Drip and Ship Versus Direct Ship: The RACECAT Study

Should we prioritize IV tPA or endovascular treatment as first-line treatment for patients with suspected large vessel occlusion?

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Intravenous tissue plasminogen activator (IV tPA) is an effective treatment option for acute stroke patients, especially those with mild and moderate symptoms.[1,2] The efficacy of IV tPA in terms of arterial recanalization in the first hours progressively drops as the burden of the occlusive clot increases.[3] Although the recanalization rate of an M2 occlusion is around 70%, the recanalization rates of M1 or terminal internal carotid artery occlusions are 30% and 10%, respectively.[4]

The main advantage of IV tPA treatment is that the treatment is readily available to centers that do not have complex technology or interventionalists with specialized skill sets. In fact, over the past decade, the growth of telestroke services has allowed the use of IV tPA treatment in remote areas that cannot provide an in-house stroke specialist 24/7.[5] Endovascular treatment (EVT) is also a powerful treatment in moderate to severe stroke patients, particularly with the use of stent retrievers, with reported recanalization rates higher than 80%.[6-10] Because of the nature of this treatment, a high level of technologic resources and specialized physicians are needed, limiting the availability of EVT to the largest comprehensive stroke centers (CSCs).

Access to EVT continues to be based on the patient's geographic location at stroke onset. Patients living in areas where the primary referral hospital is an endovascular-capable stroke center (EVT-SC) have much higher chances of undergoing EVT than patients primarily referred to local CSCs (Figure 1).[11]

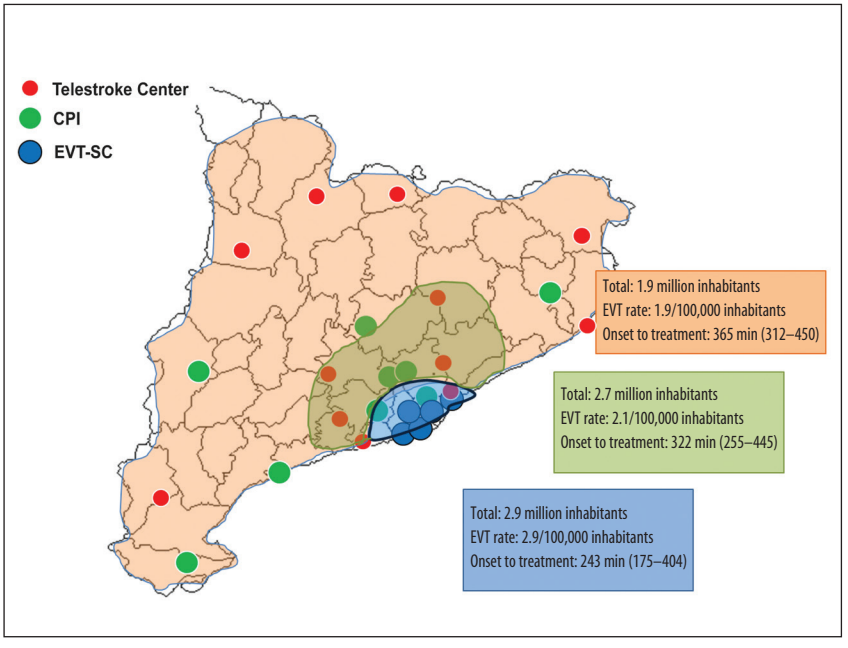

Figure 1. Distribution of mechanical thrombectomies performed in 2015 by patient's location at stroke onset according to three geographical areas (inner and outer metropolitan areas and the provinces). CPI, primary stroke center. Adapted from Perez de la Ossa N, Abilleira S, Dorado L, et al. Access to endovascular treatment in remote areas: analysis of the reperfusion treatment registry of Catalonia. Stroke. 2016;47:1381-1384.

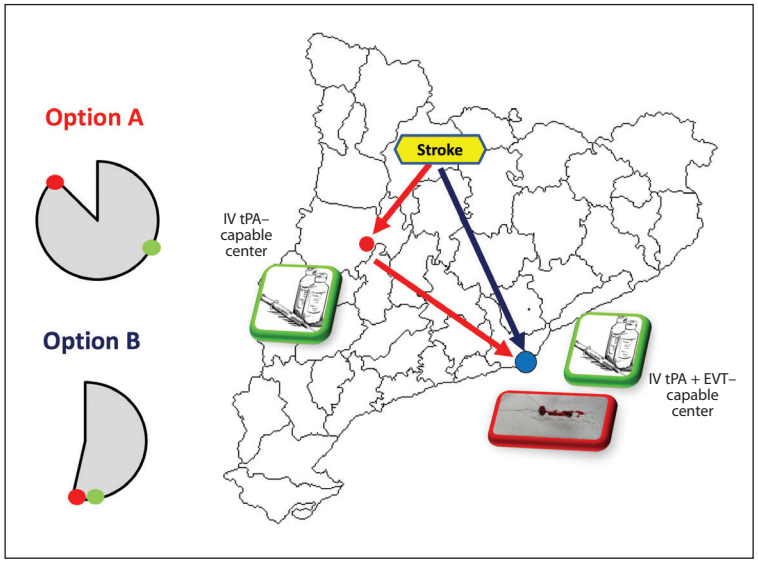

Figure 2. Different primary transfer options of suspected ELVO stroke patients prioritizing IV tPA treatment (option A) or EVT (option B).

OPTIONS FOR STROKE PATIENT TRANSFER

It is clear that the number of trained interventionalists will grow and new EVT-SCs will be created. Still, the presence of EVT-SCs in remote areas with low population density will not be justified. At present, there are two different strategies for transferring acute stroke patients with different geographic availability. In both cases, time to treatment initiation is critical, and the sooner the treatment is started, the higher the chances of clinical recovery. A recent study showed that in the first hours after stroke onset, the likelihood of regaining functional independence drops 10% to 15% for each 30-minute delay in initiation of EVT.[12] This raises the question of where to transfer a patient with a suspected emergent large vessel occlusion (ELVO) stroke (Figure 2).

One option would be to drip and ship, in which the patient is transferred to the nearest local CSC for immediate care including IV tPA , which offers rapid access to the less effective treatment. The patient is then secondarily transferred to an EVT-SC, where the patient may arrive: (1) already recanalized (no further specific treatment needed), (2) with a large infarct and no mismatch (no further specific treatment needed), or (3) with persistent occlusion and savable brain tissue (will receive EVT with a time delay as compared with the direct ship option). The time to admission in the CSC will be determined by the initial distance to the EVT-SC and the door-in/door-out time at the local CSC.

A second option is direct ship of the patient to the nearest EVT-SC, bypassing the nearest local CSC, which offers access to all effective treatments. However, this results in a substantial delay in initiation of IV tPA as compared with drip and ship. The time to admission to the EVT-SC will only be determined by the distance to stroke onset location.

Based on the currently available evidence, there is no answer to the question of which patient transfer option is ideal. Transferring patients primarily to an EVT-SC seems reasonable, because it may increase the number of patients who will benefit from EVT; however, this must be proven. Moreover, several other issues should concern us. How safe is it to transfer these severe stroke patients long distances before they have access to a hospital? Is there a distance beyond which there is no or very limited benefit from a direct transfer to an EVT-SC? In this case, new endovascular-capable facilities will need to be strategically created.

THE RACE SCALE

Theoretically, the benefits of primary transfer to an EVT-SC would only apply to patients with ELVOs and may unnecessarily delay treatment in all others. Therefore, the predictive power of initial screening tools to identify patients with suspected ELVOs becomes of paramount importance. Several prehospital scales have been developed with the aim of rapidly assessing suspected acute stroke patients by paramedics. The Rapid Arterial Occlusion Evaluation (RACE) Scale is a quick and simple neurologic scale designed for prehospital evaluation of patients with acute stroke who have a high probability of ELVO to facilitate transfer to a CSC for EVT.[13] The RACE Scale is a simplification of the National Institutes of Health Stroke Scale, using those items with a higher ability to predict the presence of an ELVO. The RACE Scale evaluates five items: facial palsy, brachial paresis, crural paresis, oculocephalic deviation, and aphasia/agnosia, with a total score of 0 to 9 (Table 1). A score > 4, as assessed by trained paramedics, has a sensitivity of 85% and specificity of 69% for ELVO.

The RACE Scale was designed and validated between 2011 and 2013 in a region of Catalonia, Spain, in a prospective study of 357 patients.[13] The scale was implemented in the region's stroke code protocol in September 2014 after emergency medical services (EMS) technicians and other EMS professionals completed an online training program. Currently in Catalonia (7.5 million inhabitants), the RACE Scale is

TABLE 1. RACE SCALE*	
Item	**RACE Score**
Facial palsy	
Absent	0
Mild	1
Moderate to severe	2
Arm motor function	
Normal to mild	0
Moderate	1
Severe	2
Leg motor function	
Normal to mild	0
Moderate	1
Severe	2
Head and gaze deviation	
Absent	0
Present	1
Aphasia (if right hemiparesis) *Ask the patient to "Close your eyes" and "Make a fist."*	
Performs both tasks correctly	0
Performs one task correctly	1
Performs neither task	2
Agnosia (if left hemiparesis)	
Patient recognizes his/her arm and the impairment	0
Does not recognize his/her arm or the impairment	1
Does not recognize his/her arm and the impairment	2
Score total	**0-9**

Abbreviations: RACE, Rapid Arterial Occlusion Evaluation.
*See www.racescale.org for more information.

being utilized and registered on the EMS database, and results of the scale are provided to the receiving stroke center in 94% of the stroke code activations. More information about the RACE Scale can be found at www.racescale.org (Figure 3). The RACE Scale and other scales, such as Los Angeles Motor Scale or Field Assessment Stroke Triage for Emergency Destination, are currently used to make decisions about where acute stroke patients should be primarily transferred.

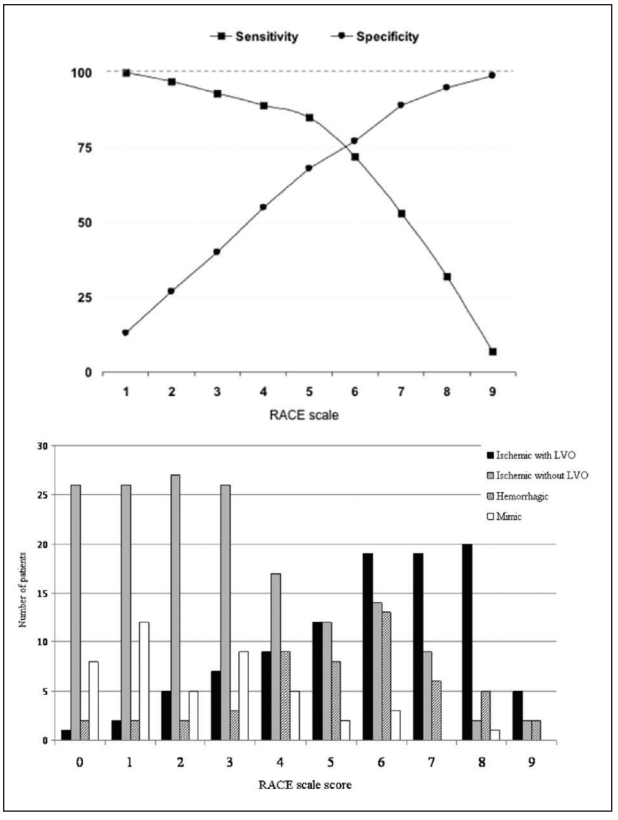

Figure 3. The RACE Scale probability of identifying ELVO in suspected acute stroke patients according to the obtained scores.

THE RACECAT STUDY

Transfer protocols are being revised worldwide, and novel algorithms are being proposed to improve access to EVT for patients living in geographic areas distant from EVT-SCs. Unfortunately, the safety and efficacy of these solutions are not supported by data from clinical studies. The RACECAT study aims to evaluate whether a prehospital triage system that includes the use of the RACE Scale to determine the best primary destination stroke center (EVT-SC or closest local CSC) increases efficiency of revascularization treatments and long-term clinical benefits.[14,15] The prospective, multicenter, cluster randomized controlled study is underway in Catalonia and has recruited 416 patients (as of January 2018) at a rate of 1.5 patients per day. The maximum number of patients to be included is 1,700, and interim analyses are performed every 300 patients. The primary outcome measure is the modified Rankin Scale score at 90 days after randomization. Results of the study will be available in the near future.

CONCLUSION

In patients with suspected acute stroke due to ELVO, identifying primary transfer destination to the nearest

stroke center versus nearest CSC is unknown. It is unclear whether IV tPA versus EVT should be prioritized. The RACECAT study aims to answer these questions. ■

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