REVASCAT Trial
Further Advancement in Endovascular Stroke Therapy

Wade S. Smith, MD, PhD; Bernard Yan, MD

The recent REVASCAT trial (Randomized Trial of Revascularization With Solitaire FR Device Versus Best Medical Therapy in the Treatment of Acute Stroke Due to Anterior Circulation Large Vessel Occlusion Presenting Within 8 Hours of Symptom Onset)\(^1\) is the latest of 5 published Prospective Randomized Open Blind End-Point (PROBE)-designed trials of acute thrombectomy for acute, anterior circulation, large-vessel ischemic stroke serving to cap the era of equipoise for endovascular stroke therapy.\(^2\)\(^4\) The history of endovascular stroke therapy has recently been summarized.\(^6\) Following the null result of the Interventional Management of Stroke (IMS)-III trial published in 2013,\(^7\) the field transitioned to more effective removable stent (stentriever) device design\(^8\)\(^9\) and use of imaging selection (principally computed tomographic angiography with or without perfusion) rather than clinical examination. The recent 5 trials were designed around this evolution (a 6th trial has been stopped for efficacy but not yet published\(^10\)).

In the REVASCAT trial, investigators randomized acute ischemic patients with large-vessel occlusion at 4 centers in Catalonia, Spain. Eligible patients were aged between 18 and 80 years (later increased to 85 years), had computed tomographic angiography–defined occlusions of the carotid T or M1 vessels, had baseline modified Rankin scale score ≤1, and had minimum National Institutes of Health Stroke Scale score ≥5. The only significant exclusion criterion was the time to endovascular treatment >8 hours and the absence of any significant infarction (noncontrast computed tomography Alberta Stroke Program Early CT Score [ASPECTS] <7 or diffusion-weighted imaging ASPECTS <6). Patients in the treatment arm could have been pretreated with intravenous tissue-type plasminogen activator (IV tPA) but failed treatment by definition of persistent large-vessel occlusion on computed tomographic angiography. The control arm could be treated with IV tPA, if eligible. Only 206 patients were randomized of 690 planned because the independent data safety and monitor¬ing board viewed the results of the preplanned 170 patients who had 90-day outcome data and, although not significant, recommended stopping the trial for ethical reasons in light of the positive results of the Endovascular Treatment for Acute Ischemic Stroke in the Netherlands (MR-CLEAN),\(^2\) Extending the Time for Thrombolysis in Emergency Neurological Deficits–Intra-Arterial (EXTEND-IA),\(^3\) and Endovascular Treatment for Small Core and Proximal Occlusion Ischemic Stroke (ESCAPE) trials.\(^4\) Subjects were well balanced in age, baseline National Institutes of Health Stroke Scale, and time to treatment because randomization was stratified by these variables. Only 7% of the thrombectomy patients underwent general anesthesia (GA). At 90 days, the endovascular group fared better than the control group (primary outcome odds ratio of modified Rankin scale scores: 1.7 [1.05–2.8]); the prespecified secondary outcome of favorable outcome (modified Rankin scale ≤2) was found in 44% thrombectomy patients and in only 28% patients in the medical control arm. This resulted in an adjusted odds ratio of 2.1 (95% confidence interval, 1.1–4.0), and the number needed to treat to cause a favorable outcome of 6.4. Significantly notable was the analysis of a concurrent registry of stroke for the Catalonian region; only 8 patients during the study who were eligible for the trial were not randomized.

The main conclusions of REVASCAT are as follows: (1) the trials provide further support for the efficacy of endovascular stroke therapy under 8 hours and (2) the results are likely generalizable to the whole population. REVASCAT was unique among the 5 published randomized controlled trials, in which there was specific exclusion of patients who demonstrated revascularization after IV tPA on neuroimaging.\(^11\) The protocol stipulated computed tomographic angiography or magnetic resonance angiography at 30 minutes after IV tPA for patients, specifically to identify the presence of revascularization. The consequence was an inevitable delay in the initiation of endovascular therapy as reflected in the increased time delay between stroke onset to IV tPA time (median [interquartile range], 117.5 [90–150] mins) and stroke onset to groin puncture time (median [interquartile range], 269 [201–340] mins) in the treatment group.\(^1\) REVASCAT did show, in spite of treatment delay, superior clinical outcomes in the treatment group, but this study did not measure whether this delay was harmful. Of the 5 published PROBE-designed trials of thrombectomy, only MR-CLEAN\(^2\) went onto planned completion, generating a domino effect where all other ongoing
trials were terminated early for ethical reasons. The fact that all 4 published subsequent trials, including REVASCAT, were positive, despite not completing full enrollment, is strong indication that endovascular stroke therapy within the 8-hour time window is effective and trends toward reduced mortality. Future meta-analysis of all PROBE-designed trials has been planned,12 and REVASCAT will provide 206 precious observations to this analysis.

Regarding the generalizability of these results, it is significant to consider that only 8 or 206 patients evaluated during this trial in the 4 treating hospitals were not randomized. We do not know, however, how centers with less experience fare using these techniques because all 4 centers had to treat over 500 stroke patients with at least 60 patients treated endovascularly annually to be eligible for the trial. Also, only a minority of endovascular patients received GA (7%), likely favoring good outcomes. Because there is a wide variation in the use of GA, and because several lines of data associate GA with worsened outcomes, centers that continue to use GA routinely may not experience the 44% good outcome rate seen in REVASCAT.

Disclosures

Dr Smith received compensation from Covidien as member of the SWIFT-Prime DSMB and from Stryker Neurovascular for member on the DAWN DSMB. B. Yan received research grant from Johnson and Johnson and speaker honoraria from Stryker, Inc.

References

REVASCAT Trial: Further Advancement in Endovascular Stroke Therapy
Wade S. Smith and Bernard Yan

Stroke. 2015;46:3012-3013; originally published online September 3, 2015;
doi: 10.1161/STROKEAHA.115.010817
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2015 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://stroke.ahajournals.org/content/46/10/3012

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published
in Stroke can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office.
Once the online version of the published article for which permission is being requested is located, click
Request Permissions in the middle column of the Web page under Services. Further information about this
process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Stroke is online at:
http://stroke.ahajournals.org//subscriptions/