Interventional Cardiologists in Acute Stroke...?

The ESC Task Force on Acute Stroke Initiative

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Each year:

- 800,000 strokes in the US, causing 200,000 deaths and a calculated annual cost in the USA of $17.5 billion.
- 1 million in the European Union and 15 million worldwide.
- For the NHS, strokes in the UK (100,000 per year) the direct and indirect costs amount to £9 billion per year.
- Currently, less than 10% of stroke patients in Europe receive IVL.
- Endovascular treatment in Europe is offered to less than 1% of the stroke population.

[Sources: Mozaffarian, Heart Disease and Stroke Statistics: A Report From the American Heart Association, Circulation 2016]
Causes of stroke

- Thrombi/Emboli of varying compositions

Diagnosis

Initial diagnosis is clinical (NIHS Stroke Scale) but immediately assisted by imaging with CT scan or MRI.

The first step is telling ischemia from hemorrhage.

Second step is:
- identify the site of vessel occlusion with angio CT.
- identify the infarcted area and the area at risk but still viable (penumbra) with a perfusion CT scan.

Third step is:
- To apply the best suited reperfusion treatment.

Ashok Srinivasan, et al. RadioGraphics 2006,10;75-95
State-of-the-Art Imaging of Acute Stroke.
Figura 3: Immagini TAC di uno stroke. A sinistra TAC diretta che evidenzia area ischemica, in mezzo angio-TAC che evidenzia occlusione dell’arteria cerebrale media di sinistra e a destra TAC di perfusione evidenziando aerea infartuata (ovale piccolo) e la penombra di tessuto a rischio ma salvabile (grande ovale).

The "occluded artery" substratum of the **acute ischemic stroke** may have similar therapeutic perspectives compared to the **myocardial infarction**.

It has been largey demonstrated that outcomes of patients with ischemic strokes that have effective vessel recanalization is much better. Therefore, to **open the vessel** is a main target.

**Objective: Open the artery!**

Etiology of acute stroke vs. acute MI

Acute stroke (%)

- Embolic MCA occlusion
- Atherothrombosis ICA
- Atherothrombosis VA/BA
- Intracranial bleeding
- Other / unknown

Acute MI (%)

- Embolic coronary occlusion
- Atherothrombosis
- Thrombosis in a normal coronary artery
- Other / unknown

[Widimsky, ESC Congress 2015]
<table>
<thead>
<tr>
<th>Acute ischemic stroke</th>
<th>Acute Myocardial Infarction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time is brain</td>
<td>Time is muscle</td>
</tr>
<tr>
<td>Efficacy of IVL is about 50%</td>
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</tr>
<tr>
<td>Early re-occlusion rate w/o heparin is nearly 15-30%</td>
<td>Early re-occlusion rate w/o heparin is nearly 15-30%</td>
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<tr>
<td>Intra-cranial bleeding 10-15%</td>
<td>Intra-cranial bleeding in 1% made the therapy worse than the disease...</td>
</tr>
<tr>
<td>Being symptomatic in 5% (this is still acceptable)</td>
<td></td>
</tr>
<tr>
<td><strong>Acute ischemic stroke</strong></td>
<td><strong>Acute Myocardial Infarction</strong></td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Impact of time delay is obvious</td>
<td>Not “visible”</td>
</tr>
<tr>
<td>Hemorrhagic extension fatal</td>
<td>Hemorrhagic extension silent</td>
</tr>
<tr>
<td>Enlargement of the necrotic area: devasting effects</td>
<td>reduces EF, but still silent</td>
</tr>
<tr>
<td>Compliactions of endovasc procedures have a very narrow safety net</td>
<td>most managed successfully</td>
</tr>
<tr>
<td>No surgical revascularization option</td>
<td>CABG may be performed</td>
</tr>
<tr>
<td>No transplantation option or cell therapy</td>
<td>Heart can be transplanted or treated with cell therapy</td>
</tr>
</tbody>
</table>
Diagnosis and treatment of acute stroke is **multi-disciplinary**, therefore, poses organizational challenges to operative protocols:

- In emergency the patient needs acute care (**intensive** emergency physician), and a rapid CT or MRI scan: **radiologist**.
- The neurologist indicates and starts **lytic therapy**
- **Angiography** and endovascular therapy require a team of experienced **interventionists** 24 h/day supported by **anesthesiologists** and **intensive care specialists**.

Another practical issue...
Key roles

- ICU nurse
- Stroke co-ordinator
- Neurologist
- Radiologist
- Interventionalist
- Laboratory
- Anesthetist
- Neurosurgeon
Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria:

- Pre-stroke modified Rankin score (mRS) 0-1
- Acute ischemic stroke receiving IV rtPA within 4.5 hours of onset according to guidelines from professional medical societies,
- Causative occlusion of the internal carotid artery or proximal middle cerebral artery (M1),
- Age 18 years and over,
- National Institutes of Health Stroke Scale (NIHSS) score of 6 or greater,
- Alberta Stroke Program Early Computed Tomography Score (ASPECTS) of 6 or greater, and
- Treatment can be initiated (groin puncture) within 6 hours of symptom onset

(Class I; Level of Evidence A).
Critical issues

• Thrombolysis achieve complete reperfusion in 32% of cases
• Outcomes (mRS<2=30-40%)
• Mortality with lysis 25-35-year%

• Device technology: Retrieve >90% first pass with minimal risk
• But, if IVT therapy applicable in large scale:

• Stoke Units not available everywhere
• Protocols for rapid transfer to stroke centers not defined
• Centers with IVT option very limited
• Center with EVT capabilities even less
Possible solution

• Multi-disciplinary cooperation among neurologist, radiologist and neuro-radiologists for early diagnosis (clinical and CT-MRI) and treatment.

• Cardiologists have challenged “the lytic level of treatment” more than 20 years ago, and have imposed a capillary network of primary PCI 24/24 worldwide
Reperfusion therapy for ST elevation acute myocardial infarction in Europe: description of the current situation in 30 countries. Eur Heart J 2010
It is not certain whether available neuroradiology services will be able to meet the expanding needs of the population (facing the fact, that CBT becomes class IA indication). In contrast, interventional cardiology services for acute myocardial infarction are available on a 24/7 basis in almost all European and North American countries, and are becoming more available on other continents. Thus, in places where neuroradiology services are not available, the involvement of interventional cardiologists may be a reasonable option. Direct mechanical thrombectomy performed by a cardiologist may be considered a treatment option for acute stroke in centers where no neurointerventional services exist. Cardiology centers are able to achieve short CT to catheter laboratory times due to their experience in primary angioplasty for acute myocardial infarction. Outcomes are comparable to endovascular interventions performed in neuroradiology centers.”

Widimsky et al., JACC 2015

The Possible cooperation: Shared treatment capabilities
ESC mission: to reduce the burden of cardiovascular disease in Europe

To the attention of Professor Flavio Ribichini
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04 November 2015

ESC Taskforce on Stroke
10:00 – 16:00, Monday 25 January 2016
ESC Office, 29 B Square de Meeus, 1000 Brussels, Belgium

Attendees:
Valeria Caso, Harry Crijns, Joost De Vries, Hans-Christoph Diener, Wolfram Doehner, Jens Fiehler, Miquel Gallofrè, Iris Grunwald, Alison Halliday, Peter Lanzer, Maggie Lawrence, Mikael Mazighi, Piotr Pieniazek, Flavio Ribichini, Marco Roffi, Catherine Sudlow, Kostas Vemmos, Isabel van Gelder, Lars Wallentin, Petr Widimsky

ESC: Barbara Casadei, Susan Del Gaiso
ESC Council on Stroke

Draft Constitution
V4.0

Article 1 – Form & rationale
The Council on Stroke is established as a Constituent Body of the European Society of Cardiology (ESC) according to the Statutes and By-laws of the ESC. The Council has been developed based on the recommendations of an ESC dedicated Task Force involving representatives of the ESC and Sister Societies. The internal governance of the Council is regulated by ESC Board approved Rules and Regulations.
Education and Training

Multi-speciality education program: for trainees in Cardiology, Neurology, Radiology, Neuro-radiology and Neuro-surgery, to foster Inter-disciplinary approach to stroke.

Standardize accreditation

Stroke Council Meetings (biannually) to monitor outcomes

Workshops (1-2 days) for continuous training on specific issues: Brain imaging, clinical endpoints, AF, stroke and cognitive decline.

Joint ESC/ESO/ESVS/ESNR/ESMINT sessions at Congreses (ESC and ESO)
Research

Development of areas of common interest (inter-disciplinary action).

Role of Cardiac disease and vascular risk factors in the incidence and progression of dementia

Stroke prevention in patients with cardiac co-morbidities

Logistics and patient’s pathways of care from FMC to rehabilitation and Post-stroke care (including secondary prevention).

Registry of management of stroke patients in cardiologic centers

Combined actions of ESC ESO in low income european countries
Join forces for the stroke and MI working platform.

Increase stroke awareness among cardiologic community

ESC representatives in each Country to raise interest on stroke by involving patients organizations, societies, industry (device manufacturers), mass media, hospital administration and politicians involved in health planning.

First ESC Council meeting in Rome at ESC 2016
A mission for the future is

Challenging the cultural limitation of caring about “professional interests” versus the patient’s interest ...
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• The brain is not the heart

• But thrombolysis may be not better than EVT performed by cardiologists...

• If expert interventional cardiologist perform EVT after adequate training in a consolidated hub and spoke network
Bringing the team from here …
....to here.