Safety and Efficacy of Stent Retrievers for the Management of Acute Ischemic Stroke*

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In the paper by Marmagkiolis et al. (1) in this issue of JACC: Cardiovascular Interventions, the authors performed a search and meta-analysis to identify randomized, controlled trials (RCTs) in which stent retrievers were used for acute ischemic stroke management using the terms “endovascular therapy and ischemic stroke,” “intra-arterial therapy and ischemic stroke,” and “randomized controlled trials.”

Data elements included the National Institutes of Health Stroke Scale score, use of intravenous tissue plasminogen activator (t-PA), history of diabetes and atrial fibrillation, 90-day modified Rankin Scale (mRS) score, symptomatic intracranial hemorrhage (ICH), and 90-day mortality. The primary endpoints included “functional independence” (defined as a low 90-day mRS score of 0-2), symptomatic ICH, and 90-day mortality. The meta-analysis included 5 RCTs that compared endovascular therapy (ET) and standard therapy (ST) for acute stroke; these were MR CLEAN (Multicenter Randomized Clinical Trial of Endovascular Treatment of Acute Ischemic Stroke in the Netherlands) (2), REVASCAT (Randomized Trial of Revascularization with Solitaire FR Device vs Best Medical Therapy in the Treatment of Acute Stroke Due to Anterior Circulation Large Vessel Occlusion Presenting within Eight Hours of Symptom Onset (3), EXTEND IA (Extending the Time for Thrombolysis in Emergency Neurological Deficits-Intra-arterial) (4), SWIFT PRIME (Solitaire With the Intention For Thrombectomy as PRIMary Endovascular treatment) (5), and ESCAPE (Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on Minimizing Neurological Effects) (6), comprising 500, 196, 70, 315, and 206 patients, respectively. A total of 634 patients were included in the ET (intervention) group and 653 patients in the ST (control) group. The frequency of a low 90-day mRS score (0 to 2) in the intervention group was 42.6% compared with 26.1% in the control group (odds ratio: 2.43, 95% confidence interval: 1.9 to 3.09; p < 0.0001). The frequency of intracranial bleeding was 4.2% in the ET group compared with 4.3% in the ST group (relative risk: 1.08, 95% confidence interval: 0.64 to 1.82; p = 0.78); 90-day mortality was 15.1% in the ET group compared with 18.7% in the ST group (relative risk: 0.81, 95% confidence interval; p = 0.19). This meta-analysis demonstrates the remarkable safety and efficacy of endovascular treatment in improving outcomes. It also confirms the effectiveness of endovascular treatment for acute ischemic stroke due to large-vessel occlusion in an extended time window (12 h).

Time is a crucial and important factor. In MR CLEAN, obtaining vascular imaging studies (e.g., computed tomography angiography and magnetic resonance angiography) would delay the initiation...
of treatment and affect outcome; therefore, this vascular imaging was not obtained, resulting in the enrollment of many patients who lacked large-vessel occlusions. Patients enrolled in MR CLEAN, EXTEND-IA, ESCAPE, and SWIFT PRIME underwent radiographic evaluation for t-PA therapy eligibility and ET in parallel, rather than sequentially, to save time. t-PA was given without delay in the ET group. Median times from symptom onset to groin puncture were 260, 210, 185, 224, and 269 min in the MR CLEAN, EXTEND-IA, ESCAPE, SWIFT PRIME, and REVASCAT trials, respectively. These studies demonstrate that obtaining diagnostic imaging does not delay the initiation of t-PA therapy.

Regarding safety, a major concern is that patients may be at risk of ICH after endovascular recanalization therapy. We may deduce that higher rates of recanalization after ET come at the expense of a higher rate of hemorrhage; however, this was not observed in any of the RCTs. The rates of symptomatic ICH in the endovascular groups ranged from 0% to 7.7% and were not different from those for the IV t-PA-alone group. Mortality was similar in both groups across studies.

In all these studies, patients achieved significantly increased rates of recanalization and functional outcomes, without increasing the risk of symptomatic ICH or death. We previously reported that decreased cerebral blood volume in the basal ganglia may be associated with the risk of hemorrhagic conversion after recanalization and reperfusion (7).

In summary, ET for acute ischemic stroke has changed remarkably over the past decade. Endovascular strategies have evolved from aspiration to retrievable stents. With the recent publication of these 5 RCTs, mechanical thrombectomy, when used in combination with intravenous t-PA, has demonstrated a significant radiographic and clinical benefit over traditional strategies with intravenous t-PA alone. These results have placed ET at the forefront of stroke treatment, redefining the standard of care.

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