Predicting Outcomes in the Era of Endovascular Therapy

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Endovascular thrombectomy (ET) is a monumental step forward for the treatment of acute ischemic stroke secondary to large vessel occlusion. However, in the 5 clinical trials that made ET standard of care for acute stroke, despite high rates of TICI (thrombolysis in cerebral infarction) ≥2b recanalization, good outcome (assessed by mRS [modified Rankin Scale] ≤2 at 90 days) was achieved in 33% to 71% of patients.1–5 Improving outcomes can be achieved by better prehospital screening, improvements in systems of care, newer generation devices, or combination of Neuroprotection with ET. However, before any new treatment is adopted in clinical practice, it will need to be tested in the setting of a clinical trial. One of the major challenges of any randomized controlled trial is the need to have effective instruments to predict outcomes and optimize the number of patients enrolled. For this purpose, several stroke scales that can predict long-term outcomes have been designed and used both in the setting of a randomized controlled trial and clinical practice.6–10 However, in the era of ET for large vessel occlusion, bio or clinical markers of stroke severity after intervention may be even more useful in predicting long-term clinical and functional outcomes.

On this regard, Sajobi et al11 compared the accuracy of early longitudinal National Institute of Health Stroke Scale (NIHSS) measurement to other early markers of stroke severity post treatment in predicting subjects’ 90-day stroke outcome. The authors used a group-based trajectory model from the ESCAPE trial (Endovascular Treatment for Small Core and Proximal Occlusion Ischemic Stroke).2 The accuracy of baseline NIHSS, infarct volume, 24-hour change in NIHSS, infarct volume, and disease severity trajectory subgroups in predicting 90-day stroke outcome were assessed using logistic regression analysis. The authors demonstrated that group-based trajectory model of the 2-day longitudinal NIHSS data revealed 3 distinct subgroups of NIHSS trajectories: large improvement (41.6%), minimal improvement (31.1%), and no improvement (27.3%) subgroups. Patients in the large improvement group were more likely to exhibit good outcomes after 90-days than those in the minimal improvement or no improvement subgroups. Among candidate predictors, the 2-day trajectory subgroup variable was the most accurate in predicting 90-day mRS at 84.5%.

It is important to note as these results demonstrated that the 48-hour post-treatment NIHSS assessment represents a strong prognostication tool. This marker very likely represents an early surrogate for the final outcome. It is also extremely interesting to understand the relationship between this marker and pre-endovascular treatment markers. Using group-based trajectory model, the group large improvement was represented by patients who were younger (P=0.02), had lower baseline NIHSS (P<0.01), had less internal carotid artery occlusions (P<0.01), had better ASPECTS (Alberta Stroke Program Early CT Score) (P<0.01), and were more likely to receive endovascular treatment and intravenous tPA (tissue-type plasminogen activator; P<0.01 and P=0.05, respectively).

Ultimately, final infarct volume is directly correlated and, therefore, is a powerful predictor of clinical outcome.12 However, identifying predictors of clinical outcomes even in the era of ET is particularly challenging because of the tremendous variability in acute stroke presentation, response to treatment, and recovery. Data from the North America Solitaire Stent registry demonstrated that age ≥80 years old, diabetes mellitus, proximal occlusion, not use of intravenous tPA seem to increase the risk of a poor outcome by 2- to 3-fold13,14 despite recanalization. The impact of the preprocedural NIHSS seems to be even stronger with a 4- to 5-fold increase in the risk of poor outcome when the NIHSS score is ≥18. Variability in degree, duration of leptomeningeal anastomosis, and time to treatment also greatly influence the results of any intervention and their outcome in these patients.15–17

With regards to predictors of outcome related to ET, fast reperfusion of the occluded artery is the most important predictor of outcomes.18 Another important procedural factor that influence outcome is the use of balloon guide catheter during clot retrieval.19 The use of general anesthesia during the procedure was also thought to negatively influence outcomes.20 However, the recently randomized controlled trial comparing local anesthesia to general anesthesia during thrombectomy did not demonstrate any significant difference in patients outcomes.21 Therefore, having a reliable, easy-to-administer tool able to predict patient long-term prognosis would be an extremely valuable tool for both future randomized controlled trials and clinical decision-making in acute stroke treatment.

Disclosures

Dr Linfante is a consultant for Medtronic, Stryker, and Penumbra. Dr Dabus is a consultant for Medtronic, Stryker, and Microvention.

References


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