL), and aneurysmal formation (defined as >10 mm of the maximum diameter) were also evaluated on initial CT angiography. The definition of each measured parameter is provided in **Figure 1**. The distance from the site of origin of the dissection to the inferior margin of the pancreas and the maximum curve of the SMA was assessed with margins of ± 10 mm in this study. The percent compression of the true lumen (TL) was measured on all CT images using the diameter of the unaffected SMA orifice and the diameter of the TL at the site of maximal stenosis between the SMA origin and the ileocolic artery origin.

Treatment Protocol

Each clinician determined the indication for hospitalization, whether oral intake should be permitted, and the type of antithrombotic therapy to administer, including antiplatelet and anticoagulant agents after diagnosis. Surgical intervention was eventually performed in patients with severe intestinal ischemia or progressive aneurysmal dilatation, and this treatment decision was not based on the severity of the symptoms. Patients who were highly suspected of having severe intestinal ischemia or necrosis on CT scan and blood test results had an indication for surgical intervention. Also, patients with progressive aneurysmal dilatation had an indication for surgery, regardless of the aneurysm's size.

Follow-up Protocol

Both symptomatic and asymptomatic patients who underwent conservative management were periodically followed up using CT angiography for up to 5 years after diagnosis. The frequency of performing CT depended on each patient, although it was normally performed every 1–3 months in the first half of the year and every 6 months thereafter. Remodeling was defined as an improvement in the SMA dissection, which was characterized by the occlusion of a false lumen and/or improved stenosis in the TL. Complete remodeling was defined as morphological recovery of the SMA to its normal condition, without any aneurysmal formation.

Figure 1. Schematic of a sagittal section of the superior mesenteric artery (SMA) showing the distances between the dissection and other points around it. (a) Distance between the SMA origin and the dissection origin, (b) distance from the inferior margin of the pancreas to the dissection origin, (c) distance from the maximum curve of the SMA to the dissection origin, (d) length of the dissection, (e) extent of maximum stenosis of the TL. FL, false lumen; TL, true lumen.

To assess the factors affecting remodeling over the natural course of spontaneous isolated SMA dissection following its actual onset, symptomatic patients who did not receive any invasive treatment and were followed for >2 years were included in the subgroup analysis. Asymptomatic patients were excluded from this subgroup analysis, as the disease onset was unclear and the condition was diagnosed incidentally in these patients.

Statistical Analysis

All statistical analyses were performed using SPSS® software (version 22.0; SPSS Inc, Chicago, IL, USA). Continuous data are expressed as mean $\pm$ standard deviation. Baseline characteristics of the symptomatic and asymptomatic groups were compared using Pearson's χ^2 or Fisher's exact tests for nominal variables, and the t-test or Mann-Whitney U test was used to analyze continuous data. Univariate analysis was performed using the patients' characteristics, morphological findings on the initial CT scan, and treatment strategy of the symptomatic and asymptomatic groups. Additionally, morphological changes with conservative treatment over the 2-year follow-up were also compared between the symptomatic and asymptomatic groups using univariate analysis. Moreover, potential factors affecting complete remodeling over the 2-year follow-up in symptomatic patients who received conservative treatment were also evaluated using univariate analysis.

Results

Patients' Characteristics

All patients included individuals of Japanese ethnicity. The demographic and clinical characteristics of the 59 enrolled patients are summarized in **Table 1**, including 36 (61.0%) and 23 (39.0%) patients in the symptomatic and asymptomatic

Table 1. Characteristics of the Symptomatic and Asymptomatic Patients With Spontaneous Isolated SMA Dissection

	All cases n=59 (100%)	Symptomatic cases n=36 (61.0%)	Asymptomatic cases n=23 (39.0%)	P value
Age, years	58.1 (11.8)	54.6 (9.1)	63.5 (13.7)	0.010
Male sex	56 (94.9%)	34 (94.4%)	22 (95.7%)	0.665
Coexisting medical conditions				
Hypertension	27 (45.8%)	16 (44.4%)	11 (47.8%)	0.799
Diabetes mellitus	3 (5.1%)	0 (0%)	3 (13.0%)	0.019
Coronary artery disease	3 (5.1%)	1 (2.8%)	2 (8.7%)	0.250
Cerebrovascular disease	4 (6.8%)	2 (5.6%)	2 (8.7%)	0.423
Chronic kidney disease	2 (3.4%)	1 (2.8%)	1 (4.3%)	0.483
Hyperlipidemia	12 (20.3%)	7 (19.4%)	5 (21.7%)	0.494
History of smoking	33 (55.9%)	21 (58.3%)	12 (52.2%)	0.929
Results of the initial CT scan				
Distance between SMA origin and dissection origin, mm	18.2 (13.9)	16.2 (13.9)	21.4 (13.6)	0.165
Distance from inferior margin of pancreas to dissection origin, mm	NE	-12.2 (17.2)	NE	
Distance from SMA maximum flexing point to dissection origin, mm	NE	-9.5 (17.2)	NE	
Length of the dissection, mm	66.5 (37.9)	81.7 (36.7)	42.7 (26.2)	<0.001
Patent false lumen	31 (52.5%)	15 (41.7%)	16 (69.6%)	0.036
Percentage of maximum true lumen stenosis, %	54.9 (24.6)	59.7 (23.5)	47.4 (24.9)	0.060
Aneurysmal formation (>10mm)	17 (28.8%)	8 (22.2%)	9 (39.1%)	0.162
Diameter of aneurysm, mm	12.9 (2.6)	13.6 (3.0)	11.6 (1.1)	0.215
Admission	27 (45.8%)	27 (75%)	0 (0%)	<0.001
Surgical intervention	3 (5.1%)	2 (5.6%)	1 (4.3%)	0.665
Antiplatelet therapy	40 (67.8%)	27 (75%)	13 (56.5%)	0.138
Anticoagulant therapy	20 (33.9%)	20 (55.6%)	0 (0%)	<0.001

Continuous data are shown as mean (standard deviation) and categorical data are shown as number (% of each group). Pearson's χ^2 test, Fisher's exact test, t-test, and Mann-Whitney U test were used. CT, computed tomography; NE, not evaluated; SMA, superior mesenteric artery; +, proximal; -, distal.

groups, respectively. Patients' age at onset ranged from 38 to 79 years, and the mean age was 58.1 ± 11.8 years; the average age in the symptomatic group was 54.6 ± 9.1 years, and the symptomatic patients were 8.9 years younger than the asymptomatic patients ($P < 0.010$); 56 (94.9%) patients were male, and only 3 (5.1%) were female.

The most common comorbidity was hypertension (45.8%), followed by major atherosclerotic factors, although the percentages for these were low. Among these factors, only the proportion of patients with diabetes mellitus significantly differed between the symptomatic and asymptomatic groups ($P = 0.019$); in fact, only the asymptomatic patients had diabetes. Moreover, 55.9% of patients had a history of smoking, although the proportion of smokers did not significantly differ between the groups.

Morphological Analysis of the Initial CT Scans

Table 1 also presents the morphological results of the initial CT angiography. The mean distance from the SMA origin to the dissection origin site was 18.2 ± 13.9 mm, and this value did not significantly differ between the symptomatic and asymptomatic groups ($P = 0.165$); among the symptomatic patients, this distance was < 40 mm in 97.2% patients.

To validate the assumed etiologies of spontaneous isolated SMA dissection, the site of origin of the dissection was evaluated in detail, particularly in the symptomatic group that exhibited a true onset. The mean distance from the inferior margin of the pancreas to this site was 12.2 ± 17.2 mm proximal

to the SMA; only 17 (47.2%) patients exhibited a distance within ± 10 mm from the inferior margin of the pancreas. The mean distance from the maximum curve of the SMA to the dissection origin was 9.5 ± 17.2 mm proximal to the SMA; only 13 (36.1%) patients exhibited a distance within ± 10 mm from the maximum curve of the SMA.

The length of the dissection ranged from 12 to 185 mm, and the mean length of the dissection was 66.5 ± 37.9 mm in all patients. The mean length of the dissection was 81.7 ± 36.7 mm in the symptomatic group, which was 39 mm and > 1.9 -fold longer than the length of the dissection in the asymptomatic group (42.7 ± 26.2 mm); the difference between these values was significant ($P < 0.001$).

Regarding a patent FL, 31 (52.5%) of 59 patients were positive on the initial CT scan. The symptomatic group included 15 (41.7%) of 36 patients, whereas the asymptomatic group included 16 (69.6%) of 23 patients with a patent FL ($P = 0.036$).

The percentage of the maximum TL stenosis on the initial CT scan was evaluated using the following equation: percent stenosis = $(1 - [\text{the maximal stenotic diameter}] / [\text{the unaffected SMA orifice}]) \times 100\%$. The mean percentage of the maximum TL stenosis in all 59 patients was $54.9 \pm 24.6\%$; this value did not significantly differ between the groups ($P = 0.060$). Moreover, this value did not significantly differ between patients with a patent and thrombosed FL ($P = 0.684$). Furthermore, 9 (15.3%) of 59 patients had $> 80\%$ stenosis. Total SMA occlusion was only observed in 2 patients.

Table 2. Morphological Changes Over a 2-Year Follow-up of Patients Receiving Conservative Treatment for Spontaneous Isolated SMA Dissection

Outcome	All cases n=41 (100%)	Symptomatic cases n=25 (61.0%)	Asymptomatic cases n=16 (39.0%)	P value
Complete remodeling	18 (43.9%)	16 (64.0%)	2 (12.5%)	0.001
Incomplete remodeling	5 (12.2%)	4 (16.0%)	1 (6.3%)	<0.001
No change	16 (39.0%)	5 (20.0%)	11 (68.8%)	0.002
Any exacerbation	2 (4.9%)	0 (0%)	2 (12.5%)	0.146
Progress of the dissection	0 (0%)	0 (0%)	0 (0%)	
Enlargement of the existing aneurysm	2/12	0/6	2/6	
New aneurysmal formation	0 (0%)	0 (0%)	0 (0%)	

Data are shown as number (% of each group). Pearson's χ^2 test, Fisher's exact test, t-test, and Mann-Whitney U test were used. SMA, superior mesenteric artery.

Aneurysmal formation on the initial CT scan was observed in 17 (28.8%) of 59 patients; the mean aneurysm diameter in these 17 patients was 12.9 ± 2.6 mm. The proportion of patients with aneurysmal formation and the aneurysm diameter did not significantly differ between the symptomatic and asymptomatic groups ($P=0.162$ and 0.215 , respectively). Among these 17 patients, 2 required surgical intervention for aneurysm enlargement and the other 15 showed favorable outcomes with improvement or no remarkable change after aneurysmal formation.

Treatment Strategy

Among the 59 enrolled patients, 32 underwent standard outpatient follow-up (54.2%), and 27 (45.8%) were admitted after SMA dissection was diagnosed (Table 1). The average duration of hospital stay of the 26 patients who were admitted and did not undergo any surgical intervention was 9.5 days (range, 3–15 days).

Of the patients who underwent surgical intervention, 1 symptomatic patient had severe epigastric pain with total SMA occlusion and signs of severe intestinal ischemia on the initial CT scan. Bypass was performed from the right common iliac artery to the ileocolic artery using an autologous great saphenous vein graft. The patient's postoperative course was unevent-

ful, and he was discharged 11 days postoperatively. In another symptomatic patient, a dissecting aneurysm of the SMA was identified on initial CT scan. The diameter of the aneurysm gradually enlarged to 18 mm within 3 months, which was twice its original size. The SMA was replaced with the great saphenous vein because of the risk of rupture. Additionally, in 1 asymptomatic patient, SMA dissection and a 13-mm aneurysm were incidentally detected, and the aneurysm increased in size to nearly 20 mm within 2 months. Aneurysmorrhaphy was performed in this patient. The other 56 patients had a good clinical course, and did not require surgical intervention during the follow-up period. Furthermore, none of the 59 patients had interventional radiology or underwent endovascular stent placement.

Analgesic and antihypertensive medications were used according to the decision of each physician based on the patients' symptoms or blood pressure. Antithrombotic treatment was another common therapy for conservative management. In the symptomatic group, 27 patients (75.0%) received antiplatelet therapy and 20 (55.6%) received anticoagulant therapy. Among the 27 patients who received antiplatelet therapy, aspirin was administered to 10, clopidogrel was administered to 9, and ticagrelor was administered to 9. Among the 20 patients who received anticoagulant therapy,

Figure 3. Representative successful symptomatic patient who received conservative treatment (axial view of the superior mesenteric artery (SMA) at the same level [Upper] and a volume-rendering reconstruction [Lower]). (A) Initial computed tomography (CT) scan showing severe stenosis of the SMA with a thrombosed false lumen; (B) SMA totally occluded 1 week after onset; despite exacerbation of the morphological findings, bowel ischemia improved; (C) CT scan after 6 months showing improvement of the dissection; (D) complete remodeling achieved 1 year after onset.

heparin was used in 17 and warfarin was used in 5. None of the patients described in the present study died of causes related to spontaneous isolated SMA dissection.

Morphological Changes During Follow-up

Morphological changes occurring over time because of spontaneous isolated SMA dissection were assessed using data from the 41 patients who were treated conservatively, and they were followed for >2 years (Figure 2). The results are shown in Table 2. Among these patients, 25 were symptomatic, and they were considered to reflect the natural course of spontaneous isolated SMA dissection from its true onset. During the follow-up period, 20 (80.0%) symptomatic patients showed some improvement in the maximum TL stenosis and recovery of the TL diameter; these improvements were only observed in 3 (18.8%) asymptomatic patients ($P<0.001$).

Among the symptomatic patients, 16 (64.0%) achieved complete recovery to a morphologically normal condition, which was considered complete remodeling. Figure 3 shows a representative patient with total occlusion of the SMA wherein complete remodeling was achieved during the follow-up period. Even a patient with a dissection length of 15 cm achieved complete remodeling. The length of time required to achieve complete remodeling varied for each patient. Regarding the evolution of the number of patients who achieved complete remodeling in the symptomatic group during the follow-up, 8 (32.0%) achieved complete remodeling after 6

months from onset, which increased to 14 (56.0%) at 1 year after onset (Figure 4). Another patient achieved complete remodeling at 5 years from onset. In all 8 patients who achieved complete remodeling within 6 months, the false lumen was already occluded on the initial CT scans.

There were 5 patients (20.0%) in the symptomatic group who did not show any remodeling during the follow-up period. All these patients had a patent FL at the onset, which persisted throughout the follow-up period. In the asymptomatic group, 11 patients did not show any remodeling, which was higher than the number of such patients in the symptomatic group (68.8% vs. 20.0%; $P=0.002$).

Factors Affecting Remodeling

Possible factors that affected complete remodeling were assessed in 25 symptomatic patients who received conservative management and were followed for >2 years (Table 3). No correlation was noted between the medical or social history and complete remodeling. The use of antithrombotic treatment and the use of antiplatelet or anticoagulant agents did not affect remodeling. On the initial CT scan, the site of origin of the dissection ($P=1.000$) and the length of the dissection ($P=0.655$) did not significantly differ among patients. Furthermore, the proportion of TL stenosis did not correlate with remodeling ($P=0.890$).

Only the presence of a patent FL ($P<0.001$) and aneurysmal formation ($P=0.012$) were significantly correlated with poor

remodeling. The odds ratio could not be determined for patients with a patent FL, as all patients with a thrombosed FL on the initial CT scan achieved complete remodeling. However, the odds ratio of aneurysmal formation on the initial CT scan for complete remodeling was 0.053 (95% confidence interval, 0.005–0.596).

Discussion

In our study of 59 consecutive patients with spontaneous isolated SMA dissection, we assessed the clinical characteristics, clinical course, morphology, and time-dependent changes to identify the clinical presentation and treatment of spontaneous isolated SMA dissection, which were previously unclear. Others have assessed the clinical and morphological courses of spontaneous isolated SMA dissection in patients undergoing conservative management, but the number of patients in those studies was <30, and the minimum follow-up period was only a few months.^{12,14,15} Moreover, none of the studies included statistical analysis to identify the factors that affect remodeling during conservative management. To our knowledge, this is the first study to assess spontaneous isolated SMA dissection over a follow-up period of 2 years using detailed CT scan analysis, including an assessment of remodeling, and a statistical analysis of the factors that influence it.

Regarding the patients' characteristics, the mean age (58.1 years) and the high proportion of men (94.9%) in the present study were similar to previous reports.^{10,11} It is natural that the mean age was younger in the symptomatic group, as most asymptomatic patients were only diagnosed in the middle of the clinical course because of incidental detection of spontaneous isolated SMA dissection.

Generally, hypertension, diabetes, and smoking have been reported as major vascular atherosclerotic risk factors for diseases such as peripheral artery disease.¹⁶ In patients with spontaneous isolated SMA dissection, a high proportion of those with hypertension and a history of smoking has been previously reported.^{5,11} Almost half of the present patients also had hypertension or a history of smoking, whereas the proportion of other risk factors, including diabetes, was low. Hence, hypertension and smoking may be correlated with the etiology of spontaneous isolated SMA dissection, which is different

Figure 4. Number of patients with spontaneous isolated superior mesenteric artery dissection who achieved complete remodeling in the symptomatic group during the follow-up with conservative management (n=25).

from the etiology of other types of spontaneous dissection of small arteries, such as spontaneous coronary artery dissection.^{17,18}

The initial CT scan indicated that the dissection began within 40mm of the SMA origin in 97.2% of symptomatic patients. Furthermore, the distance between the SMA origin and the dissection origin, as well as the mean length of the dissection, were both greater in the asymptomatic group than in the symptomatic group. Park et al reported that the length of dissection becomes shorter with its recovery.¹¹ Our study indicated the same result and showed that spontaneous isolated SMA dissection began adjacent to the SMA origin, and the dissection origin was located toward the distal side of the SMA with its recovery.

Several hypotheses have been proposed regarding the etiology of spontaneous isolated SMA dissection. Solis et al

Table 3. Factors Affecting Complete Remodeling Over 2 Years of Follow-up in Symptomatic Patients With Spontaneous Isolated SMA Dissection (n=25)

Characteristic	P value	Odds ratio (95% CI)
Age	0.921	
Sex	0.600	
Hypertension	0.407	
Smoking	0.392	
Results of initial CT angiography		
Distance between the SMA origin and the dissection origin	1.000	
Length of the dissection	0.655	
Patent false lumen	<0.001	NC
Percentage of true lumen stenosis	0.890	
Aneurysmal formation at onset	0.012	0.053 (0.005–0.596)
Antiplatelet therapy	0.097	
Anticoagulant therapy	0.530	

Pearson's χ^2 test, Fisher's exact test, t-test, Mann-Whitney U test were used respectively. CI, confidence interval; NC, not calculated. Other abbreviations as in Table 1.

hypothesized that the dissection was caused by shear stress at the inferior edge of the pancreas because of the difference of SMA fixation.^{9,11} Others have stated that the shear stress at the maximum curve of the SMA was the cause of the dissection, based on a hemodynamic simulation study.^{19,20} However, our study indicated that the dissection origin was located more proximal to the pancreatic edge or the maximum curve of the SMA, and less than half of patients showed conditions similar to those described by Solis et al⁹ and Park et al.¹⁹ Thus, the mechanism of spontaneous isolated SMA dissection remains unknown, but may include multiple etiologies.

Concerning treatment of spontaneous isolated SMA dissection, a relatively high proportion of patients requiring surgical intervention has been previously reported.²¹ However, several recent reports have indicated a high success rate with conservative management alone,^{7,11,22} and our study showed that conservative treatment was successful in 96.6% of patients. Failure of conservative management during the follow-up period has been reported in previous studies,^{23–25} and surgical interventions were required 10 days to 1 year after diagnosis, because of symptom recurrence. In our study, surgical intervention was required in 2 patients during conservative management, because of aneurysmal enlargement, although no patient had symptom recurrence, suggesting that severe intestinal ischemia occurred during the follow-up period. We believe that unnecessary interventions should be avoided in those with spontaneous isolated SMA dissection; however, further studies are needed to confirm the precise indication of surgery for this disease.

Endovascular stent placement is an interventional method for treatment of spontaneous isolated SMA dissection. Since it was first described by Leung et al,²⁶ several reports have presented the usefulness of such interventional treatment.^{20,27–32} However, the long-term outcome of stent placement for spontaneous isolated SMA dissection remains unclear, as SMA stent placement is associated with a risk of thrombosis and intimal hyperplasia. Moreover, multiple lateral branches of the SMA may be occluded by stent placement.^{26,31} Rong et al¹⁵ and Chang et al³³ reported serious complications, including death. Surgeons should be aware of complications if endovascular stent placement is performed.

Regarding antithrombotic treatment, some reports have indicated that it may be reasonable to use it for spontaneous isolated SMA dissection.^{23,34} In contrast, Park et al recently reported that antithrombotic treatment is not necessary, as it does not yield better results.¹¹ In our study, 43 patients (72.9%; a higher proportion than in previous reports³¹) were treated with antithrombotic medication, and good results were achieved. No apparent prognostic difference was observed between patients treated with or without antithrombotic medication. Thus, the usefulness of antithrombotic treatments for spontaneous isolated SMA dissection remains controversial, and more studies are needed to investigate this topic further.

Vascular remodeling is an interesting phenomenon in the natural course of spontaneous isolated SMA dissection. The proportion of patients who achieved complete remodeling in our study was evaluated in symptomatic patients who received conservative treatment; this value (64.0%) was much higher than previously reported (15.2–25%).^{11–13} One possible reason for this is that most previous reports included both symptomatic and asymptomatic patients, and the follow-up period may have been too short to confirm remodeling. In our study, we evaluated the remodeling of symptomatic and asymptomatic patients with spontaneous isolated SMA dissection separately for over 2 years, which is different from the methods of previ-

ous studies. Furthermore, our univariate analysis indicated that a patent FL and aneurysmal formation on the initial CT scan were significant negative factors. Thrombosis of the patent FL is the first remodeling step, hence complete remodeling is considered difficult in patients with a patent FL. In contrast, a patent FL on the initial CT scan was a risk factor of subsequent aneurysmal formation without remodeling in our study.

Conclusions

Up to 64.0% of symptomatic patients who received conservative management achieved complete remodeling within 2 years of the onset of spontaneous isolated SMA dissection. A patent FL and aneurysmal formation on the initial CT scan were the only significant negative factors of complete remodeling, as determined by univariate analysis. Because spontaneous isolated SMA dissection has a good prognosis, both clinically and morphologically, conservative management should be considered first.

Disclosures

The authors declare no conflicts of interest.

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