Systematic review and meta-analysis of current evidence in spontaneous isolated celiac and superior mesenteric artery dissection

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ABSTRACT

Objective: Spontaneous isolated celiac artery dissection (SICAD) and spontaneous isolated superior mesenteric artery dissection (SISMAD) represent the major types of spontaneous visceral artery dissection. However, no quantitative meta-analysis of SICAD and SISMAD is available. The aim of our study was to pool current evidence concerning basic profiles, treatment strategies, long-term adverse events, and morphologic changes of lesioned vessels in SICAD and SISMAD patients.

Methods: We searched the MEDLINE, Embase, Scopus, and Cochrane Databases (January 1, 1946-September 21, 2017) for studies of SICAD and SISMAD. Related cohort studies or case series with sample size larger than 10 were included. Two reviewers independently extracted and summarized the data. A random-effects model was used to calculate pooled estimates.

Results: In total, 43 studies were included. An estimated 8% (95% confidence interval [CI], 0.01-0.21) symptomatic SICAD and 12% (95% CI, 0.06-0.19) symptomatic SISMAD patients with initial conservative management required secondary intervention during follow-up, whereas none of the asymptomatic patients treated conservatively required secondary intervention. As for morphologic changes during follow-up, a higher proportion of SICAD patients (64%; 95% CI, 0.47-0.80) achieved complete remodeling compared with SISMAD patients (25%; 95% CI, 0.19-0.32), and an estimated 6% (95% CI, 0.00-0.16) of SICAD and 12% (95% CI, 0.05-0.20) of SISMAD patients had morphologic progression. Overall, the pooled estimate of long-term all-cause mortality was 0% (95% CI, 0.00-0.03) in SICAD and 1% (95% CI, 0.00-0.02) in SISMAD. When stratified by symptoms, symptomatic patients were associated with a significantly increased probability of accomplishing complete remodeling (odds ratio, 3.95; 95% CI, 1.31-11.85) compared with asymptomatic patients.

Conclusions: Initial conservative treatment is safe for asymptomatic SICAD or SISMAD patients. Symptomatic patients managed conservatively have relatively high occurrence of late secondary intervention, which may require closer surveillance, especially in SISMAD because of a lower rate of remodeling. (J Vasc Surg 2018;■:1-13.)

Keywords: Spontaneous isolated celiac artery dissection; Spontaneous isolated superior mesenteric artery dissection; Long-term adverse effects; Remodeling

Spontaneous isolated celiac artery dissection (SICAD) and spontaneous isolated superior mesenteric artery dissection (SISMAD) represent the dominant types of visceral artery dissection.[1] Although the incidence was reported to be approximately 0.08%,[2] widespread application of computed tomography angiography (CTA) improved the ability to diagnose SICAD and SISMAD at initial admission, followed by an increasing number of published studies concerning the management and clinical outcomes of SICAD and SISMAD.[3-8] Recent systematic reviews summarized the treatment strategies of SICAD and SISMAD and suggested that conservative management is the most common initial management.[9,10] However, no quantitative evidence is available regarding the main profile, morphologic classification, occurrence of adverse events, and morphologic changes of lesioned vessels in SICAD and SISMAD.

The clinical presentation of SICAD and SISMAD can range from incidental discovery without symptoms to acute abdominal pain with bowel ischemia or peritonitis, which creates difficulties for surgeons or emergency physicians in making standard initial treatment plans. In fact, current treatment strategies vary by surgeon's preference in most circumstances, including outpatient observation, medical therapy, endovascular interventions, and open surgery, and there has been evidence advocating both initial conservative management and invasive intervention.[11-14] Despite lack of consensus, most published studies were likely to select initial treatment

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according to the clinical presentation of SICAD and SISMAD patients on admission. However, the natural course and clinical outcomes of asymptomatic and symptomatic patients still remain unclear, especially in terms of remodeling, morphologic progression, secondary intervention, and long-term survival. Given the infrequency of diagnosis in SICAD and SISMAD, most published studies have been case series, and no related guidelines have been established.

Therefore, we performed a systematic review and meta-analysis of current evidence on SICAD and SISMAD, hoping to provide quantitative pooled data for the natural course and treatment standardization of the disease. The primary aim of our study was to determine the adverse events and morphologic changes of lesioned vessels in SICAD and SISMAD patients in relation to their clinical presentation. Furthermore, we sought to identify the baseline profile and prevalence of each angiographic classification in SICAD and SISMAD patients on admission.

METHODS

We performed this systematic review and meta-analysis according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.[15] We also reported the included observational clinical studies according to the Meta-analysis Of Observational Studies in Epidemiology standard[16] (Supplementary Table I, online only).

Literature source and search strategy. Our target electronic databases included Ovid MEDLINE, Ovid Embase, Scopus, and Cochrane Database (January 1, 1946-July 18, 2017). In addition, related articles searched manually from the reference list were also adopted. We used the following Medical Subject Headings terms or keywords: ("Mesenteric Artery, Superior" [Mesh] OR "Celiac Artery" [Mesh] OR "visceral artery" [All Fields]) AND ("Aneurysm, Dissecting" [Mesh] or "artery dissection" [All Fields]). The detailed search strategy is shown in the Appendix. The latest literature search was updated on September 21, 2017.

Inclusion and exclusion criteria. Two authors independently selected studies according to previous established inclusion and exclusion criteria, and discrepancy was solved by discussion with a third author. Studies were included if they met the following criteria: clinical studies investigating the natural course, classification, and outcomes of SICAD or SISMAD; patients diagnosed with isolated celiac or superior mesenteric artery dissection; published peer-review articles. Studies were excluded if they were case reports or case series with a sample size of <10 patients.

Data extraction. A standard extraction form was designed at the beginning of our study, and two authors independently collected data from included studies. Any disagreement was handled by discussion with a third reviewer. If the full-text article was not available, we contacted the author to obtain the data. The extracted data involved characteristics of included studies: author, year of publication, study design, involved arteries, ethnicity, age, sex proportion, prevalence of comorbidities and risk factors, manifestation, morphologic classification, initial treatment, indication for interventional treatment, detailed medical treatment, and follow-up period; and clinical outcomes of SICAD and SISMAD in the overall population, symptomatic and asymptomatic patients, and different type of SISMAD on CTA.

Definition. Complete remodeling was defined as no residual stenosis or occlusion at the superior mesenteric artery trunk, no false lumen, or no intramural thrombus on CTA.[12] Incomplete remodeling was defined as improved SISMAD lesion but showing residual stenosis or intramural thrombus on CTA.[12] Morphologic progression was defined as the aggravation of stenosis of the true lumen or aneurysmal degeneration of the false lumen. In general, morphologic remodeling and progression were defined for patients receiving conservative management. For morphologic classification of SICAD and SISMAD on CTA, we adopted the Zerbib classification in our study because it covered all types of SICAD and SISMAD in the included studies.[17]

Quality assessment of included studies. Two reviewers independently assessed the quality of each included study. The Newcastle-Ottawa Scale was adopted for cohort studies and mainly involved three domains: selection of study cohorts, comparability of the cohorts, and outcomes ascertainment.[18] An overall score for cohort studies ranged from 0 to 9 and was categorized as having a high (score <6), moderate (score of 6 or 7), or low (score of 8 or 9) risk of bias. Only cohort studies with low risk of bias were included in the quantitative analysis. For case series, we used an 18-item tool (Supplementary Table II, online only) with the modified Delphi technique.[19] Disagreement during assessment was discussed and resolved by a third reviewer. The results of quality assessment are shown in Supplementary Tables III and IV (online only).

Statistical analysis. We summarized the effects across included studies according to methods outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (version 5.1.0; The Cochrane Collaboration). Values of proportion outcomes were expressed as proportions and 95% confidence intervals (CIs) and then transformed into quantities according to the Freeman-Tukey double arcsine transformation.[20] The pooled effect estimates were calculated as the back-transformation of the weighted mean of the transformed proportions, using DerSimonian-Laird weights of a random-effects model and expressed as percentage proportions.[21] For dichotomous data, we entered totals and numbers of events in symptomatic and asymptomatic groups and calculated