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Commentary

2025 Triumphs and Setbacks: Endovascular Neurosurgery Perspective

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ABSTRACT

In 2025, the field of stroke and carotid artery disease experienced a new update, with the publication of two landmark randomized trials that represent contrasting examples of setback and triumph within endovascular neurosurgery. The MeVO trials proved no superiority of mechanical thrombectomy over best medical therapy for acute ischemic stroke caused by distal- and medium-vessel occlusions. The CREST-2 trials demonstrated a significant reduction in stroke when carotid artery stenting is added to medical therapy. These trials illustrate how recent evidence has simultaneously challenged and reaffirmed the role of neurointerventional therapy.

Introduction

The clinical practice of endovascular neurosurgery has entered an era of continual evolution, in which rapid advances in technology and growing clinical evidence are reshaping indications and follow-up strategies for neurointerventional procedures. Both newly developed and long-established neurointerventional therapies are increasingly subjected to rigorous re-evaluation, reflecting a broader shift toward evidence-guided precision in neurointerventional care[1-2].

In 2025, the field of stroke and carotid artery disease experienced a new update, with the publication of several landmark randomized trials that challenged dominant assumptions and redefined therapeutic boundaries. Notably, the MeVO (Medium Vessel Occlusion) and CREST-2 (Carotid Revascularization and Medical Management for Asymptomatic Carotid Stenosis Trial) trials emerged as contrasting examples of setback and triumph, respectively, within endovascular neurosurgery.

Here, we try to address the 2025 landmark trial evidence in endovascular neurosurgery through both a practical and evidence-based lens, focusing on how new data have simultaneously challenged and reaffirmed the role of neurointerventional therapy. We aim to provide perspective on how the neurointerventional community react to the innovation while maintaining a firm commitment to evidence-based patient care[1-2].

MeVO Trials as a Setback for Thrombectomy Expansion

Over the past years, the neurointerventional stroke field was energized by a series of high-quality trials that transformed practice and markedly expanded the role of thrombectomy for acute ischemic stroke. Started in 2015, the MR CLEAN trial (Multicenter Randomized Clinical trial of Endovascular treatment for Acute

ischemic stroke in the Netherlands) was the first randomized trial to show that mechanical thrombectomy significantly improved functional outcomes in patients with large vessel occlusion (LVO) [1]. Shortly thereafter, other landmark trials reported consistent findings, leading to guideline updates endorsing thrombectomy as standard of care for LVO stroke [2-9]. Subsequent studies such as DAWN (DWI or CTP Assessment with Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention) and DEFUSE-3 (Endovascular Therapy Following Imaging Evaluation for Ischemic Stroke 3) extended the beneficial window up to 24 hours in selected patients with salvageable brain tissue [10-12].

Following the success of thrombectomy for acute ischemic stroke attributed to large vessel occlusion, the neurointerventional community pursued further expansion into smaller and more distal arterial territories stroke. In this context of rapid adoption, many centers and device manufacturers chased expanding thrombectomy into more distal- and medium- vessel occlusions (D/MeVO). Several stroke centers refined workflows, interventionalists developed new strategies, and industries invested heavily in the design of smaller, more delicate stent retrievers tailored for distal vessels. The collective momentum was beyond a doubt — driven by the extraordinary success of thrombectomy in proximal LVO occlusions[2-4].

Against the backdrop of prior achievement, the year 2025 delivered a critical inflection point for neuroendovascular intervention with the publication of the ESCAPE-MeVO (Endovascular Treatment for Small Core and Proximal Occlusion Ischemic Stroke – Medium Vessel Occlusion) and DISTAL (EnDovascular therapy plus best medical treatment (BMT) versus BMT alone for medIum distal veSsel occlusion sTroke) trials [13, 14]. Although differing in design, inclusion criteria, and technical approach, both randomized trials converged on a consistent conclusion: the superiority of mechanical thrombectomy over best medical therapy for acute ischemic stroke caused by distal- and medium-vessel occlusions (D/MeVO) was not found. These findings represent a significant setback for a field that has, in recent years, experienced rapid expansion of endovascular techniques and growing expectations regarding the scope of neurointerventional stroke care[2-5].

For the neurointerventional community, the results were received as disappointing news, interrupting a period of rapid development. The MeVO trials demonstrated that technical feasibility does not necessarily convert into clinical benefit. The improvement in functional outcomes was not encountered with intervention, and in some analyses, the procedural risk was beyond the corresponding gain in patient outcomes [15]. Rather than validating an anticipated outcome, these trials forced the field to reconsider its assumptions. Yet, in a broader sense, they serve as an essential corrective, reinforcing that evidence, not capability, must define the limits of practice. The MeVO trials remind us that restraint, when guided by rigorous data, is as important to patient care as innovation itself.

CREST-2 trial as a Triumph in Neurointervention for Carotid Stenosis

The management of carotid stenosis has evolved over more than seven decades, beginning with the surgical era of carotid endarterectomy (CEA) in the 1950s [16] and progressing through landmark randomized trials in the 1990s that established its benefit in symptomatic and selected asymptomatic patients [17, 18]. The subsequent emergence of carotid artery stenting (CAS) prompted large comparative trials throughout the 2000s [19-22], culminating in CREST, which demonstrated comparable effectiveness between stenting and surgery [23]. For decades, CEA and CAS have been mainstay treatments in the prevention of ischemic stroke attributed to severe symptomatic carotid stenosis. However, advances in medical therapy during the 2010s — including high-intensity statins, antiplatelets, antihypertensive treatments, and risk-factor modification — have substantially reduced baseline stroke risk, prompted new debate and raised a fundamental question: Can best medical therapy alone provide sufficient protection against stroke in patients with asymptomatic carotid stenosis?

The CREST-2 program was designed to directly address this fundamental question. Although the effectiveness of carotid revascularization was recentely revisited in 2021, the trial did not assess endovascular intervention against medical therapy alone [24]. Although surgery and stenting are the cornerstones, newer medications and better risk-factor control have raised questions about whether such procedures are still needed for people who do not exhibit symptoms. In consequence, the CREST-2 program, reported in 2025, comprised two large, parallel, randomized clinical trials, one of which specifically compared CAS plus best medical therapy with best medical therapy alone in patients with severe (≥70%) asymptomatic carotid stenosis, with the aim of determining whether endovascular intervention provides superior clinical benefit over best medical therapy [25]. Notably, the stenting arm demonstrated a significant reduction in stroke when CAS is added to medical therapy, suggesting that selected patients may derive clinical benefit from an endovascular preventive strategy. Patients with advanced narrowing, high-risk plaques, or unstable imaging features gained the greatest benefit. These findings offer much-needed clarity for clinicians navigating preventive strategies in asymptomatic carotid disease and highlighting the importance of patient selection rather than a universal approach.

The CREST-2 program emerged as a defining triumph for the neurointerventional community in 2025. The results were described as “historical”, not because they unconditionally endorse procedural therapy, but because they redefine its role in the context of modern medical management. In doing so, CREST-2 represents a major achievement for the field — demonstrating that neuro-intervention in the form of carotid stenting has extended clinical benefits that are evidence-driven, and capable of improving patients’ long-term outcomes.

When Evidence Leads the Way

Taken together, the MeVO and CREST-2 trials capture the defining tension of neurointerventional practice in 2025. Although these trials address distinct vascular territories — intracranial distal and medium vessel occlusions versus extracranial carotid artery stenosis — they meet on a shared and fundamental question: Which therapeutic strategies truly offer the greatest clinical benefit for patient care? The answer, undoubtedly, lies in rigorous evidence.

The future of neurointerventional practice is rapidly evolving within an industry-driven environment. In the aftermath of the MeVO trials, some interventionalists have questioned whether the results fully reflect the potential of thrombectomy in distal and medium vessel occlusions, noting that many of these studies relied on catheters originally designed and tailored for large-vessel anatomy. In parallel, industry has begun to develop dedicated microcatheters, aspiration systems, and stent retrievers specifically engineered for the smaller caliber and increased fragility of distal cerebral vessels. As these technologies mature, it remains reasonable that the role of thrombectomy in D/MeVO may be revisited through future trials comparing tailored devices against standard medical therapy. Conversely, continued advances in medical management — including targeted-medical therapy and risk-factor modification — may similarly challenge the durability of the CREST-2 findings over time. As medical therapy continues to evolve, the clinical benefit of carotid stenting in selected asymptomatic patients may warrant re-evaluation, emphasizing the dynamic nature of evidence generation in neurovascular care.

The current results of MeVO trials suggested a necessary pause on the rapid expansion of mechanical thrombectomy, demonstrating that technical feasibility and procedural achievability do not certainly translate into improved clinical outcomes, particularly in distal and medium vessel occlusions. On the other hand, CREST-2 reaffirmed the enduring value of neurovascular intervention when applied with precision, showing that carotid artery stenting — when added to intensive medical therapy — can reduce stroke risk in selected patients with severe asymptomatic carotid stenosis. Together, these trials reflect a field in maturation: one willing to confront its limits, reevaluate the targets, and ultimately redefine progress not by procedural reach, but by evidence-based benefit to patients.

Conclusion

Together, the stroke MeVO and carotid CREST-2 trials define neuro-intervention in 2025 as a field flexible enough to accept limitations, yet resilient enough to advance when evidence supports action.

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Conflict of Interest

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Data availability

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Author Contributions

AS and SH performed the literature review, revised the manuscript, and approved the final version.

All authors meet the ICMJE criteria for authorship and agree to be accountable for all aspects of the work

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