Utilisation du CT, CTA et CTP dans l’évaluation de l’AVC aigu avec l’emphase sur la sélection des candidats appropriés pour la thrombectomie.

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Disclosure

- I have no conflict of interest to disclose for the content of this lecture.
Learning Objectives

• 1) Review the CT and CTA findings in acute stroke;
• 2) Review the imaging inclusion criteria for Thrombectomy candidates;
• 3) Optimize the use of CT and mCTA to provide rapid decision for Thrombectomy;
• 4) Discuss management of exemplary cases.
1.9 million of neurons 13.8 billion synapses, and 12 km of axonal fibers are lost every minute following an ischemic stroke in a large supra-tentorial artery territory.
Cincinnati Stroke Scale

FACE
ARM
SPEECH
TIME

If the 3 findings are present 85% probability of a stroke.

http://clinicalphysician.net/ebm/pre-hospital-diagnosis-and-treatment-of-stroke
## Summary Results of Trials

<table>
<thead>
<tr>
<th></th>
<th>MR CLEAN</th>
<th>ESCAPE</th>
<th>EXTEND-IA</th>
<th>SWIFT-PRIME</th>
<th>REVASCAT</th>
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</thead>
<tbody>
<tr>
<td>Pts</td>
<td>500</td>
<td>316</td>
<td>70</td>
<td>196</td>
<td>206</td>
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<tr>
<td>Circulation</td>
<td>Anterior</td>
<td>Anterior</td>
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<tr>
<td>Imaging</td>
<td>CT-CTA</td>
<td>CT-CTA dynamic</td>
<td>CT-CTA-CTP</td>
<td>CT-CTA-CTP</td>
<td>CT-CTA</td>
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<tr>
<td>Time Window</td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Pt’s Age</td>
<td>65</td>
<td>70</td>
<td>69</td>
<td>66</td>
<td>66</td>
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<tr>
<td>RANDOMIZATION</td>
<td>ENDO</td>
<td>CTRL</td>
<td>ENDO</td>
<td>CTRL</td>
<td>ENDO</td>
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<td>NIHSS</td>
<td>17</td>
<td>18</td>
<td>16</td>
<td>17</td>
<td>17</td>
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<tr>
<td>IV-TPA (%)</td>
<td>87.1</td>
<td>90.6</td>
<td>72.7</td>
<td>78.7</td>
<td>100%</td>
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<tr>
<td>Perfusion Delay (h)</td>
<td>5.5</td>
<td>4.0</td>
<td>4.1</td>
<td>4.2</td>
<td>5.9</td>
</tr>
<tr>
<td>mRS 0-2 at 90days (%)</td>
<td>32.6</td>
<td>19.1</td>
<td>53</td>
<td>29.3</td>
<td>71.4</td>
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<tr>
<td>NNT</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>6</td>
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<tr>
<td>Symptomatic ICH</td>
<td>7.7</td>
<td>6.4</td>
<td>3.6</td>
<td>2.7</td>
<td>0</td>
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<tr>
<td>Death at 90 days(%)</td>
<td>18.9</td>
<td>18.4</td>
<td>10.4</td>
<td>19</td>
<td>9</td>
</tr>
</tbody>
</table>
Volumetric Multiphase CTA
VmCTA Goal of imaging: (72 secs acquisition time)

- **P- Parenchyma**: ASPECT SCORE;
- **P- Pipes**: Site of Occlusion;
- **C- Collaterals**: Viability of Collaterals.
P- Parenchyma

Quantification of the Ischemic Area on CT Plain

- 10 points topographic imaging score
- MCA territory divided into 10 regions each of which is given 1 point.
- For each area involved 1 point is deducted from that score.

Role of TTP as predictor of Final Stroke territory

- Pilot study including the CTP of a total of 11 patients presenting with anterior circulation stroke referred to our Institution prior to the Escape trial who did not undergo any IV or IA recanalization.

- These parameters were calculated:
  1) ASPECT score on initial CT head;
  2) Volumetric measurement of the TTP increased area on the CTP obtained on admission;
  3) Volumetric measurement of the stroke calculated on the CT follow up.

- The result of the Pearson Correlation test is $r = 0.725$, the correlation is significant $p$ value = 0.012.

- If a large volume of elongated TTP is present on the CTP in the hyper-acute phase of the stroke, we can expect a large volume of ischemia in the follow up CT.

![Fig.3A-C: 66yo F, Left hemiparesis. Initial CT ASPECT of 7 (A). Large volume of increased TTP (B). Follow up CT scan at 4 weeks (C).](image-url)
From May to Nov 2016 a total of 96 patients arrived at our institution as code stroke. Of these, 18 patients (18.5%) presented as a Minor stroke (NIHSS ≤6). In total, 12 patients (12.5%) met the inclusion criteria.

- All 12 patients had whole brain CT perfusion abnormalities and all presented abnormal time to peak. Four (33.3%) patients had concomitant abnormal cerebral blood flow and cerebral blood volume.
- 10 (83.3%) patients had cortical ischemic lesions and 2 (16.6%) had Basal Ganglia ischemic lesions.
- The results suggest that the time to peak map is a very useful technique in the detection of small ischemic lesions in patients with minor strokes.
46 year-old male patient with minor right MCA stroke symptoms (NIHSS 4). The MRI was performed as follow-up 2 days after the acute symptoms onset and CT acquisition.

Exemplary Case NUMBER 2

CBV TTP CBF CT ADC T2 SWI DWI 3DCTA
Collaterals: presence of cortico-cortical anastomosis towards the infarcted area

Case of sept 2013: 49 y.o. M left hemiplegia
C - Collaterals

Rt MCA Occlusion early arterial

Late arterial: exactly 6 secs later

Late phase exactly 12 secs since early arterial
19 year-old female patient with right arm weakness
Mechanical Thrombectomy

- Insertion of a device in the occluded artery that enables to fragment then aspirate or remove the clot.
- Devices:
  - Merci
  - Penumbra
  - Solitaire
  - Trevo
Conclusions: Rapid Imaging Selection VmCTA

- **P** – Parenchyma: ASPECT 6 or more;
- **P** – Pipes: ICA, M1, may consider M2;
- **C** – Collaterals: present.
Thank You!

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