



Endovascular therapy for acute ischemic stroke: which role for neurologists?

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Dear Editor,

ESCAPE, MR CLEAN, EXTEND IA, REVASCAT, and SWIFT-PRIME trials provided strong evidence to support the use of endovascular therapy (EVT) for achieving revascularization in acute ischemic stroke (AIS) with large vessel occlusion (LVO). These results absolutely renew the scenery of AIS management, encouraging worldwide changes in the guidelines for management of AIS by EVT. As a consequence, neurologists, in addition to patient management in stroke units and to administering intravenous thrombolysis in eligible patients, are now confronted with other specialists, as radiologists and neurosurgeons, previously not involved in ischemic stroke treatment. Thus far, there has been a separation of tasks between the stroke physicians and the interventionalist (although a few experiences of stroke physicians performing both first clinical evaluation and EVT are also reported [1]).

Given the need for a fast recanalization of LVO, there is an increasing urge to recruit and form professional figures for endovascular stroke treatment but this process is limited by the shortage of neurointerventionists [2], probably due to the rigorousness of training standards for endovascular treatment of all the neurovascular diseases (artero-venous malformations, sub-arachnoid hemorrhages, brain and neck tumors), discouraging neuroradiologists to pursue this professional career [3]. Moreover, vascular interventional

radiologists usually do not fit the expertise standards required for stroke endovascular treatments and cannot be considered a resource for thrombectomy.

Furthermore, since care for stroke patients is based on the individual patients' status (i.e., presence of comorbidities, concomitant anticoagulant/antiaggregant therapy, pre-morbid disability), it seems reasonable that taking decisions and consequently undertaking minimally invasive procedures could be done by physicians trained in the clinical neurosciences, highlighting the concept of "organ specialists." This already happens for coronary diseases in which the utilization of interventional diagnostic/therapeutic procedures is increasingly accessible by cardiologists.

Despite these considerations and the increasing numbers of stroke patients eligible for endovascular treatments, for physicians specialized in neurology, the access to endovascular treatment is still limited. The US Accreditation Council for Graduate Medical Education (ACGME) in 2006 and an international consensus paper subscribed by European Society of Minimal Invasive Neurological Therapy (ESMINT) in 2016 included physicians with a neurology background in the Endovascular Surgical Neuroradiology (ENS) education program, a subspecialty dedicated to diagnosis and treatment of neurovascular disease using x-ray fluoroscopy and angiography [4]. Since there, the evolution of the field has led some neurologists to pursue the necessary additional training to perform these procedures. To our knowledge, in few countries (the USA, Australia, Germany, France), there is the possibility for neurologists to work in angiographic rooms, after an adequate training, for neurologists to work in angiographic rooms. In Italy, the situation still remains unclear, with the only possibility for neurologists to attend a 2-year master in EVT which has the preferential selection criteria of being a specialist radiologist and is not qualifying to operate as an EVT specialist; moreover, the job positions for neurointerventionist are opened only for specialist in radiology.

Given this background, we asked to the Neurology residents of Rome universities (the neurologists of the next

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Fig. 1 Text of the survey presented to the residents in Neurology coming from four different Roman universities

The new clinical trials have introduced mechanical thrombectomy as an effective tool in selected cases of ischemic stroke. Endovascular therapy requires radiological and interventional skills.

As a future neurologist, would you be interested in a period of training in endovascular therapy in the course of residency, while knowing that this will reduce the time for training in other neurological skills? Please check the box you are interested in:

I am not interested in a training period in endovascular therapy yes
not

if you answered YES, please check one option below:

I am interested in a training period during residency, because neurologists should be familiar with EVT, but this will not be my future career

I am interested in a period of training during residency because I would like endovascular therapy to be part of my future job

40 years) if they were willing to take this road, participating to this revolutionary step in the field of AIS treatment. We asked their opinion about (1) their interest in EVT of ischemic stroke, (2) the possibility during the residency of a training period in EVT technique, and (3) the future opportunity to undertake a career as neurointerventional specialist (Fig. 1).

Among 111 overall residents (Table 1), 98 answered to the survey (response rate 88%): 90 residents (92%) stated to be interested in EVT; 36 (37%) were favorable to a training period in EVT technique during residency because neurologists should be familiar with EVT, even if not directly interested in pursuing a neurointerventional career and 54 (55%) were favorable to a training period in EVT technique during residency because they are interested in pursuing a career as an interventional specialist.

Our survey confirms the interest of young neurologists in EVT and opens up the possibility of introducing an optional training period during the residency course in neurology or post-specialization training methods more readily accessible to neurologists interested in stroke, retracing the experience which saw the split in interventional and traditional branches of cardiology about 30 years ago.

The role of the neurologist in the acute diagnostic workout of stroke is critical for the recognition of symptoms of ischemia, and the definition of the eligibility of the patient to treatment with intravenous thrombolysis and endovascular therapy. A unique figure able to manage all the diagnostic and therapeutic steps in the acute phase of stroke, a “stroke physician” [3] in toto, could allow to minimize the time loss and the consequent loss of neuronal tissue, leading to a better clinical outcome, reducing the burden of disabilities, and, in some cases, saving lives.

Desirably, stroke physicians should be able to manage all neurovascular interventions, but a more limited practice focused on clot retrieval and stenting would have much more social benefits [3].

In fact, even if aware of the importance of a specialized neuro-interventionalist capable to treat all brain disorders eligible to endovascular approaches in specialized centers, the higher incidence, the post-acute disability burden, and especially the rapid urge of treatment of AIS should require a more focused training for the treatment of large vessel occlusion. This aspect is important also considering the actual distribution of the comprehensive stroke centers

Table 1 Among 111 residents in Lazio region, Italy, 98 answered to our survey (RR 88%); 8 (8% of the respondents) were not interested in a training period in endovascular therapy (EVT) for stroke while 36

(37%) considered it a reasonable option; 54 (55%) would even consider EVT as a possible career

	Respondents	Interested in training during residency	Interested in a training period during residency	Interested and I wish a EVT career after residency
Catholic University of the Sacred Heart	33 (100%)	32 (97%)	16 (48%)	16 (48%)
Sapienza and San Andrea University	27 (67%)	21 (78%)	11 (41%)	10 (37%)
Tor Vergata University	24 (100%)	24 (100%)	5 (21%)	19 (79%)
Campus Biomedico University	14 (100%)	13 (93%)	4 (29%)	9 (64%)
	98 (88%)	90 (92%)	36 (37%)	54 (55%)

where it is possible to undertake endovascular procedures, usually allocated in big cities, with disadvantage for more remote areas [5].

Moreover, the inclusion of neurologists in a consortium similar to Thrombolysis in Myocardial Infarction (TIMI) study group could boost the development of new and interesting research lines about endovascular treatment of stroke.

In conclusion, as scientific debates are currently undergoing on this delicate topic, we think that the introduction of training periods for young neurologists in EVT of AIS could in the future facilitate the recruitment of more figures specialized in EVT leading to a better optimization of the therapeutic window, a more favorable outcome for patients, a reduction of costs for the national health system, and stimulate new research about stroke treatment.

At least in our survey, the neurologists of the next generation seem eager to go through this opportunity, not just for a professional outlook, but also because they recognize the society benefits deriving from it.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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