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## Two Cases of Spontaneous Isolated Dissection of Superior Mesenteric Artery in One Night: Report of a (Noninvasive) Double Challenge

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Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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**Conflict of interest:** None declared

### Case series

**Patients:** Male, 54-year-old • Male, 45-year-old

**Final Diagnosis:** Spontaneous isolated dissection of superior mesenteric artery

**Symptoms:** Abdominal pain • fever

**Medication:** —

**Clinical Procedure:** —

**Specialty:** Radiology

**Objective:** Management of emergency care

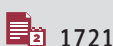
**Background:** Spontaneous isolated dissection of the superior mesenteric artery (SID-SMA) is a rare but potentially fatal condition. Although many cases of SID-SMA have been reported in the literature in recent years because of the increased use of contrast-enhanced computed tomography (CT) scanning, optimal management has not yet been firmly established.

**Case Reports:** We report 2 cases of SID-SMA that were managed with stenting and angioplasty via transfemoral access. In case 1 a 54-year-old man presented with diffuse abdominal pain without Blumberg sign. Laboratory data were unremarkable. Abdominal CT scanning revealed SID-SMA and initial bowel ischemia. The angiogram revealed a dissected true lumen of SMA with a narrowing of the ileo-colic artery managed, respectively, with self-expandable stent placement and angioplasty. In case 2, a 45-year-old man presented with severe abdominal cramping and pain of 3 days' duration. Physical examination revealed abdominal tenderness with positive Blumberg sign. Laboratory tests showed leukocytosis and increased lactate dehydrogenase. Abdominal CT scan revealed SID-SMA and initial bowel ischemia. After an SMA angiogram, 2 self-expandable stents were placed and an angioplasty was performed. Although a postprocedural angiogram showed good patency of the SMA in both patients, the first patient had a recurrence of abdominal pain after 5 days with a new narrowing tract of the SMA and more inferiorly a dissection with aneurysm of a false lumen, detected on CT scan, treated respectively with stenting and coils. CT follow-up showed successful morphological results in both patients.

**Conclusions:** In our experience, endovascular treatment of SID-SMA is safe and effective, including in cases of recurrence and postprocedural evolution.

**Keywords:** Case Reports • Dissection • Endovascular Procedures • Mesenteric Artery, Superior

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## Background

Spontaneous isolated dissection of the superior mesenteric artery (SID-SMA) is a rare condition complicated by difficulty in diagnosis. We describe 2 patients who presented with SID-SMA on the same night in 2 different Emergency Departments and who underwent endovascular treatment (ET) in our Interventional Radiology Unit. Therapeutic options of SID-SMA include surgical treatment, medical treatment, and ET, although no consensus has been reached regarding the best treatment modality [1]. Two patients affected by SID-SMA in one night represent not only 2 cases, but also an opportunity to review the literature.

## Case Reports

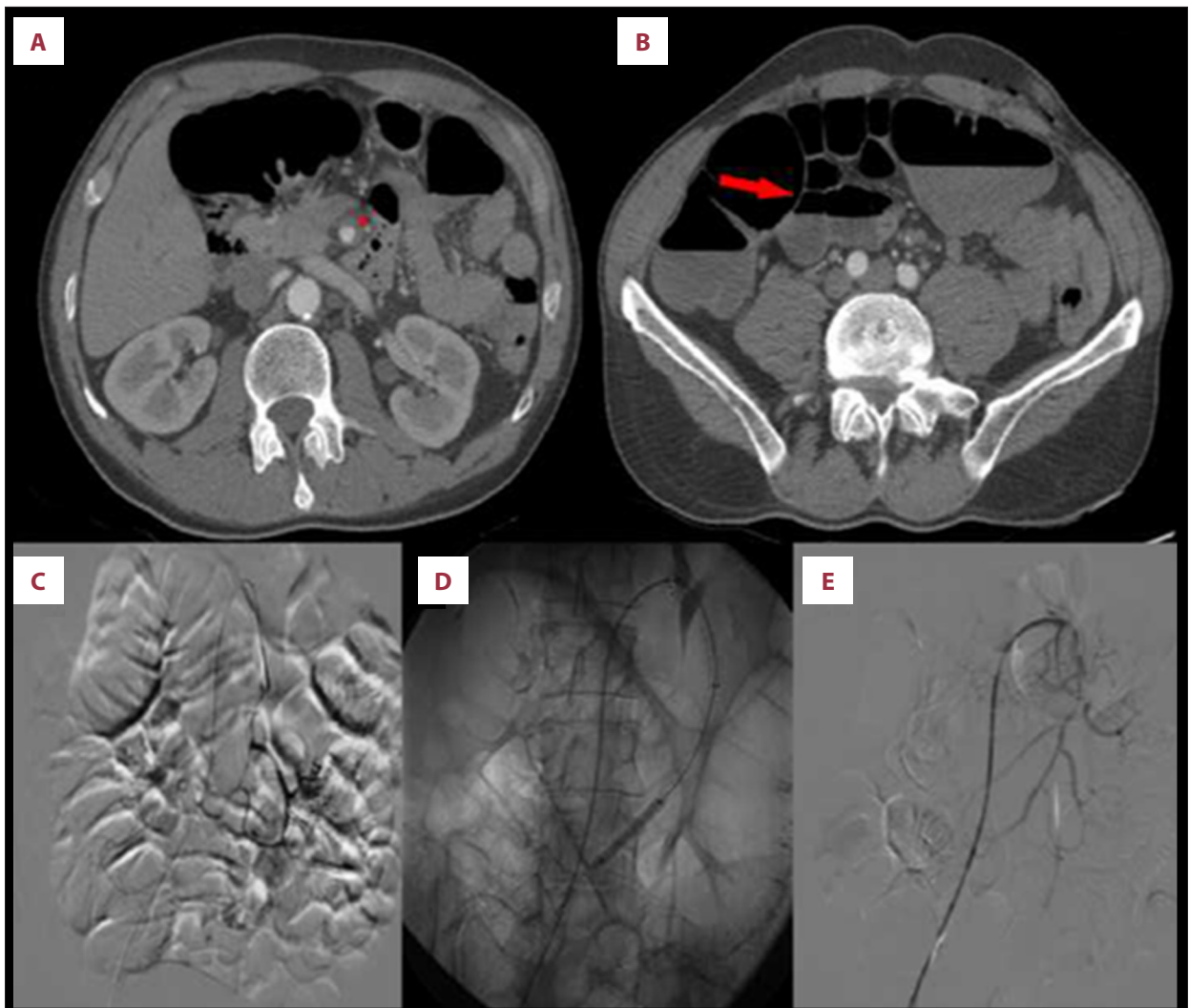
### Case 1

A 54-year-old White man, with a medical history of hypertension treated with oral medications, was admitted to the Emergency Department with a 2-day history of diffuse abdominal pain. The patient denied any fever, nausea, or vomiting and reported being a regular smoker. Physical examination revealed mild diffuse abdominal pain with deep palpation without obvious muscle guarding or rebound tenderness, temperature of 36°C, respiratory rate of 20 breaths/min, blood pressure of 150/90 mmHg, and a regular pulse rate of 75 beats/min. Laboratory tests showed leukocytosis (white blood cell [WBC] count,  $16\,000 \times 10^3/\mu\text{L}$ ) and increased lactate dehydrogenase (LDH, 825 UI/L). Abdominal computed tomography (CT) scan with intravenous bolus contrast injection demonstrated SID-SMA (Figure 1A) associated with “paper-thin wall” intestinal sign (Figure 1B), dilatation of bowel lumen, and mesenteric fat stranding, without pneumatosis. The patient was quickly transferred to our Interventional Radiology Unit, where an SMA angiogram confirmed SID-SMA with a narrowing of the ileo-colic artery (Figure 1C). We started the procedure with the right common femoral access. The SMA was superselected with a 5-Fr catheter (Merit Medical) through an 8-Fr introducer sheath (Epsylar, Optimed). A 0.9-mm guide wire (Terumo, Tokyo, Japan) and 0.8-mm super stiff guide wire (Amplatz Super Stiff) were negotiated to pass through the dissected true lumen. A 10×40-mm self-expandable stent (BARD E – LUMINEXX) was deployed across the dissection (just covering the proximal intimal tear); the ileo-colic artery angioplasty was subsequently performed (ULTRAVERSE 6.0×40-mm BARD) (Figure 1D). A postprocedural angiogram showed good patency of the SMA and ileo-colic artery (Figure 1E). The patient had a rapid resolution of abdominal pain and was treated with intravenous fluids, antibiotics (cefazolin 2 g daily) and anticoagulant/antiplatelet therapy (sodium enoxaparin 8000 UI and clopidogrel 75 mg daily). Although subsequent blood exams were normal, the patient had a recurrence of abdominal pain after 5

days and abdominal CT scan revealed a narrowing tract of the SMA distal to the previous employed stent and a dissection with aneurysm of false lumen more inferiorly (Figure 2A, 2B). We then used 2 stents (10×60 mm and 10×40 mm, BARDE – LUMINEXX) and 3 coils (MWCER 35-7-10 COOK) in the aneurysmatic false lumen (stent-assisted embolization) (Figure 2C). The patient was discharged 10 days after admission on antiplatelet therapy (clopidogrel 75 mg daily). Abdominal CT scan follow-up after 2 months showed successful restoration of the SMA lumen with good patency of the ileo-colic artery (Figure 2D).

### Case 2

A 45-year-old White man was admitted to the Emergency Department with a 3-day history of severe abdominal cramping and pain. He had no medical history and reported being a regular smoker. Physical examination revealed a temperature of 37°C, respiratory rate of 18 breaths/min, blood pressure of 135/90 mmHg, and a regular pulse rate of 66 beats/min. Abdominal deep palpation demonstrated tenderness in the mesogastrium and in lower quadrants with positive Blumberg sign and the presence of abdominal distension with an inability to pass stool or gas. Laboratory tests showed neutrophilic leukocytosis (WBC  $14\,300 \times 10^3/\mu\text{L}$ ) and increased LDH (700 UI/L). Radiography of the abdomen demonstrated poor representation of intestinal meteorism and ultrasound was not diagnostic. Abdominal CT scan with intravenous bolus contrast injection showed a contrast filling defect in the proximal SMA (3 cm from the origin) that extended to a jejunal branch, an intimal flap and thrombosis of the false lumen with true lumen compression, and initial sign of bowel ischemia in absence of pneumatosis. The patient was quickly transferred to our Interventional Radiology Unit where an SMA angiogram revealed a compressed true lumen and an intimal flap with a dissection and segmental narrowing distal to it (true lumen compressed) (Figure 3A, 3B). We started the procedure with right common femoral access. The SMA was superselected with a 5-Fr Cobra catheter through a 7-Fr guiding sheath. A 0.9-mm J-tip guide wire (Terumo) was negotiated to pass the dissection. We deployed 2 overlapping self-expandable stents (10×40 mm BARD E – LUMINEXX) placed across the dissection (just covering the proximal intimal tear) and angioplasty. A postprocedural angiogram showed good patency of the SMA with no narrowing (Figure 3E). The patient had a rapid resolution of abdominal pain during hospital course, with resumption of gastrointestinal function on the second day; he was treated with intravenous fluids, antibiotics (cefazolin 2 g daily), and double antiplatelet therapy (aspirin 100 mg and clopidogrel 75 mg daily). Postoperative blood tests were normal, and the patient was discharged home in good health 6 days after ET on antiplatelet therapy (clopidogrel 75 mg daily). Two months later, CT scan follow-up showed successful restoration of the true lumen with good distal flow (Figure 3C, 3D).

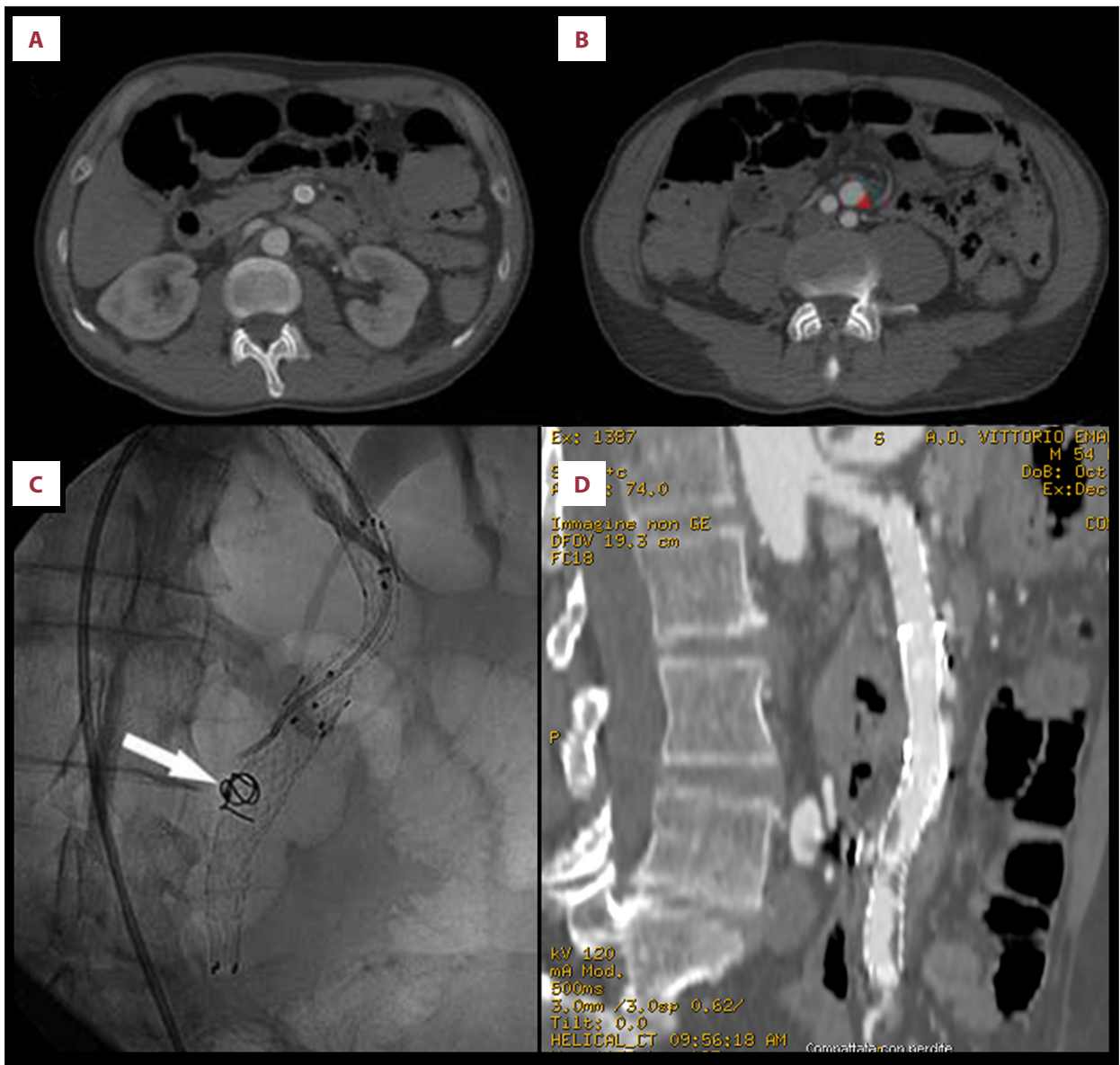


**Figure 1.** Case 1 involved a 54-year-old White man with a medical history of hypertension and a 2-day history of diffuse abdominal pain. An abdominal computed tomography (CT) scan showed SID-SMA (red signal) associated with “paper-thin wall” intestinal sign (arrow), dilatation of bowel lumen, and mesenteric fat stranding (A, B). Preprocedural selective angiography showed narrowed lumen of SMA and ileo-colic artery (arrow) with reduced distal perfusion (C). Fluoroscopy shows the deployed stent in SMA and balloon inflation during ileo-colic angioplasty (D). Postprocedural angiogram demonstrates the stent placement in SMA with better patency of the ileo-colic artery (E). SID – spontaneous isolated dissection; SMA – superior mesenteric artery.

## Discussion

SID-SMA is an extremely rare condition, with a reported incidence of 0.06% in a series of 6666 autopsy cases [2]. It occurs after a tear in the intima or primary hemorrhage in the media (due to rupture of the vasa vasorum) with subsequent accumulation of blood between the medial and the adventitial layers, and it can extend over a variable distance [3]. After the carotid artery, the SMA is the second most common peripheral artery to be affected by dissection [4]. Since it was first reported by Bauersfeld [5] in 1947, there have been approximately 90 cases of SID-SMA in the literature, and 60 cases

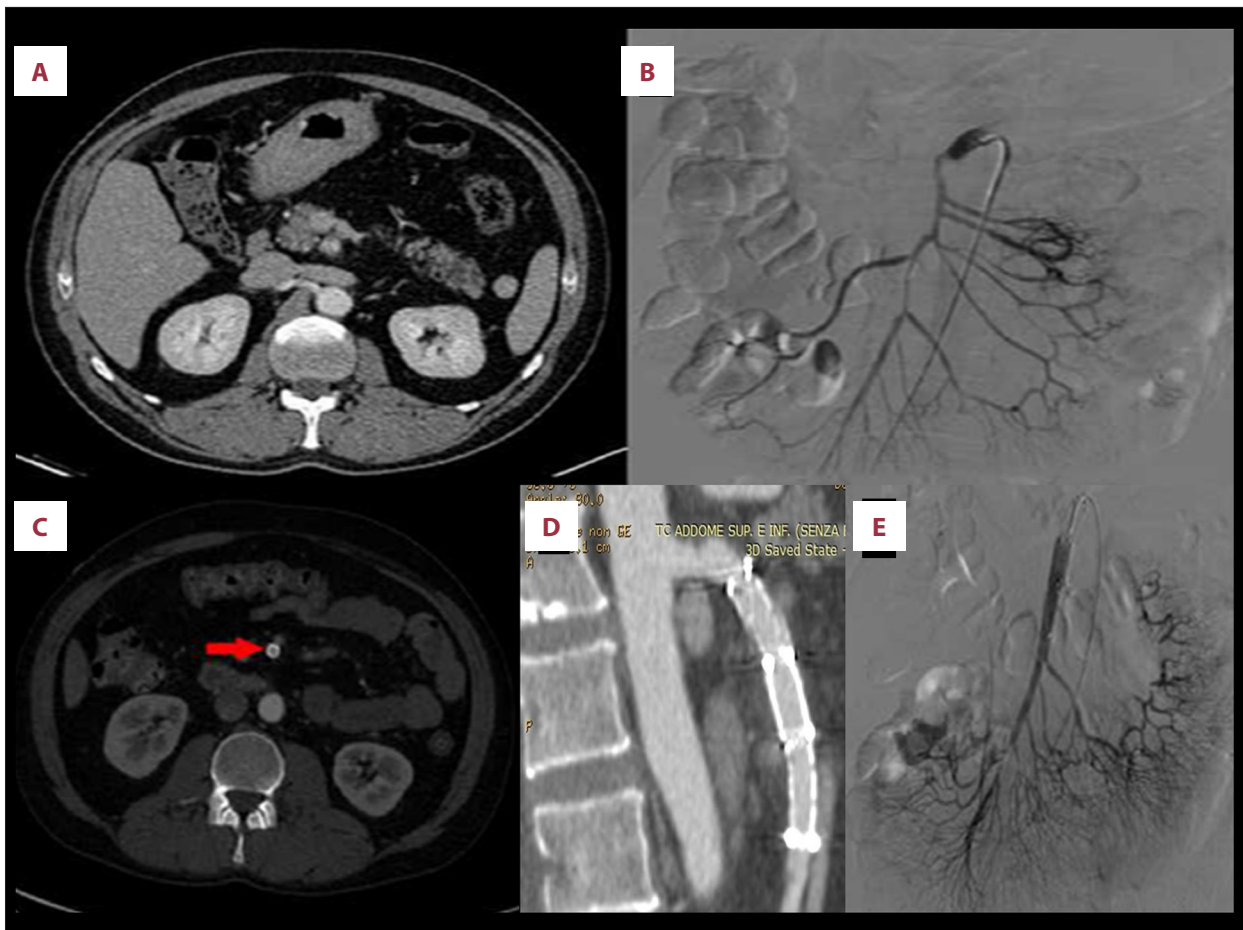
were treated with ET from 2000 to 2011 [6]. Diagnosis is difficult due to nonspecific symptoms and signs. In recent years, the widespread use of high-quality contrast-enhanced CT scans has revealed an increased incidence of SID-SMA. The majority of cases reported were found in men 39-82 years old, with a mean age of 54 years [7]. The cause of SID-SMA is not fully understood, and several risk factors have been postulated, such as pathologies of the arterial wall (fibromuscular dysplasia, cystic medial necrosis, adventitial inflammation), congenital connective tissue disorders, genetic predisposition (heterogeneity of chromosome locus 5q13-14), trauma, abnormal hemodynamic forces caused by convex curvature and the running



**Figure 2.** Case 1 involved a 54-year-old White man with a medical history of hypertension and a 2-day history of diffuse abdominal pain. An abdominal computed tomography (CT) scan revealed the presence of the previously employed stent for SID-SMA (A) and the recurrence of a dissection inferiorly with the aneurysm of false lumen (red signal) (B). Fluoroscopy showed additional stenting of the distal SMA with coils deployed in the aneurysm of the false lumen (white arrow) (C). A follow-up abdominal CT scan showed good patency of the stent lumen (D). SID – spontaneous isolated dissection; SMA – superior mesenteric artery.

of the SMA from a fixed to a relatively mobile area, hypertension, and cigarette smoking [8]. Pathogenesis is based on shear-stress injury. The entry of the dissection is mostly located on the anterior wall (98.1%) [9] and around the greater curve of the SMA curvature (ie, 1.5-3.0 cm from its origin) [10]. Diagnosis is a challenge because clinical presentation ranges from asymptomatic to acute peritonitis and it is correlated with stenosis of the true lumen and dissection length of the SMA. Abdominal pain is the most common symptom, and other

atypical accompanying symptoms are nausea, vomiting, ileus, bloody stool, diarrhea, and emaciation [11]. Laboratory tests and abdominal radiography are usually unremarkable, but ultrasound imaging is helpful in identifying the intimal flap and the entry or reentry points; CT angiogram and arteriography are the diagnostic modalities of choice. Optimal management has not been firmly established, and treatment approaches include conservative management (anticoagulation and blood pressure control), percutaneous endovascular interventions (stent



**Figure 3.** Case 2 involved a 45-year-old White man with a 3-day history of severe abdominal cramping and pain. Abdominal computed tomography (CT) scan and preprocedural angiogram confirmed SID-SMA with hypoperfusion of the bowel loops and cecum (A, B). Follow-up abdominal CT scan showed good patency of the stent lumen (C, arrow; D). Postprocedural angiogram showed good patency of the SMA and ileo-colic artery with improved distal vascularization (E). SID – spontaneous isolated dissection; SMA – superior mesenteric artery.

placement, intralesional thrombolytic therapy, or embolotherapy), and surgical interventions (artery ligation, endoaneurysmorrhaphy, aortomesenteric bypass, or laparotomic resection) [3]. The aim is to limit the extension of the dissection, to prevent the rupture of the false lumen, and to maintain the distal blood perfusion [12]. The choice depends on clinical aspects, CT findings, and professional resources, such as whether an interventional radiologist is available. In asymptomatic patients with incidental findings or in symptomatic patients with no evidence of bowel infarction, bleeding, or aneurysmal changes, with good flow on the angiogram, conservative treatment may be the first choice. ET should be performed in the case of dissection progression, increasing size of the aneurysmal dilatation of the SMA, luminal thrombosis, or persistent symptoms despite anticoagulation. Emergency surgery is reserved for symptomatic patients in whom low blood flow with bowel necrosis or artery rupture is suspected [3]. The indication for ET is disputed. Min et al [13] suggested severe compression of

the true lumen (>80%) and aneurysmal dilatation >20 mm in diameter. Stent placement via the conventionally used femoral artery approach or via the radial artery approach [14] provides immediate symptom relief by obliterating the false lumen and increasing blood flow into the small intestine and quickly prevents further progression of the SMA dissection. Because the dissection is consistently located around the curvature of the SMA, the stent must completely cover the curvature of the SMA and needs good flexibility and minimal shortening and it must not change location due to the continuous movements of the mesentery. A self-expanding stent is recommended because of its good radial strength, flexibility, conformability, and sufficient length [15]. Stenting technique has been the most commonly used approach in recent years, with a success rate of 86% [16]. However, little is known about the risk of restenosis or obstruction of the stented segment, and studies with longer follow-up periods are needed [17]. The efficiency of stent placement is similar to surgical recanalization

of the SMA, and both treatments are better than conservative management with anticoagulation [11]. In case of a dissecting SMA aneurysm, coiling of the aneurysmatic false lumen (to exclude the aneurysm from the blood flow) and stenting of the true lumen, as in case 1, represent a safe and effective alternative treatment to surgery [18]. Our experience (illustrated by case 1) demonstrates that postprocedural restenosis and aneurysmatic dilatation are possible postprocedural evolutions, but even in this event, an ET is effective. Close follow-up and a tailored treatment are the keys for a successful management.

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## Conclusions

To date, no recommended guidelines exist for the treatment of SID-SMA and follow-up of asymptomatic patients, nor has the best therapeutic strategy been established in symptomatic patients. Based on previous cases reports and our experience reported here, SID-SMA can be successfully treated with ET. Stent placement represents the definitive treatment for symptomatic patients (without arterial rupture or intestinal necrosis) because it is rapid, safe, and effective, including in the event of postprocedural evolutions.