A Nationwide Prospective Registry of Standard Medical Treatment Plus Endovascular Treatment versus Standard Medical Treatment Alone for Ischemic Stroke Patient With Acute Basilar Artery Occlusion (basilar study)
Disclosures:

Stryker Neurovascular
- DAWN Trial PI (unpaid)
- Trevo Registry Steering Committee
- Trevo-2 Trial PI

Medtronic
- SWIFT & SWIFT-PRIME Trial Steering Committee (unpaid)
- STAR Trial Core Lab

Penumbra (unpaid)
- 3-D Separator Trial Executive Committee

Neuravi /Cerenovus
- ARISE-II Trial Steering Committee (unpaid)
- ENDOLOW Trial and EXCELLENT Registry PI

Phenox, Anaconda, Corindus Robotics, Biogen, Genentech, Prolong Pharmaceuticals

Allm Inc - JOIN (unpaid)
- Free Consultant and Beta-Site
- FAST-ED App (Freeware)
- RESILIENT Trial Collaboration

IschemaView
- CRISP, SWIFT-PRIME, & DAWN Trials (unpaid)
- Speaker (paid)
- RESILIENT Trial Collaboration

Brainomix (unpaid)
- Research Software Usage
- RESILIENT Trial Collaboration

Viz-AI (Stock Options)
- Physician Advisory Board

Raul Nogueira, MD
Presenter Disclosure Information

Raul G. Nogueira

A Nationwide Prospective Registry of Standard Medical Treatment Plus Endovascular Treatment versus Standard Medical Treatment Alone for Ischemic Stroke Patient With Acute Basilar Artery Occlusion

FINANCIAL DISCLOSURE:
[Insert description of relationship with commercial supporter and name of commercial supporter.]

UNLABELED/UNAPPROVED USES DISCLOSURE:
[Describe intended unlabeled/unapproved use in presentation.]
1. Background

- Acute Basilar Artery Occlusion (BAO)
  - accounts for 5% of all large vessel occlusive strokes
  - Severe disability and mortality rates reach 68% - 78%

Acute BAO has become a research hotspot in the field of ischemic stroke.
1. Background

Efficacy and safety of endovascular treatment (EVT) for acute anterior circulation large vessel occlusion have been proved.
1. Background

- Lack of prospective data on EVT for acute BAO patients
- The efficacy of medical treatment is unfavorable
- RCTs: BEST, BASICS, BAOCHE
- Whether EVT is beneficial for acute BAO is unclear

**BAO CHE**

**BASICS trial**
Netherlands, Start-up in 2013
750 cases needed
300 cases randomized
Closed in Dec. 2019

**BAO CHE trial**
Beijing, CHN, Start-up in 2016
318 cases needed
about 110 cases randomized
Still ongoing

**BEST trial**
Nanjing, CHN, Start-up in 2015
344 cases needed
131 cases randomized
Ended prematurely in Sep. 2017

http://basicstrial.com
1. Background

THE LANCET Neurology

BASICS registry
multicenter
prospective

Study period:
2002.11~2007.10

Treatment and outcomes of acute basilar artery occlusion in the Basilar Artery International Cooperation Study (BASICS): a prospective registry study

<table>
<thead>
<tr>
<th>BASICS</th>
<th>EVT group</th>
<th>Medical treatment group</th>
<th>$\chi^2$ value</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRS 0 – 3</td>
<td>74/288 (25.7%)</td>
<td>116/304 (38.2%)</td>
<td>3.247</td>
<td>0.0012</td>
</tr>
</tbody>
</table>
1. Background

Safety and Outcome of Intra-Arterial Treatment for Basilar Artery Occlusion

Study period: 2006.01~2015.12

Single-center, single-arm, retrospective study

All patients were treated with endovascular treatment

Successful recanalization rate: 89%. mRS score 0-3: 50%
1. Background

Endovascular Thrombectomy for Acute Basilar Artery Occlusion: A Multicenter Retrospective Observational Study

A three-center, single-arm, retrospective study (n = 212)

All patients were treated with endovascular treatment

Successful recanalization rate: 91.5%.  mRS score 0-3: 52.3%

Study period: 2011.01~2017.08
Meta analysis: Endovascular treatment reduces mortality by 2 times and reduces risk of fatal disability by 1.5 times.
Patients with acute BAO within 24 hours of symptom onset

EVT+SMT (EVT group) Versus SMT alone (Control group)

BAO = basilar artery occlusion; EVT = endovascular treatment; SMT = standard medical medical treatment
3. Method

3.1 Study design——Multicenter, prospective, registry with blinded endpoints assessment

3.2 Patient selection

✓ Inclusion criteria:
   1) age ≥18 years;
   2) presentation within 24 hours of estimated time of BAO;
   3) initiation intravenous thrombolysis within 6 hours of estimated time of BAO
   4) EVT had to be initiated within 24 hours of estimated time of BAO
3.2 Patient selection

- **Exclusion criteria:**
  1) Pre-existing disability with a mRS > 2
  2) Cerebral hemorrhage
  3) lack of follow-up information
  4) currently pregnancy or lactation
  5) serious, advanced or terminal illness
  6) incomplete baseline imaging and time metric data points

3.3 Treatment

- SMT alone group (control group)
- SMT plus EVT group (EVT group)
3.4 Endpoints

- **Primary**: mRS score at 90 days
- **Secondary**: mRS score 0~3 vs. 4~6
  - mRS score 0~2 vs. 3~6
  - mRS score 0~1 vs. 2~6
- NIHSS score change from baseline at 24 hours
- NIHSS score change from baseline at 5~7 days
- mTICI score of 2b or 3 at final angiogram
- Mortality at 90 days
- Intracranial hemorrhage
- etc.
3. Method

Study flowchart

Acute symptomatic BAO

CTA/MRA/DSA confirmed BA occlusion

Informed consent

Received treatment

SMT alone
SMT plus EVT

mRS at 90 days

BAO = basilar artery occlusion; BA = basilar artery; EVT = endovascular treatment; SMT = standard medical treatment
4. Results

4.1 Distribution of the study centers on the map of China

- 15 provinces cover
  - Population: 65.91%
  - Area: 27.75%

Good representation

- 47 comprehensive stroke centers
4. Results

- 4.2 CONSORT flow diagram of the BASILAR study

- 1254 patients were assessed
- 829 recruited into final analysis

The largest prospective multicenter registry

1254 patients with BAO
- 22 nonconsecutive patients
- 121 patients with chronic BAO
- 71 patients accompanied by anterior circulation large-vessel occlusion

1040 patients with acute BAO
- 13 patients with OTI > 24h
- 92 without records of time points
- 95 with poor quality of images

188 patients treated with usual SMT alone
- 6 patients lost to 90 days follow-up

652 patients treated with SMT plus EVT
- 5 patients lost to 90 days follow-up

182 evaluable patients
647 evaluable patients

BAO = basilar artery occlusion; EVT = endovascular treatment; OTI = onset to imaging diagnosis time; SMT = standard medical treatment
# 4. Results

## 4.3 Primary and Secondary Efficacy Outcomes and Safety outcomes

<table>
<thead>
<tr>
<th>Effect variable</th>
<th>Control (n=182)</th>
<th>EVT (n=647)</th>
<th>Adjusted Value (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRS at 90 days</td>
<td>6(5 to 6)</td>
<td>5(2 to 6)</td>
<td>cOR 3.07(2.07 to 4.54)</td>
</tr>
<tr>
<td>mRS 0~3 at 90 days, no./total no. (%)</td>
<td>17/182(9.3)</td>
<td>207/647(32.0)</td>
<td>OR 4.70(2.53 to 8.75)</td>
</tr>
<tr>
<td>mRS 0~2 at 90 days, no./total no. (%)</td>
<td>13/182(7.1)</td>
<td>177/647(27.4)</td>
<td>OR 4.90(2.43 to 9.87)</td>
</tr>
<tr>
<td>mRS 0~1 at 90 days, no./total no. (%)</td>
<td>10/182(5.5)</td>
<td>134/647(20.7)</td>
<td>OR 4.54(2.16 to 9.56)</td>
</tr>
<tr>
<td>NIHSS score change from baseline at 24 hours, median (IQR)</td>
<td>0(0 to 6)</td>
<td>0(-4 to 3)</td>
<td>Beta -2.60(-4.15 to -1.05)</td>
</tr>
<tr>
<td>NIHSS score change from baseline at 5~7 days, median (IQR)</td>
<td>1(0 to 9.5)</td>
<td>-2(-12 to 3)</td>
<td>Beta -5.45(-7.41 to -3.50)</td>
</tr>
<tr>
<td>mTICI score of 2b or 3 at final angiogram, no./total no. (%)</td>
<td>11/182(6.0)</td>
<td>522/647(80.7)</td>
<td>NA</td>
</tr>
<tr>
<td>Mortality at 90 days, no./total no. (%)</td>
<td>130/182(71.4)</td>
<td>299/647(46.2)</td>
<td>OR 2.93(1.95 to 4.40)</td>
</tr>
</tbody>
</table>

cOR = common odds ratio; mTICI = modified treatment in cerebral infarction; NA = not applicable, OR = odds ratio
4. Results

4.4 Distribution of modified Rankin scale score at 90 days

A. Overall

B. Propensity score matching dataset
### 4. Results

#### 4.5 Subgroup analyses

The treatment effect remained consistent in almost all predefined subgroups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of patients</th>
<th>Common Odds Ratio (95% CI)</th>
<th>P Value for Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>829</td>
<td>3.1 (2.1 to 4.6)</td>
<td>0.643</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;75 years</td>
<td>401</td>
<td>3.1 (1.9 to 4.8)</td>
<td></td>
</tr>
<tr>
<td>&gt;=75 years</td>
<td>428</td>
<td>3.7 (1.6 to 8.6)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>217</td>
<td>3.7 (1.7 to 8.2)</td>
<td>0.518</td>
</tr>
<tr>
<td>Male</td>
<td>612</td>
<td>2.9 (1.9 to 4.7)</td>
<td></td>
</tr>
<tr>
<td>Baseline pc-ASPECTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–7</td>
<td>355</td>
<td>2.8 (1.6 to 5)</td>
<td>0.274</td>
</tr>
<tr>
<td>8–10</td>
<td>468</td>
<td>4.2 (2.5 to 7.2)</td>
<td></td>
</tr>
<tr>
<td>Baseline NIHSS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–26</td>
<td>412</td>
<td>2.2 (1.3 to 3.6)</td>
<td>0.516</td>
</tr>
<tr>
<td>&gt;26</td>
<td>417</td>
<td>3.3 (1.7 to 6.5)</td>
<td></td>
</tr>
<tr>
<td>Severity of stroke onset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild to moderate</td>
<td>185</td>
<td>3.1 (1.5 to 6.3)</td>
<td>0.688</td>
</tr>
<tr>
<td>Severe</td>
<td>644</td>
<td>2.4 (1.5 to 3.8)</td>
<td></td>
</tr>
<tr>
<td>Occlusion Site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BA distal</td>
<td>267</td>
<td>2.5 (1.2 to 5.3)</td>
<td>0.133</td>
</tr>
<tr>
<td>BA middle</td>
<td>295</td>
<td>3.1 (1.7 to 5.2)</td>
<td></td>
</tr>
<tr>
<td>BA proximal</td>
<td>121</td>
<td>14.6 (3.1 to 69.4)</td>
<td></td>
</tr>
<tr>
<td>VA-V4</td>
<td>146</td>
<td>2.5 (0.8 to 7.7)</td>
<td></td>
</tr>
<tr>
<td>OTI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=360 min</td>
<td>629</td>
<td>2.9 (1.8 to 4.5)</td>
<td>0.926</td>
</tr>
<tr>
<td>&gt;360 min</td>
<td>200</td>
<td>4.1 (1.8 to 9.5)</td>
<td></td>
</tr>
<tr>
<td>IVT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>663</td>
<td>3.7 (2.3 to 6)</td>
<td>0.145</td>
</tr>
<tr>
<td>yes</td>
<td>166</td>
<td>2 (1 to 4.2)</td>
<td></td>
</tr>
</tbody>
</table>

IVT = intravenous thrombolysis; OTI = onset to imaging diagnosis time; VA-V4 = the 4th segment of vertebral artery
5.1 Why the favorable outcomes rate of SMT alone group is as low as 9.3%, which is much lower than that of BASICS registry

✓ The following reasons may be the explanations

• Baseline NIHSS
• Deficit at time of treatment (mild to moderate or severe)
• Onset to treatment time 0-3 hours proportion
• Stroke mechanism (TOAST classification)
• In the BASICS registry 41 patients treated with additional EVT after IVT were allocated in IVT group, not in EVT group
### 5.2 BASILAR Versus BASICS registry

<table>
<thead>
<tr>
<th>Item, no./total no. (%)</th>
<th>BASICS registry</th>
<th>BASILAR registry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SMT alone</td>
<td>SMT+EVT</td>
<td>P value</td>
</tr>
<tr>
<td>Baseline NIHSS &gt; 20</td>
<td>136/304 (44.7%)</td>
<td>174/288 (60.4%)</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Deficit at time of treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild to moderate</td>
<td>153/304 (50.3%)</td>
<td>92/288 (31.9%)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>151/304 (49.7%)</td>
<td>196/288 (68.1%)</td>
<td>0.0003</td>
</tr>
<tr>
<td>OTT 0-3 hours</td>
<td>112/304 (36.8%)</td>
<td>67/288 (23.3%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
</tr>
<tr>
<td>Recanalization rate</td>
<td>NA</td>
<td>207/288 (71.9%)</td>
<td></td>
</tr>
<tr>
<td>mRS 0-3</td>
<td>116/304 (38.2%)</td>
<td>74/288 (25.7%)</td>
<td>0.0012</td>
</tr>
<tr>
<td>Mortality at 90 days</td>
<td>97/304 (31.9%)</td>
<td>117/288 (40.6%)</td>
<td>0.0273</td>
</tr>
</tbody>
</table>

EVT = endovascular treatment; SMT = standard medical treatment; OTT = onset to treatment time
### 5. Discussion

#### 5.2 SMT alone VS. SMT+EVT group between BASILAR and BASICS

<table>
<thead>
<tr>
<th>Item, no./total no. (%)</th>
<th>SMT alone group</th>
<th>SMT + EVT group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASICS</td>
<td>BASILAR</td>
<td></td>
</tr>
<tr>
<td><strong>Baseline NIHSS &gt; 20</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>136/304 (44.7%)</td>
<td>111/182 (61.0%)</td>
<td>0.0005</td>
</tr>
<tr>
<td><strong>Deficit at time of treatment</strong></td>
<td></td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td><strong>Mild to moderate</strong></td>
<td>153/304 (50.3%)</td>
<td>45/182 (24.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td>151/304 (49.7%)</td>
<td>137/182 (75.3%)</td>
<td></td>
</tr>
<tr>
<td><strong>OTT 0-3 hours</strong></td>
<td>112/304 (36.8%)</td>
<td>71/182 (39.0%)</td>
<td>0.633</td>
</tr>
<tr>
<td><strong>Recanalization rate</strong></td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>mRS 0-3</strong></td>
<td>116/304 (38.2%)</td>
<td>17/182 (9.3%)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td><strong>Mortality at 90 days</strong></td>
<td>97/304 (31.9%)</td>
<td>130/182 (71.4%)</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

EVT = endovascular treatment; SMT = standard medical treatment; OTT = onset to treatment time
5.3 Limitations

- A non-randomized study
  - Propensity score matching
  - Multivariable analyses
- Number of cases ($N_{SMT+EVT} >>> N_{SMT \text{ alone}}$): may result in imbalance among participating centers in regards to the efficacy of EVT

5.4 Conclusion

- EVT administered within 24 hours of estimated occlusion time is associated with better functional outcomes and reduced mortality
This is a revised manuscript.

RE: Endovascular Treatment for Acute Basilar Artery Occlusion: a Nationwide Prospective Registry

Dear Dr Yang:

We have completed our review of your manuscript and are pleased to accept it for publication in JAMA Neurology. Your manuscript is accepted with the understanding that its contents, all or in part, have not been published elsewhere and will not be published elsewhere in print or electronic format without the consent of the editor.
Clinical Research Team, Xinqiao Hospital, Army Medical University, China
Contact us

- **Contacts**: Wenjie Zi, Tel +8618523033816, email ziwenjie1981@126.com, 
  Zhongming Qiu, Tel +8613236599269, email qiuzhongmingdoctor@163.com, 
  Skype qiuzhongmingdoctor, iMessage qiuzhongmingdoctor@163.com

- **Address**: Clinical Research Center, 10th Floor, Third Inpatient Department, Xinqiao Hospital, No. 183 Xinqiao main Street, Shapingba District, Chongqing, China

- **WeChat Official Account**: XinQiao Stroke Intervention Accademy

Welcome to join our multi-center research team!

Welcome to Xinqiao Hospital for cooperation and exchange!
Welcome to Chongqing, China!
Thanks very much for your attention!