



Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com



Editorial

Patients' selection for mechanical thrombectomy and the wrong axis comparisons



Acute ischemic stroke care has recently made an exceptional leap forward with the demonstration of the compelling efficacy of mechanical thrombectomy (MT) to improve functional outcome and decrease mortality in selected patients. Now four years on, the publication of the pivotal trials and the resulting changes in international guidelines [1,2] have catalyzed a common misperception of how patients should be selected for MT, and in general crystallized in the stroke community a trend in modern care decision making.

These guidelines are indeed intended at setting minimal thresholds of demonstrated benefit in rigorously designed randomized controlled trials, for rigorously selected patients, but they are widely used instead to deny MT to patients for whom the benefit is not demonstrated, or the number needed to treat perceived too high. Keeping in mind that one's experience can never replace randomized data, the real question when selecting a patient for MT then should be considering, is "Does MT put this patient at risk of a worse clinical outcome?" but NOT "does this variable (age, ASPECT, pre stroke functional status, . . .) make it less likely that the patient will recover well?".

In other words, our clinician scope is heavily trained and biased to think on the wrong axis (a concept coined by Pr J. Raymond [3,4], that is to consider potential outcome modifiers, rather than expected treatment effect, in the individual selected for the treatment [5]. Many articles compare outcomes of patients, all of whom are treated with MT, in order to define parameters that can influence the outcome. Some of these most recent factors include poor collaterals on baseline imaging [6], age at index event [7], occlusion location [8], and baseline clinical severity [9] and the list keeps growing as patients and stroke characteristics are used to artificially split samples to compare outcomes in the resulting subsamples. However, while these factors can give us some information about who might respond best to the treatment (here MT), they certainly don't mean that some of these patients should be denied MT, as these aforementioned studies don't include a comparable group of patients who were not treated with MT. Without this second group (the control group), it is impossible to determine if patients will or will not benefit from MT. Moreover, many of the aforementioned factors apply to any treatment: younger patients usually recover better than their older counterparts, patients with smaller infarcts are at inherent higher odds of favourable outcome than those with larger infarcts, etc. . . whether they are treated (with any technique or treatment) or not. Further, all these factors are often entangled

in a complex pathophysiological process (poor collaterals lead to a higher infarct which leads to a higher NIHSS score, etc.) that is difficult, if not impossible to process in a comprehensive way at bedside, in the acute setting. This becomes even more complex when ethical considerations are mixed with care decisions, as is often the case in a deadly and debilitating disease such as acute ischemic stroke due to large vessel occlusion.

When selecting a patient for MT, one must also reconsider the goals and expectations of the treatment. It is indeed impossible for a patient with a previous stroke now cognitively normal but with residual lower limb paresis, to be independent (that is mRS 0–2) three months after a new stroke due to large vessel occlusion. For this patient, the goal of treatment is to minimize the risk of added disability, and death, not to be able to walk independently, hence evidence deriving from abovementioned randomized trial are hardly applicable, and care must be tailored to specific, patient-centered, goals.

The only way forward for the patients we care, and the community we strive for, is to embrace the absolute need to randomize patients [10] in each of our clinical encounters where uncertainty regarding treatment benefit remains [11–13].

References

- [1] Turc G, Bhogal P, Fischer U, et al. European Stroke Organisation (ESO) - European Society for Minimally Invasive Neurological Therapy (ESMINT) Guidelines on mechanical thrombectomy in acute ischemic stroke. *J NeuroInterventional Surg* 2019, *neurintsurg*-2018-014569.
- [2] Powers WJ, Rabinstein AA, Ackerson T, et al. 2018 Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2018. *STR*. 000000000000158.
- [3] Raymond J. Endovascular neurosurgery: personal experience and future perspectives. *World Neurosurg* 2016;93:413–20.
- [4] Raymond J, Fahed R, Roy D, Darsaut TE. The 2018ter Brugge lecture: problems with the introduction of innovations in neurovascular care. *Can J Neurol Sci J Can Sci Neurol* 2019;46(2):151–8.
- [5] Nogueira Raul G, Ribó M. Endovascular treatment of acute stroke. *Stroke* 2019, <http://dx.doi.org/10.1161/STROKEAHA.119.023811>. *STROKEAHA*119023811.
- [6] Nordmeyer H, Webering N, Chapot R, et al. The association between collateral status, recanalization and long term outcome in stroke patients treated with stent retrievers—Are there indications not to perform thrombectomy based on CT angiography? *J Neuroradiol* 2017;44(3):217–22.
- [7] Barral M, Lassalle L, Dargazanli C, et al. Predictors of favorable outcome after mechanical thrombectomy for anterior circulation acute ischemic stroke in octogenarians. *J Neuroradiol* 2018;45(4):211–6.

- [8] Grieb D, Schlunz-Hendann M, Brinjikji W, et al. Mechanical thrombectomy of M2 occlusions with distal access catheters using ADAPT. *J Neuroradiol* 2019;46(4):231–7.
- [9] Da Ros V, Cortese J, Chassin O, et al. Thrombectomy or intravenous thrombolysis in patients with NIHSS of 5 or less? *J Neuroradiol* 2019;46(4):225–30.
- [10] Raymond J, Fahed R, Darsaut TE. Randomize the first patient. *J Neuroradiol* 2017;44(5):291–4.
- [11] MOSTE LASTE In Extremis Study - MOSTE LASTE. Extrem. <https://www.inextremis-study.com>. Accessed August 19, 2019.
- [12] Efficacy and safety of thrombectomy in stroke with extended lesion and extended time window - full text view - ClinicalTrials.gov. <https://clinicaltrials.gov/ct2/show/NCT03094715>. Accessed August 19, 2019.
- [13] Ducroux C, Fahed R, Khoury NN, et al. Intravenous thrombolysis and thrombectomy decisions in acute ischemic stroke: an interrater and intrarater agreement study. *Rev Neurol (Paris)* 2019;175(6):380–9.

Grégoire Boulouis*
*Neuroradiology Department, INSERM UMR1266,
IMABRAIN, Université de Paris, CH Sainte-Anne,
75014 Paris, France*

Robert Fahed
*Ottawa Stroke Program, The Ottawa Hospital:
Division of Neurology, University of Ottawa, Ottawa,
Ontario, Canada*

* Corresponding author.
*E-mail address: gregoireboulouis@gmail.com
(G. Boulouis)*