Stent Placement for Spontaneous Isolated Superior Mesenteric Artery Dissection via Radial Approach with Intravascular Ultrasound Assistance

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Spontaneous isolated superior mesenteric artery (SMA) dissection was a sporadically reported vascular event, but an increasing number of case reports have been published in recent years. The optimal therapy opinions are widely divided. Despite there still being no consensus on the best treatment, an increasing number of patients in recent years have been reported to be treated successfully by non-surgical rather than surgical approaches. Here, we present a 47-year-old man with SMA dissection, who received percutaneous stent placement. According to our experience, successful stent placement would be achieved more easily by radial approach and intravascular ultrasound (IVUS) assistance.

Key Words: Dissection • Intravascular ultrasound • Radial approach • Superior mesenteric artery

INTRODUCTION

Spontaneous isolated superior mesenteric artery (SMA) dissection is a rare cause of acute mesenteric ischemia but might be fatal. This condition was first described in the literature in 1947. There are three treatment approaches: conservative (with or without anticoagulation), surgery and endovascular repair. Optimal treatment remains controversial at present. To prevent bowel necrosis, a right time to perform intervention and a proper process to accomplish the procedure are what we intend to look for. This article reports one case of spontaneous isolated SMA dissection. In order to relieve persistent abdominal symptoms, percutaneous endovascular treatment was performed via radial approach with intra-vascular ultrasound (IVUS) assistance.

CASE REPORT

A 47-year-old man presented to our emergency department because of abdominal fullness for one day. He had been in good health except for history of left renal stone. He denied hypertension, diabetes mellitus, hyperlipidemia or any recent abdominal trauma. On arrival, the initial physical examination showed epigastric tenderness. Due to prolonged pain, abdominal CT was done and revealed superior mesenteric artery dissection (Figure 1A). After prescription of pain killer, tenderness was temporarily relieved. In the following 3 days, his symptoms recurred persistently. We therefore performed percutaneous endovascular stenting for SMA dissection via left high radial artery approach. The angiogram disclosed an aneurysm formation nearby the SMA ostium, and IVUS revealed an intimal flap corresponding to a
narrow segment on the angiogram (Figures 1B&C). A Wallstent (10 mm in diameter and 31 mm in length) was deployed to cover the dissected portion through a 7Fr Kimney guiding catheter (100 cm). In order to cover the aneurismal segment between the SMA orifice and the dissected segment, an Express SD stent (balloon expandable stent, 7 mm in diameter and 19 mm in length) was deployed to cover the SMA orifice and overlap with the abovementioned Wallstent. During procedure, the stent balloon was used to dilate the in-stent portion of Wallstent (Figure 2A). Final angiogram and Volcano IVUS confirmed a good result of the stent landing and expansion. (Figures 2B&C). The patient was discharged 3 days after the procedure, maintained on aspirin and
elopidogrel simultaneously for 3 months and then aspirin alone thereafter. He remained asymptomatic during 5 months’ follow-up.

DISCUSSION

Isolated spontaneous SMA dissection is a sparse vascular event. It’s a rare condition with poor prognosis if early diagnosis and proper management are not given. This rare vascular event has a characteristic of difficult diagnosis and is likely to be neglected. Most of the published cases presented with abdominal pain or other gastrointestinal symptoms, such as nausea, vomiting or abdominal fullness. Therefore, most SMA dissections were diagnosed accidentally by contrast-enhanced abdominal CT scan. According to literature review, the postmortem incidence in a series of 6666 autopsies was 0.06%. The superior mesenteric artery is the second most frequent peripheral artery after the internal carotid artery to be affected by spontaneous dissection. Bauersfeld et al. reported the first case in 1947, and recently, an increasing number of case reports has been published due to the tendency to use abdominal CT scan for patients presenting with acute abdomen of unknown etiology.

In contrast to the well-known correlation between hypertension and aortic dissection, the etiology of spontaneous isolated SMA dissection remains a riddle. Recently published cases were predominantly male, over forty years of age. Even though there is no sufficient evidence to suggest smoking and hypertension as the main causes of SMA dissection, they are reported as predisposing factors for developing this serious condition; however, the majority of recorded cases were generally healthy. According to the report of Sparks et al., the typical dissection entry point is usually located at 1–6 cm distal to the orifice of SMA (mean 2.6 cm). This segment is a transition zone of the SMA from a fixed segment under the pancreas to the mobile segment at the mesenteric root. Yun et al. suggested that because the transition point could be the focus of intimal tear under abnormal sheering stress, the convex-curved run of the SMA might provide a mechanical factor that initiates SMA dissection.

Optimal treatment for isolated SMA dissection is still controversial. Currently, the surgical option is the mainstay modality, particularly in patients presenting with a sign of bowel necrosis or impending rupture. Several surgical approaches were reported, such as bowel resection, direct arterial repair, venous or prosthetic grafts, etc. Unfortunately, surgery has generally been accompanied with a variety of complications. Spontaneous SMA dissection was viewed as self-limited disease in the absence of persistent abdominal pain. Although conservative treatment keeps patient away from hazard of invasive treatment, there is still a dispute about the administration of anticoagulation therapy. Yun et al. suggested that anticoagulation could prevent false lumen thrombosis, but also promote further dissection propagation. In our opinion, anticoagulation therapy should not be given to those patients with SMA dissection who are being treated conservatively.

The major cause of death in SMA dissection is bowel necrosis. The most important aim of treatment for SMA dissection is symptom relief and prevention of bowel necrosis. These can be achieved by early percutaneous endovascular treatment when surgical indication is not matched yet but there is high index of suspicion of disease progression. According to report of Yun et al., dissection length is positively associated with more severe clinical symptoms. Theoretically, longer dissection length contributes to higher incidence of bowel ischemia and subsequent necrosis. We postulate that if there are persistent abdominal symptoms, stent placement for SMA dissection without branch involvement is a practical approach in order to stop disease progression and deterioration of patients clinical condition.

To our knowledge, this case is the first and only patient who received SMA stent placement via radial approach. Here we address three advantages of radial artery approach: 1. On account of superior take-off of the SMA orifice, it is easier to engage the orifice from above than below. 2. Engagement from above provides easier stent deployment because it supplies a more stable guiding system by taking shape with a smaller angle over the orifice for stent to pass. 3. Major bleeding rate is reduced and allows earlier ambulation, in contrast to femoral artery approach. Nevertheless, radial artery approach has inevitable disadvantages: 1. A lengthened guiding catheter is demanded due to the longer distance between the SMA orifice and radial artery. 2. For a minority of patients, tortuous, stenotic or spastic vessels
make radial approach impossible. 3. Radial artery size should be large enough to accommodate a 7F guiding catheter. However, with advancement of material technology, lengthened guiding catheter with smaller profile is now available. Given the experience regarding with renal artery stenting in our center,10 the guiding catheter (100 cm) is too short to reach renal artery orifice via traditional radial approach, particularly if right-sided, with higher incidence of subclavian and/or innominate artery tortuosity in the elderly, or in patients with body height over 170 cm. So we prefer the high left radial approach (10–15 cm above the styloid process), otherwise a special order of guiding catheter over 110 cm is recommended. As long as the orifices of the renal artery and SMA are closely related anatomically, we presume that left high radial approach is applicable in SMA stenting. Considering on the procedure difficulty and post procedure wound care, left high radial artery approach deserves to be the first option due to its multiple merits, and IVUS assistance provides flawless deployment of stent and promotes long-term stent patency.

In conclusion, we have provided this case to illustrate that even though optimal treatment strategy for this rare condition is uncertain, based on our experience and literature review, conservative therapy without anti-coagulation can be efficient in an asymptomatic patient. If there is persistent dissection-related symptom or sign, percutaneous endovascular stent placement should be done early for bowel salvage. High left radial artery approach deserves to be the first option due to its multiple merits, and IVUS assistance provides flawless deployment of stent and promotes long-term stent patency.

REFERENCES