Intervention sur les AVC: recommandations actuelles

Luisa Biscoito
Serviço Imagioologia Neurológica
Hospital Universitário Santa Maria-CHLN
Lisboa-Portugal
Stroke Patients are a complex group of patients that may need since Intensive Care Treatment till Palliative Care
ISCHEMIC STROKE IS A MAJOR DISABLE DISEASE

• About 700,000 americans each year suffer a new or recurrent stroke
  • On average a stroke occurs every 45 seconds
  • Stroke kills more than 150,000 people a year (1 of every 16 deaths)
  • Nº 3 cause of death (every 3 to 4 minutes someone dies of stroke)

• In Europe
  • Nº 2 single cause of death
  • Stroke kills almost 1,1 million people each year
  • Over one in seven women and one in ten men die from the disease

• In worldwide in 2012 - 6,7 million deaths
Time is Brain

Estimated Pace of Neural Circuitry Loss in Typical Large Vessel, Supratentorial Acute Ischemic Stroke

<table>
<thead>
<tr>
<th></th>
<th>Neurons Lost</th>
<th>Synapses Lost</th>
<th>Myelinated Fibers Lost</th>
<th>Accelerated Aging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Stroke</td>
<td>1.2 billion</td>
<td>8.3 trillion</td>
<td>7140 km/4470 miles</td>
<td>36 y</td>
</tr>
<tr>
<td>Per Hour</td>
<td>120 million</td>
<td>830 billion</td>
<td>714 km/447 miles</td>
<td>3.6 y</td>
</tr>
<tr>
<td>Per Minute</td>
<td>1.9 million</td>
<td>14 billion</td>
<td>12 km/7.5 miles</td>
<td>3.1 wk</td>
</tr>
<tr>
<td>Per Second</td>
<td>32 000</td>
<td>230 million</td>
<td>200 meters/218 yards</td>
<td>8.7 h</td>
</tr>
</tbody>
</table>

Saver J., Stroke, 2006
MULTIDISCIPLINARY TEAM WORK

Net of health treatment

Regulation System

ORGANIZATION INFORMATION

PRE-HOSPITAL

CLINICAL

IMAGE

CATH LAB

ICU

19èmes JAFRIM – Alger, avril, 2019
MULTIDISCIPLINARY TEAM WORK

Emergency Team

Neurologist
Neuroradiologist  Decision making

CLINICAL
PRE-HOSPITAL

IMAGE

CATH LAB

ICU

SYNCRONIZATION

COMUNICATION

PRE- HOSPITAL

19èmes JAFRIM – Alger, avril, 2019
MULTIDISCIPLINARY TEAM WORK

PRE-HOSPITAL

ANGIO NURSES

X-RAY TECHNICIAN

IMAGE

CLINICAL

CATH LAB

ICU

INTERVENTIONAL NEURORADIOLOGIST

ANESTESIOLOGIST

19emes JAFRIM – Alger, avril, 2019
MULTIDISCIPLINARY TEAM WORK

CLINICAL

PRE-HOSPITAL

IMAGE

CATH LAB

ICU

19emes JAFRIM – Alger, avril, 2019
MULTIDISCIPLINARY TEAM WORK

CLINICAL

PRE-HOSPITAL

IMAGE

CATH LAB

ICU

INTENSIVE CARE DOCTOR

NURSES

NEUROLOGIST

NEUROSURGERY

19èmes JAFRIM – Alger, avril, 2019
Man, 50 y, NIHSS 19, 5 hours evolution
2013

2015

2017

2018

SYNTHESIS
IMS III
MR RESCUE

MR CLEAN
ESPAPE
SWIFT
EXTEND
REVASCAT

DAWN STUDY
DEFUSE III
TENSION TRIAL

ASTER TRIAL
AURORA TRIAL

SITS - MOST
WHERE ARE WE KNOW?
STROKE WITH LARGE VESSEL OCCLUSION
Proximal LVOs (large vessel occlusion) respond poorly to standard treatment, IV t-PA.
IMAGING

TRIALS

TOOLS

2015

CHANGE OF PARADIGM IN THE TREATMENT OF ISQUEMIC STROKE
# Clinical Trials Mecanical Thrombectomy

<table>
<thead>
<tr>
<th>STUDY</th>
<th>WINDOW TIME</th>
<th>THROMBECTOMY SITE</th>
<th>Image</th>
<th>Patient selection</th>
<th>Method</th>
<th>TICI 2B/3 %</th>
<th>mRs 0-2 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR CLEAN</td>
<td>6 h</td>
<td>ICA, M1, M2, A1, A2</td>
<td>MR/CTA</td>
<td>17 vs 18 NIHSS ≥ 2</td>
<td>Stentretriever em 97%</td>
<td>59</td>
<td>32,6 vs 19,1</td>
</tr>
<tr>
<td>ESCAPE</td>
<td>12 h</td>
<td>ICA, M1</td>
<td>MR/CTA</td>
<td>16 vs 17</td>
<td>solitaire 86,1%</td>
<td>72,4</td>
<td>53 vs 29,3</td>
</tr>
<tr>
<td>EXTEND-IA</td>
<td>4,5 h</td>
<td>ICA, M1, M2</td>
<td>CTP/A</td>
<td>17 vs 13</td>
<td>Solitaire 100%</td>
<td>86</td>
<td>71,4 vs 40</td>
</tr>
<tr>
<td>SWIFT</td>
<td>6 h</td>
<td>ICA, M1</td>
<td>MR/CTA</td>
<td>17 vs 17</td>
<td>Solitaire 88,8%</td>
<td>88</td>
<td>60,2 vs 35,3</td>
</tr>
<tr>
<td>REVASCAT</td>
<td>8 h</td>
<td>ICA, M1</td>
<td>CTA/MRI</td>
<td>17 vs 17</td>
<td>Solitaire 95,1%</td>
<td>65,7</td>
<td>43,7 vs 28,2</td>
</tr>
</tbody>
</table>

19èmes JAFRIM – Alger, avril, 2019
The recent trials led to

• **Fast reperfusion** is the key to a good outcome

• **Endovascular treatment** by using stent retrievers is safe and effective

• **Imaging** plays a critical role in patient selection for endovascular therapy

• **Teamwork** is the key to success
THROMBECTOMY

- new guidelines ESO / ESMINT / ESNR: ESO-Karolinska
- New “AHA / ASA GUIDELINES”

Consensus statement on mechanical thrombectomy in acute ischemic stroke – ESO-Karolinska Stroke Update February 2015

RECOMMENDATIONS

• Patients eligible for iv t-PA **should receive iv t-PA** even if endovascular treatments are being considered (Class I; Level of Evidence A)

• Patients should receive **endovascular therapy with a stent retriever** if the criteria: (class I; level of evidence A)

  • Prestroke mRS score = 0 to 1
  • Acute stroke receiving iv t-PA within 4,5 h
  • Occlusion of the ICA or proximal M1
  • Age ≥ 18 y
  • NIHSS score of ≥ 6
  • ASPECTS ≥ 6
  • Treatment can be initiated (groin puncture) within 6 h
Aspects Scale

Alberta Stroke Program Early CT Score, 2000

Quantification of ischemic involvement

Degree of Core estimation

Only for MCA stroke

10 points
- 6 for cortical (M1-M6)
- 1 insula ribbon
- 1 lenticular
- 1 internal capsule
- 1 head caudad

Within the first 3 hours The baseline ASPECTS correlated inversely with the NIHSS and functional outcome

RG, vol 26, 2006
Mecanical Thrombectomy Era

What have changed with MT?

- Mechanical recanalization of the artery
- Earlier recanalization
- Smaller area of infarct

**HERMES** (Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke Trials)

MR CLEAN
ESCAPE
SWIFT PRIME
REVASCAR
EXTEND-IA

19emes JAFRIM – Alger, avril, 2019
Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials


- Endovascular thrombectomy reduces disability for patients with large vessel anterior circulation ischemic stroke with benefits seen across a wide range of age and initial stroke severity and apply to patients irrespective of eligibility for intravenous alteplase

- The rates of Symptomatic Intracranial Hemorrhage and radiological intracerebral hematoma (PH2) are no higher with MT than with best medical treatment alone and mortality risk did not differ significantly
Time is brain but is also Physiology
Hyperacute stroke is a dynamic process

Imaging is a snapshot in time of a dynamic process

M.Goyal, AJNR 33, 2012
Baseline DWI Volume (ml)

Time between Symptom Onset and Baseline MRI (hrs)

FAST PROGRESSORS

Baseline DWI Volume (ml)

Time between Symptom Onset and Baseline MRI (hrs)

SLOW PROGRESSORS

MORE RECENT GUIDELINES - 2018

STROKE WITH LARGE VESSEL OCCLUSION
Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging


24 January
THROMBECTOMY – 2018-2019

- new guidelines ESO / ESMINT / ESNR: ESO-Karolinska
- New “AHA / ASA GUIDELINES”

European Stroke Organisation (ESO) – European Society for Minimally Invasive Neurological Therapy (ESMINT)
Guidelines on Mechanical Thrombectomy in Acute Ischaemic Stroke
Endorsed by Stroke Alliance for Europe (SAFE)

AHA/ASA Guideline

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

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons
Endorsed by the Society for Academic Emergency Medicine and Neurocritical Care Society
The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists.

19emes JAFRIM – Alger, avril, 2019
RECOMMENDATIONS

- Patients eligible for iv t-PA **should receive iv t-PA** even if endovascular treatments are being considered
- Patients should receive **endovascular therapy with a stent retriever** if the criteria

- Prestroke mRS score = 0 to 1
- Acute stroke receiving iv t-PA within 4.5 h
- Occlusion of the ICA or proximal M1
- Age ≥ 18 y
- NIHSS score of ≥ 6
- ASPECTS ≥ 6

- Treatment can be initiated (groin puncture) after 6h

19èmes JAFRIM – Alger, avril, 2019
Benefits are uncertain

• Occlusion of M2 or M3 or ACA, VA, BA or PCA within 6 h, may be reasonable (Class IIb; level of evidence C)

• Prestroke mRS >1; ASPECTS<6 or NIHSS<6 within 6h and occlusion of ICA or M1 may be reasonable (Class IIb; level of evidence B-R)

• EVT for tandem occlusion. There is no conclusions for the optimal treatment approach for patients with tandem occlusions (no revascularization vs angioplasty vs stent)

• Reasonable to select na anesthetic technique on the basis of individualized assesment of risk and technical performance
# AHA/ASA Guideline

## 3.7. Mechanical Thrombectomy (Continued)

<table>
<thead>
<tr>
<th>7. In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is <strong>recommended.</strong></th>
<th>COR</th>
<th>LOE</th>
<th>New, Revised, or Unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>A</td>
<td>New recommendation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. In selected patients with AIS within 16 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is <strong>reasonable.</strong></th>
<th>COR</th>
<th>LOE</th>
<th>New, Revised, or Unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IIa</td>
<td>B-R</td>
<td>New recommendation.</td>
</tr>
</tbody>
</table>
ESO/ESMINT new recommendations

• LVO, anterior circulation, 6 to 24 hours from time last known well fullfilling the selection criteria of DEFUSE-3 (CTP or MRP) or DAWN (CTP or DW-MRI) recommended Thrombectomy
Thrombectomy beyond 6 hours
MR Diffusion/Perfusion or CT Perfusion

DAMN Trial Criteria

NIHSS/Volume of infarct

< 80 y

NIHSS ≥ 10-19
Volume < 30 ml

NIHSS > 20
Volume 31-51 ml

> 80 y

NIHSS ≥ 10
Volume < 20 ml

DEFUSE 3 Trial Criteria

Volume of ischemia in perfusion/volume infarct

≤ 90 y

Volume infarct < 70 ml
Mismatch ≥ 1.8
Penumbra ≥ 15 ml (Tmax>6s)

Previous criteria: mRs ≤ 1; ≥ 18 y; NIHSS > 6; ASPECTS > 6; occlusion of ICA or M1
Guidelines..

- Same criteria till 7h
- After 7 h and less than 12h - collaterals
- After 12-24 h - use perfusion
The near future...

MR CLEAN NO IV

To determine whether direct mechanical thrombectomy (MT) is more effective than MT preceded by IV alteplase in patients with acute ischemic stroke caused by a proximal large vessel occlusion.

https://mrclean-nol.nl

MR CLEAN LATE
Multicenter Randomized Clinical trial for Endovascular Treatment of Acute Ischemic Stroke in the Netherlands for Late Arrivals

Inclusion criteria
- Age ≥18; NIHSS≥2
- Infarct on NCCT <1/3 MCA territory
- Start of IAT possible between 6-24 hours or last seen well <24 hours
- Presence of poor to good collateral flow (CTA)
  - Maximum of 100 patients with poor collateral flow
19èmes JAFRIM – Alger, avril, 2019

**LASTE (LArge Stroke Therapy Evaluation)**

Evaluation of Acute Mechanical Revascularisation in large stroke (ASPECT 0-5) with Large Vessel Occlusion. A Multicenter Randomized Trial

**MOSTE (MINOR Stroke Therapy Evaluation)**

Efficacy of Thrombectomy compared to best medical treatment in patients with Minor Stroke (NIHSS ≤ 5) and intracranial Occlusion. A Multicenter Randomized Trial

The TWO extremes ...

**ASPECT 0-5**

NIHSS 0-5

At least 25-30% of patients with LVO within 6 hours not included in Level 1A of evidence.

Courtesy of Prof V. Costalat, Montpellier, Fr.
Man, 79y, wake up stroke. Last seen well at 22h
Drip and ship
1rst hospital at 10h NIHSS 25 ASPECTS 10?? CTA – carotid occlusion
Comprehensive stroke center at 15h
Recanalization 17,30h
Woman, 79y
Onset at 11,15h
Drip and ship
1st hospital at 12,15h NIHSS 17 ASPECT 10 CT Angio – ‘T’ carotid
Comprehensive stroke center at 15,54h
Recanalization 18h

One aspiration