Morphologic findings and management strategy of spontaneous isolated dissection of the celiac artery

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Objective: **We report the morphologic findings and treatment of spontaneous isolated dissection of the celiac artery (SIDCA).**

Methods: **Twenty-three patients with SIDCA presenting between January 2009 and December 2014 were enrolled in this retrospective study. The demographic data, clinical features, morphologic findings, treatment modalities, and follow-up results of these patients were reviewed. We proposed a morphologic classification for SIDCA similar to that of spontaneous isolated dissection of the superior mesenteric artery.**

Results: **Initially, 11 patients were treated endovascularly, and 12 were treated medically. Four patients treated medically had an aggravation of the dissection and needed endovascular salvage. All patients recovered successfully. None of the patients developed abdominal pain, required reintervention, or died. In the medically treated group, the false lumen was completely thrombosed and absorbed in 4 patients, partially thrombosed in 2, and patent in 2. All stents were patent with the false lumen completely thrombosed and absorbed in the endovascular group.**

Conclusions: **SIDCA can be treated medically in stable patients but requires intensive follow-up. Endovascular therapy can be applied in high-risk patients with recurrent symptoms, visceral malperfusion, or aneurysm. Open surgery should be considered if endovascular repair is not suitable or has failed. The short-term results of endovascular management are encouraging but further evaluation with long-term follow-up is necessary. (J Vasc Surg 2016;64:389-94.)**

Spontaneous isolated dissection of the celiac artery (SIDCA), without associated aortic dissection, is clinically rare but is increasingly reported with advances in computed tomography (CT).[1-3] However, its etiology, natural history, and prognosis are unclear. Only a small number of case series (around 100 cases) have been reported on the subject, and many of these include both SIDCA and spontaneous isolated dissection of the superior mesenteric artery (SIDSMA), which makes it difficult to analyze the literature.[1,3-5]

There is no consensus on the optimal management of SIDCA. Treatment options include observation, anticoagulants and antiplatelets, open surgery, and endovascular intervention. Observation or conservative therapy with anticoagulants and antiplatelets has acceptable results but still carries the risk of dissection aggravation resulting in malperfusion, aneurysmal dilation, or rupture.[1,2,6-8] Open surgery involves complex vascular reconstruction and carries high morbidity and mortality.[9,10] With the development of the minimally invasive vascular interventions, endovascular repair may also be used for SIDCA.[3,11-14] However, only a limited number of patients have received endovascular stents or stent grafts (no more than 10 patients), and the prognosis of endovascular therapy has not been fully analyzed.

We report the morphologic findings, management experience, and follow-up results of 23 patients with SIDCA to explore the treatment strategy and evaluate the role of endovascular repair.

METHODS

Study population. Twenty-three patients, diagnosed with SIDCA in our department between January 2009 and December 2014, were included in this study. Fifteen received endovascular repair, and the remaining eight were treated conservatively (Fig 1). The protocol of the retrospective study was approved by the Institutional Review Board from the Ethics Committee of Zhejiang University. Informed consent was obtained from all patients. SIDCA was defined as dissection of the celiac artery with or without the involvement of its branches. The diagnosis of SIDCA was made on spiral CT angiography (CTA) findings, such as intimal flap in the celiac trunk, and/or thrombosis of the false lumen. Patients with concomitant aortic dissection or recent abdominal trauma were excluded from the study.

Patient evaluation. We retrospectively reviewed the data on the demographics, risk factors, symptoms, clinical features, CT images, treatment modalities, and follow-up results of 23 patients. Morphologic characteristics such as

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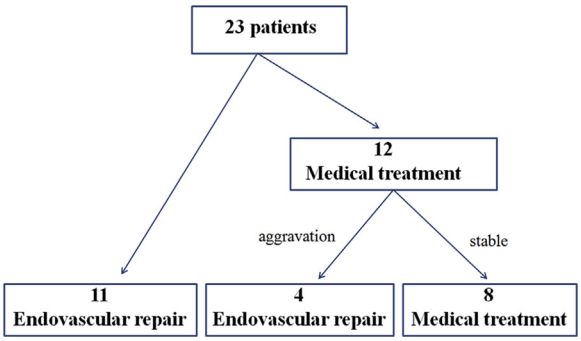

Fig 1. Flowchart of patients included in the study.

the extent of dissection, aneurysmal dilatation, status of the false lumen, and patency of celiac artery and its branches before and after the procedure were analyzed from the CTA pictures. Thrombosis of the false lumen after endovascular therapy was classified as complete, partial, or no thrombosis.

We proposed a morphologic classification of SIDCA based on the CTA similar to the classification of SIDSMA[15]: type I, patent false lumen with both entry and re-entry; type II, "cul-de sac" shaped false lumen without re-entry (IIa, patent true lumen; IIb, severe stenosis or occlusion of true lumen); type III, thrombosed false lumen with an ulcer-like projection (IIIa, patent true lumen; IIIb, severe stenosis or occlusion of true lumen); type IV, completely thrombosed false lumen without an ulcer-like projection (IVa, patent true lumen; IVb, severe stenosis or occlusion of true lumen); and type V, aneurysm development in association with dissection (Fig 2).

Treatment options. The treatment of patients was decided on the symptoms and the morphology of the dissection, such as the peri-arterial effusions, patency of true lumen, and aneurysmal dilation of false lumen. All patients received medical therapy initially. Endovascular therapy was indicated if any of the following appeared during treatment: intractable abdominal pain despite medical therapy, rupture or impending rupture, celiac or hepatic malperfusion, or aneurysm development. Endovascular treatment involved the implantation of bare or covered stents in the true lumen of the celiac artery. Additional embolization of the false lumen aneurysm or branches was performed if indicated. Technical success was defined as successful implantation of the stent or stent graft with coverage of the primary entry tear and reperfusion of the true lumen.

Follow-up. Patients were evaluated after the treatment at 6 months, 12 months, and yearly thereafter. The patients received a thorough clinical evaluation and CT scan at every follow-up visit.

RESULTS

Patient characteristics. Nineteen men (83%) and four women (17%) were included in the study. The median age at the time of diagnosis was 50 years (range, 30-82 years). Nineteen patients (83%) presented with abdominal pain, flank pain, or epigastric discomfort, whereas the remaining four (17%) were diagnosed incidentally. Eleven patients (48%) had hypertension and eleven (48%) were smokers. None of the patients had a history of celiac compression syndrome, polyarteritis nodosa, fibromuscular dysplasia, connective tissue disorder, or other congenital disorders of the vascular wall. The demographic data of patients are presented in Table I.

Morphologic characteristics. The morphologic characteristics of SIDCA are listed in Table II.

Treatment and endovascular repair. Initially, 11 patients received endovascular repair and 12 received medical treatment (Fig 1). The indications for endovascular therapy in these 11 patients included aneurysmal dilation (5), celiac or hepatic malperfusion (4), and recurrent abdominal pain with true lumen stenosis despite medical treatment for about 1 week (2). During follow-up of the patients treated medically, two developed aneurysms of the celiac trunk, one had abrupt abdominal pain with an arterial rupture, and one had occlusion of the hepatic artery. All these were then treated with endovascular repair.

Fifteen patients had endovascular stenting (14) and coil embolization (one) without any complications. Fourteen patients were punctured through the femoral artery, and one was punctured through the brachial artery. Five patients received bare stents (Xpert; Abbott Vascular, Abbott Park, Ill; S.M.A.R.T.; Cordis, Miami Lakes, Fla) and nine received covered stents (Viabahn; W. L. Gore and Associates, Newark, Del). The technical success rate was 100%. The splenic artery was covered or embolized in 10 patients. The hepatic artery was occluded before endovascular therapy and was covered with stent graft in one patient. One patient received only celiac embolization because of rupture of the aneurysm. All patients receiving stents were treated with antiplatelets for at least 6 months after the procedure.

Follow-up. The mean follow-up duration was 21 months, with a range of 6 to 70 months. None of the patients had abdominal pain or epigastric discomfort until the final follow-up. No patient developed liver dysfunction or symptomatic splenic infarction. There were no reinterventions or deaths. All patients in the medical group had a patent celiac trunk and branches except for splenic artery occlusion in one patient. Of the patients treated medically, the false lumen was completely thrombosed and absorbed in four patients (Fig 3), partially thrombosed in two patients, and patent in two patients. In the endovascular group, 14 patients had a patent celiac trunk (except one patient receiving celiac embolization), 13 had patent hepatic artery, and seven had a patent splenic artery. All stents were patent with the false lumen completely thrombosed and absorbed after endovascular repair (Fig 4). The treatment and follow-up results of these patients are described in Table III.

DISCUSSION

SIDCA is a rare vascular disease that is increasingly being detected because of advances in imaging technology.[1-3] Compared with aortic dissection, the underlying